REPUBLIC OF IRAQ

MINISTRY OF CONSTRUCTION, HOUSING, MUNICIPALITIES & PUBLIC WORKS

ROADS AND BRIDGES DIRECTORATE

Emergency Operation Development Projects (EODP)
(P155732)

SITE SPECIFIC

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
(LIMITED ESIA)

For the

REPAIR FOR OMAR BIN ABDUL AZIZ BRIDGE IN AL ANBAR GOVERNORATE IRAQ

February 24, 2017
<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>Description or Reason for Change</th>
<th>Discipline Review</th>
<th>Director Review</th>
<th>Approval</th>
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<td>00</td>
<td>17/12/2016</td>
<td>Initial release</td>
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<tr>
<td>01</td>
<td>10/02/2017</td>
<td>First Revision</td>
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**Prepared by:** Tatyana Gorskaya

**Contributor:** Linda Khalil - Slim
EXECUTIVE SUMMARY

Introduction

According to the Environmental and Social Management Framework (ESMF) which was prepared for the Emergency Operation for Development Project (EODP) and disclosed locally in Iraq and on the World Bank’s InfoShop, a limited site specific Environmental and Social Impact Assessment (ESIA) should be prepared, cleared, publically consulted and disclosed prior to the commencement of any construction activity for bridges crossing permanent water courses.

This limited Environmental Impact Assessment (ESIA) is prepared in accordance to the Terms of Reference for Repair of Omar Bin Abdul Aziz Bridge in Al Anbar Governorate within the framework of EODP (P155732) (IBRD Loan No.: 8520) and in accordance with the requirements of the World Bank (WB) environmental and social safeguards and the Iraqi regulations. As per WB safeguards, the project is categorized as Category B.

Project Description

The Ramadi Barrage is located in the city of Ramadi in Anbar Governorate about 100km west of Baghdad. It regulates the Euphrates flow regime by discharging excess flood water into Lake Habbaniyeh through the Warrar Regulator. Oman Bin Abdul Aziz Bridge is located on the Warrar Irrigation channel that diverts water from the Warrar regulator as shown in the following figure.
Description of the Bridge

Omar Bin Abdul Aziz Bridge was completed in 2010. It has total length of 216 m (9 spans 24m long each). It has a width of 12m (9m two –way carriageway and 1.50 m side walk). The super structure consists of concrete girders 24 m long and 1.20 m depth and reinforced concrete deck.

Current Condition

In November 2015, the bridge was subject to bomb attack and was put out of service. At present, the bridge suffers damages in its first, second, fourth, fifth, and ninth spans as shown in the engineering drawings presented in Annex 4. Additionally, the bridge cross beam, concrete pads, girders, and expansion joint are also damaged. The piers and the girders are completely destroyed and the debris is in the water channel as can be seen in the following figure.

![Figure E2: Current condition of Omar Bin Abdul Aziz Bridge](image)

Currently and during rehabilitation works, Al-Houz Bridge located around 2.3 km south of Omar Bin Abdul Aziz Bridge and parallel to it can be used as alternative.

Project Activities

Reconstruction works for Omar bin Abdul Aziz Bridge include:
- Removal of debris and reparation of the first, second, fourth, fifth, and ninth damaged spans (1500 m² deck, 40 damaged girders, 80 failure rubber pads, asphalt, etc.,)
- Treatment of cracking of damaged piers and concrete pads and installation of the new rubber pads (80 rubber),
- Installation of pre–cast pre-stressed girders (40 girders),
- Surfacing of the deck slab (0.20m depth),
- Lighting, setting the expansion joints, and hand rail.

The area has received clearance from the Iraqi Armed Forces for the absence of UXO/REW. However, in case of accidental discovery, the personnel should be immediately evacuated and armed forces contacted. The works could be resumed only after removal of the munitions.

The construction camp is envisioned to be located within the ROW on governmental property with the area of the construction camp not to exceed 300 m². The construction camp is not envisioned to have any residential facilities, with the exception of the facilities for the guards. Parking and machinery yards are to be located within the ROW. It comprises the operational center, with prefabricated offices and parking areas for administration and technical staff. This will also include areas for materials testing and storage, and equipment cleaning and maintenance. The need for residential accommodation is likely to be relatively minor with only accommodation for the night guards. The construction camp should have independent sources of water and electricity, and septic tanks for the domestic effluent disposal.

The total number of personnel, including technical and administrative staff, skilled and unskilled labor is approximately 57 persons. The personnel employed on this project are envisioned to be mostly local and national.

The total project duration is 10 months. The breakdown of project activities is presented in the Table below:

**Table E1: Duration of Project Activities**

<table>
<thead>
<tr>
<th>#</th>
<th>Activity</th>
<th>Duration (man days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cleaning post-combat debris</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>Piles and columns construction</td>
<td>145</td>
</tr>
<tr>
<td>3</td>
<td>Girders installation</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>Cleaning road cracks</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>Structural repairs of the approaches</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>Paving</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Installation of guardrails and lighting</td>
<td>48</td>
</tr>
<tr>
<td>8</td>
<td>Installation of communication lines</td>
<td>42</td>
</tr>
<tr>
<td>#</td>
<td>Activity</td>
<td>Duration (man days)</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>9</td>
<td>Installation of traffic and warning signage</td>
<td>24</td>
</tr>
</tbody>
</table>

Baseline Conditions

Land Use

The land use around the bridge is mainly residential however, the nearest residential units are approximately at 200 m distance from both sides of the bridge. The area immediately adjacent to the bridge is vacant.

Regional Geology and Stratigraphy

Geologically the project is located in the Rutba geological zone. It is usually covered with the desert pavement, and in most areas is characterized as Hamada land surface. In the project location the geological formation is composed of thin-bedded, black bituminous limestone, dolomitic limestone and black papery shale with streaks of thin black chert.

Topography

The area is mostly a plane surface with the slopes gradient of 10-20 m per km with the elevation ranging from 100 to 200 m asl.

Seismic Activity

The project area is located in a minor seismic risk with a seismic activity of II on MM scale.

Water Resources

The Euphrates River\(^1\) is the largest river in the Middle East in terms of catchment area and length, and the second largest in terms of water volume. In Iraq, there are no major surface water contributions to the Euphrates except for rare runoff events generated by heavy storms. The Ramadi Barrage regulates the Euphrates flow regime by discharging excess flood water into Lake Habaniyeh through the Warrar Regulator. The project is located on the Warrar Irrigation Channel that diverts water from the Euphrates River.

As regards the groundwater, alluvial deposits in the marshlands in the lower Mesopotamian Plain in Iraq create a shallow aquifer. Recharge mainly occurs during winter and through infiltration of Euphrates and Tigris river water. Generally, water

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\(^1\) UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. Inventory of Shared Water Resources in Western Asia. Beirut.
flows into the groundwater during high flows when the water level of the rivers exceeds the groundwater table.

Small-scale irrigation from river water in Iraq may produce minor quantities of recharge from irrigation return flow in shallow aquifers. The discharge quantities are, however, insignificant in comparison to the total river flow.

Groundwater quality is mainly bicarbonate at the recharge areas, and becomes sulphatic at the discharge areas. The groundwater quality in the project area is slightly brackish with the salinity of 1000-3000 ppm. The groundwater depth in the project area ranges from 30-40 m below surface.

**Soils**

The area consists of potentially fertile soils characterized as heavy alluvial soils, with some organic content and a high proportion of clays.

**Climate**

The climate in the project area is "desert. In a year, the average rainfall is 115 mm. The driest month is June, with 0 mm of rain. The greatest amount of precipitation occurs in February, with an average of 23 mm. The average annual temperature is 22.4 °C in Ramadi. July is the warmest month of the year. The temperature in July averages 34.5 °C. The lowest average temperatures in the year occur in January, when it is around 9.3 °C.

**Air Quality**

At present, there is no information on ambient air quality in the project area as no measurements on air quality were performed previously. The roads in the area are in rather bad conditions and partially destroyed due to the war conditions in recent years. The main source of pollution is dust generated through the agricultural activities and emissions and dust from traffic movement in addition to the dust generated by windy conditions during dry periods.

**Noise**

Similarly, no information on noise levels is available for the project area. It is mainly associated with the vehicle movement and limited agricultural activities.

**Biological Environment**

The project is located in an ecosystem classified as Arabian Desert and East Saharo-Arabian Xeric Shrub-lands. The biodiversity of this region is the least known in the country.

The region has very limited floristic diversity. Vegetation is very diffuse but fairly evenly distributed, with some interruptions of near sterile dunes. The number of
mammalian, amphibian, reptilian and bird species are associated with this eco-system, however, their actual status in the project area is unknown.

The riparian vegetation predominantly comprises reeds and rushes that grow in the wetland areas and poplars, willows and tamarisk trees along river channels, banks, and beside irrigation ditches throughout the country. The freshwater habitats of the marshlands, which are part of the Tigris-Euphrates River Eco-region, are surrounded by desert xeric shrub lands and therefore are considered as important corridors for the wildlife.

The project area does not contain any globally important habitats or ecosystems. There are no Nature Reserves or other legally protected areas in the vicinity of the project or in a close proximity. The area is well away from any sites of special ecological value. It is also distanced from “leading lines” that identify migration routes, and distant from Important Bird Areas (IBAs).

No conservation practices are exercised in the project area apart from the control of hunting to the extent they are controlled and monitored throughout the country.

**Land Acquisition**

The project comprises the rehabilitation of the existing facilities with no additional structures to be constructed. Therefore, the project will not require any permanent or temporary land acquisition. Accordingly OP 4.12 will not be applied for this project.

**Socio-Economic Baseline Conditions**

The closest urban area to the project is Ramadi City. The population of Ramadi City is estimated at 375,000 inhabitants. Following are the main socio-economic indicators of Ramadi city.

- Gender Distribution: Male: 50%; Female: 50%
- Geo Distribution: Rural: 48%; Urban: 52%
- High proportions of households in Ramadi (19%) source their drinking water straight from a stream, river or lake;
- Illiteracy rate for aged 10 and over is almost 13.4%.
- The number of households living below the poverty line (2.2 US $ per day) is 32.9%.
- Access to sanitary network is 82.4%. No sanitary landfills in the area, only authorized dumping sites; municipal waste collection rate is 43.1%.
- Unemployment is 21%. In addition, half of all jobs in the governorate are unwaged, with two thirds of these in agriculture where the family members are employed.
- At present, according to the assessment of the Ministry of Health of Iraq only 10% of the existing healthcare facilities are operational. However,
about 82.3% of population has access to the medical and healthcare services.

- The main Amman–Baghdad road passes through the city. A railway line also runs through the southern outskirts of Ramadi, heading east to Baghdad and west to Haditha and the Syrian border.
- No sites of historical, cultural or religious importance are located in the project area.

**Legal aspects**

The applicable national legislation is as following:

- The Law for the Protection and Improvement of Environment No. 27, 2009;
- Protection of Wild Animals and Birds No. 21 of 1979;
- Regulating Exploitation and Protection of Aquatic Life No. 46 of 1976;
- Ministry of Water Resources Law No. 50 of 2008;
- Public Health Law No. 89 of 1981, amended by Resolution No. 54 of 2001;
- Regulation for the Provision of Water Resources, No. 2, 2001;
- Regulation for the Protection of Rivers No. 25, 1967;
- Law No. 27 of 1999 concerning the establishment of the General Authority for Water and Sewage;
- Instructions No. 2 of 2014 on Environmental Protection from Municipal Waste;
- Directive No. (67) of 1986 Regulating the Debris Collection Areas;
- Clean Air Act No. 1 of 2004;
- Noise Prevention Law No. 21 of 1966;
- Directive No. 4 of 1993 concerning occupational health, protection of workers against vibration;
- Instructions No. 3/1985 Concerning Occupational Safety;
- Law No. 6 of 1988 concerning the National Commission for Occupational Hygiene and Safety;
- Law No. 55 of 2002 for The Antiquities & Heritage of Iraq;
- Acquisition Law No. 12. of 1981

At present, there is no national Building Code in Iraq and the most commonly used are the ACI 318 codes.

The main WB safeguard policies triggered by this specific project is:

- OP/BP 4.01 Environmental Assessment

In addition, the Directive and Procedure on Access to Information, will apply to this ESIA.
In case of the difference between the National Legislation and WB Safeguard Guidelines, it has been agreed that the WB instructions will prevail over the national legislation provisions.

**Impacts Assessment**

The assessment of the potential adverse impacts on different environmental parameters during the construction phase was done using the Leopold Matrix: on the horizontal axis the actions, which cause environmental impact, and on the vertical axis, the existing environmental receptors which may be affected by those actions were added.

**During the construction/rehabilitation phase**

The majority of impacts are expected to be minor to moderate and on a short-term. They will affect mainly the following environmental receptors:

**Soil:** erosion due to the excavation activities and leaving open excavated areas during rain events or in the vicinity of existing watercourses; contamination due to the inadequate disposal of the effluent, solid waste, and construction debris, leakage of fuel and oil from the equipment. The impacts are expected to be moderate.

**Water resources:** Alteration of water flow and drainage in the areas of cofferdams and debris disposal in unauthorized areas blocking the natural drainage patterns; Contamination of surface water: spillages of chemicals and hydrocarbon products; disposal of the raw sewage from the construction camp directly into the water courses as it is a common practice in the area; disposal of generated solid waste from the construction camp and construction debris on ad hoc basis as is also the common practice in the area. The impact is considered as moderate.

There is also a potential contamination of groundwater through the leachate from improperly disposed construction debris and materials containing hazardous matter. Due to the underlying rock structure mostly comprising of lime stone, the impact is considered minor due to the potential filtration of effluent before reaching the groundwater levels.

**Biodiversity:** Vehicle movements beyond agreed working areas, and in some cases unplanned burning may affect existing flora. Fauna may suffer reduction in biodiversity through destruction of dens, burrows and nests, clearance of feeding grounds, increased traffic kills and possible illegal hunting by off-duty construction workers. The disruption of wildlife movement and foraging patterns are also anticipated during construction phase. However, the impact is considered minor.

**Air Quality:**

- Cleaning activities such as raising dust and emissions from the operating equipment and machinery;
• Increased dust levels due to excavation and transportation activities, especially transporting of the debris in open vehicles;
• Air pollutants typically associated with the combustion of fossil fuels, such as nitrogen oxides (NOx), sulfur dioxide (SO\textsubscript{2}), carbon monoxide (CO), and particulate matter (PM), volatile organic compounds (VOCs) and metals that may also be associated with emissions from vehicles, equipment, and materials.
• Increased sedimentation load raised by cleaning activities

The impact is considered moderate.

**Noise and Vibration:** The main sources of noise during construction phase are the noises produced by the operation of the construction machinery. The noise emission levels are expected to exceed the WB Standards for noise levels and the noise impact is considered as moderate and poses a significant health risk to the workers using the equipment and, since the project is located in close proximity to the residential areas can be a source of nuisance and disturbance to local population. The construction equipment inevitably produces vibration, and in some cases the vibration can be quite severe posing the health risk to the personnel handling the equipment. The impact of vibration is considered moderate.

**Land use:** The project comprises rehabilitation of the existing facility; therefore, the project does not require permanent land acquisition. The construction camp and the machinery yard are anticipated to be located within the ROW, and therefore, no temporary land acquisition is envisioned.

**Traffic:** The temporary impacts on traffic during the period of construction on the intersection leading to the bridge where the machinery and construction vehicles will be parked on the exiting main road.

**Physical, Cultural Resources:** At present, no cultural, religious or historic heritage sites were identified in the immediate vicinity of the project. However, during construction phase if any is found, then the procedure for dealing with such cases as specified in the Annex 1 will be applied. The impact is minor.

**Public safety:** The risk to public safety in both physical and the types of risk posed is considered moderate. Areas of high danger to public include:

• Where heavy equipment is moving in and out of contractor’s yards;
• The sites of loading of the debris;
• At storage areas for construction materials, fuel and surplus spoil.
• Additional risks to public and to employees present the not discovered previously UXO/ERW

**Worker’s Safety:** Inhaling of hazardous substances and extended exposure to dust; Health risk due to the extended exposure to noise and vibration; Falling from the
raised scaffolding; Accidents involving construction vehicles and equipment; Caving of trenches.

**Waste Management:** The main impact of the inadequate waste disposal is potential contamination of soil and surface water resources, eventually infiltrating to groundwater resources.

**During operational phase**

In general, the impacts during operational phase are considered minor with the exception of the increased levels of noise that are evaluated as moderate.

The main impacts during operational phase are:

**Soil:** Accumulated debris during maintenance works and accidental spills could potentially cause the soil contamination. The impact is considered minor.

**Water resources:** Accidental dumping of the debris during the resurfacing prior to paving and scheduled structural repairs might cause diversion of the water flow of the river and creation of the shallow areas and localized ponds. The impact is minor.

**Biodiversity:** the impact is considered minor; the higher danger is to the freshwater habitat. The accidental spills of the hazardous materials and increased levels of noise during the maintenance could cause the minor impacts on both the terrestrial habitats and freshwater habitats.

**Air quality:** Environmental effects of the vehicle emissions include acidification of soil and surface waters, adverse effects on crops and animal species, and damage to buildings and structures.

**Noise and Vibration:** The noise levels from traffic movement will slightly exceed the WB standards but is subject to changes depending on the wind speed and direction. Noise is considered as a moderate impact during operational phase.

**Land use** impacts are considered very minor and are related to inadequate waste management.

**Public Health and Safety:** Accumulation of litter from passing vehicles and the debris of the scheduled and emergency repairs if not disposed timely and at the designated dumping site might pose the threat to public health. Traffic movement could potentially be the cause of accidents involving pedestrians. The impact is considered minor.

**Indirect, Cumulative, and Residual Impacts**

Indirect impacts are considered to be minor due to the limited duration of the construction activities: settling of hazardous materials on soils and in run off valleys.
during dry season consequently contributing to the transport of sediments and pollutants to the main water bodies and infiltration into the shallow aquifer.

The main cumulative impact anticipated through implementation of this project is the incremental effect on of construction waste disposal on the waste management in the area already suffering from the lack of disposal facilities.

Cumulative impact on the increase of traffic level on the Al-Houz Bridge to be used as an alternative route both for Omar bin Abdul Aziz Bridge and Al Qasem bridge.

Residual or irreversible impacts are considered to be very minor and mostly concern the use of the construction debris dumping sites as permanent municipal waste disposal areas. Another residual impact will be the increased level of noise due to traffic movement.

**Environmental and Social Management Plan**

In order to manage the Environmental & Social impacts in line with Iraqi Government policies, and WB policies, an ESMP has been prepared. It contains management measures avoidance, mitigation, as well as enhancements that would be implemented during the construction and operation/maintenance phase of the project.

The ESMP matrices are prepared for the proposed project during construction and operation /maintenance phases. The main element of ESMP is the cost of implementation which shall be integrated into the contactor’s cost.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td><strong>Vehicle emissions</strong>&lt;br&gt;• Contractor to keep vehicles and machinery properly operated and maintained.&lt;br&gt;• Contractor to minimize unnecessary vehicle idling.&lt;br&gt;• Switch off any engine as soon as it is not used.&lt;br&gt;<strong>Dust</strong>&lt;br&gt;• Minimize dust from materials (such as sand, cement) and construction activities (such as excavation) by using covers, storage, control equipment, and increasing moisture content.&lt;br&gt;• Prepare concrete before going to the site to avoid movement of materials (gravel, sand, cement) if possible.&lt;br&gt;• Minimize dust from vehicle movements, using water sprays or appropriate.&lt;br&gt;• Avoid the burning of materials on site.&lt;br&gt;• Switch off any engine as soon as it is not used.&lt;br&gt;<strong>Hazardous Emissions</strong>&lt;br&gt;• Avoid storage of hazardous materials in open areas without proper covering;&lt;br&gt;• Provide adequate ventilation for work areas</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>The bidders will be able to include these costs in their bidding. Additional cost for air quality testing to establish the baseline to be conducted by the third party: 1500 US $</td>
</tr>
<tr>
<td>Noise</td>
<td><strong>Noise and vibration management</strong>&lt;br&gt;• Avoid or minimize transport through community areas.&lt;br&gt;• Switch off any engine as soon as it is not used.&lt;br&gt;• Working at night is prohibited.&lt;br&gt;• Contractor to minimize unnecessary vehicle idling&lt;br&gt;• Muffling of the equipment;&lt;br&gt;• Additional health check-ups for personnel handling the vibrating and noisy equipment</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>Additional cost for medical check ups 2000 US $</td>
</tr>
<tr>
<td>Water resources</td>
<td><strong>Water run-off management (drainage plan)</strong>&lt;br&gt;• In the event that sediment is transported onto the road it should be cleaned using a street sweeper or by physically sweeping the street in cases of small areas to ensure the sediment is not washed into the drainage system with water runoff.</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>Hydrogeological Investigation: 500 US $</td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
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<tr>
<td></td>
<td></td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>Delineation of excavated areas: 300 US $; Emergency soil testing in case of accidental spills: 1000 US $</td>
</tr>
<tr>
<td>4</td>
<td>Soil</td>
<td>Contractor</td>
<td>PMT</td>
<td>No additional costs</td>
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<tr>
<td></td>
<td></td>
<td>Resident Engineer</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Construction Camp</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td>Location of the camp should be agreed with the local beneficiaries</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td>Location of the camp outside known aquifer recharge zones</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td>Provision of adequate infrastructure for effluent collection</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td>Timely disposal of effluent</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
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</tr>
</tbody>
</table>
| Solid and hazardous wastes | - Timely disposal of solid waste  
- Provision of collection pits for collection of used machinery oils;  
- Adequate vehicle maintenance  
- Transporting wastes to the designated disposal sites  
General:  
- Keeping the site clean and tidy:  
  a. Ensure there is no loose materials or debris lying around the site including the perimeter; and  
  b. Vehicles are regularly checked for cleanliness (general aspect and making sure no leaks are occurring)  
- Burning of waste is prohibited  
- Reducing construction waste related to on-site construction and off-site manufacture or fabrication.  
- Reusing the material on site (in situ or for new applications) whenever it is possible  
- Monitoring the amount of site construction waste created to make sure it does not affect the surrounding and the adjacent areas.  
  - Waste is not blocking pathways  
  - Construction waste will be gathered in a specific zone of the construction site  
  - Contractor to evacuate any construction waste that are not possible to reuse, by truck to nearest authorized dumping site pre-agreed with the local authorities and distanced from the environmentally sensitive receptors and on a regular basis to avoid accumulation;  
- All used motor oil, lubricants, etc. are to be collected in closed bins to avoid leakage and transferred to the refinery for processing  
- All staff will avoid littering in the open. Workers to use bins to throw garbage.  
Hazardous materials:  
- Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.  
- Use impervious surfaces for refuelling areas and other fluid transfer areas.  
- Provide portable spill containment and clean-up equipment on site, and train staff | Contractor  
- Resident Engineer  
- PMT |  | Additional costs for disposal of hazardous materials:  
<p>|  |  |  | 3000 US $ |</p>
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
</table>
| 7        | **Flora & Fauna**  
- Provide training to the construction crew on the impact of disturbance and damage to habitats;  
- Monitor the construction crew and provide punitive measures for illegal hunting and/or fishing;  
- Provide the crew with fuel for cooking to avoid burning of natural materials;  
- Apply waste management plan;  
- Avoid cutting of the reeds or any other riparian vegetation;                                                                | Contractor      | Resident Engineer | Training if conducted by the third party: 400 US $ |
|          |                                                                                                                                                                                                                  | PMT            |             |                              |
| 8        | **Topography and surface drainage**  
- Storage areas for construction materials should be located at sites that do not permit direct runoff into watercourses and are on land sloping at less than 1.5%.  
- Time limitation on works during rainy events;  
- Regular maintenance of the equipment and machinery to avoid spillage of hazardous materials;  
- Re-vegetation of cleared areas  
- Timely and adequate disposal of liquid and solid waste in authorized areas.                                      | Contractor      | Resident Engineer | Re-vegetation cost: 1000 US $ |
|          |                                                                                                                                                                                                                  | PMT            |             |                              |
| 9        | **Access and traffic**  
- Set up warning signs in the workplace:  
  - All safe footpaths are marked; construction materials are not blocking pathways  
  - Site entrances and exits are clearly marked for visitors and delivery drivers to see; and  
  - If present, site reception is clearly signposted OR all visitors are escorted to the reception.  
- Providing separate traffic routes for pedestrians and vehicles, where possible  
- Designating specific parking areas for workers’ and visitors’ vehicles outside the construction area.  
- Avoid or minimize transport through community areas.  
- In compliance with national regulations the Contractor will ensure that the construction site is properly secured and construction related traffic regulated.  
- The site will be clearly visible and the public warned of all potential hazards by | Contractor      | Resident Engineer | Additional costs for marking and signage: 300 US $ |
<p>|          |                                                                                                                                                                                                                  | PMT            |             |                              |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>signposting and barriers / fencing</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>No additional costs; the cost is imbedded in mandatory HSE measures</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Traffic management system and staff training, especially for site access and near-site heavy traffic. Provision of safe passages and crossings for pedestrians where construction traffic interferes.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Adjustment of working hours to local traffic patterns, e.g. avoiding major transport activities during rush hours or times of livestock movement</td>
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<tr>
<td></td>
<td>If required, active traffic management by trained and visible staff at the site for safe passage for the public</td>
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<tr>
<td></td>
<td>Ensuring safe and continuous access to all adjacent office facilities, shops and residences during construction</td>
<td></td>
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<tr>
<td>Health and Safety</td>
<td>There is posted material indicating the nearest police station and hospital (with accident and emergency facilities).</td>
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<td></td>
<td>The contractor must take reasonable steps to prevent unauthorized people accessing the site.</td>
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<tr>
<td></td>
<td>Training on handling of UXO/ERW</td>
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<tr>
<td></td>
<td>Avoid the burning of materials on site.</td>
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<td></td>
<td>Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers.</td>
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<tr>
<td></td>
<td>Providing extinguishers on work site.</td>
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<td></td>
<td>If work involving the use of flammable materials is being carried out, stop people smoking and do not allow other work activities involving potential ignition sources to take place nearby.</td>
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<tr>
<td></td>
<td>Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence).</td>
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<tr>
<td></td>
<td>Marking excavation holes with physical boundaries (barriers, tape or fence)</td>
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<tr>
<td></td>
<td>The contractor should put up barriers or covers in the area of openings and excavations.</td>
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<tr>
<td></td>
<td>Store building materials (such as pipes, manhole rings, and cement bags) so that</td>
<td></td>
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<td></td>
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<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
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<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Handling Complaints</td>
<td>Reducing impacts on the community through community and neighbour engagement.</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In cases of where there are minority communities speaking a different language in the area or working on site, notices are printed in the common local language.</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Physical cultural resources</td>
<td>In case of accidental discovery stop all works and contact the responsible authority within 24 hours;</td>
<td>Resident Engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide training to the construction crew on the mode of conduct in case of accidental findings</td>
<td>PMT</td>
<td></td>
</tr>
</tbody>
</table>

Total cost US$ (rehabilitation phase) 10,000 US$
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Air quality including odors</td>
<td>Water spraying for dust control in maintenance areas;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Draining of ponds to prevent stagnation;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provide traffic regulation measures to avoid traffic congestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Noise</td>
<td>Advance warning to public ahead of planned maintenance and repair activities;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Restriction on maintenance activities on working hours to 8.00-19.00 during working days and avoidance of works during holidays unless needed on emergency basis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provide traffic regulation measures to avoid traffic congestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Water resources</td>
<td>Timely and adequate disposal of debris generated by maintenance activities and solid and liquid waste;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Maintaining the drainage ditches and manholes unblocked on the river banks.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Soil</td>
<td>Maintaining the drainage channels unblocked;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Draining of ponds;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adequate disposal of waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Solid and hazardous wastes</td>
<td>Use of non-toxic paints for repairs;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Storage of hazardous materials used for repairs in sealed containers;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Disposal of waste to authorized disposal sites;</td>
<td></td>
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<tr>
<td></td>
<td>Avoid disposal of effluent into the river.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Traffic</td>
<td>Informing the public about schedule of repair and maintenance works</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Provision of temporary alternative access roads/ by-passes</td>
<td></td>
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<tr>
<td></td>
<td>On the spot traffic management</td>
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<tr>
<td></td>
<td>Ensure traffic safety</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7 Flora &amp; Fauna</td>
<td>Keeping the manholes and ditches clean;</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td></td>
<td>Adequate waste disposal;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Draining of ponds;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-vegetation with the plants native to the area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Handling Complains</td>
<td>Compliance with GRM</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
</tbody>
</table>
| 9 Public hygiene and quality of water | ▪ Adequate waste disposal;  
▪ Timely draining of ponds to avoid breeding of insects which could be the source of vector breeding diseases | Operator       | RBD         | Included in regular maintenance costs |

**Total cost US$ (Operation phase)**  
No additional costs
Environmental and Social Monitoring Plan

In order to ensure full compliance of the performed activities to the environmental and social requirements, regular monitoring should be performed. For this purpose, an environmental and social monitoring program has been established for the construction phase as shown in the following Table E4 and for the operational phase as shown in the following Table E5.

ESMP Institutional Arrangements

In order to ensure full compliance with the environmental and social requirements which are described above, RBD PMT will nominate qualified staff(s) to act as the focal point(s) for environmental and social affairs at the central level. On the field level, RBD PMT will nominate specialist(s) to act as environmental and social officer(s). Those officers will be trained by the environmental and social specialist(s) at the central level on monitoring and reporting of environmental and social impacts and how to fill the checklist to be used during field visits before implementation starts.

RBD Resident Engineer will be the officially responsible staff member for ensuring environmental and social compliance. S/He will be assisted by the designated environmental and social field officer(s).

In addition, a qualified consultant will be recruited by the PMT to provide technical assistance and capacity building to the environmental and social team both at the central level and at the field level.
### Table E4: Environmental and Social Monitoring during Construction Phase

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
</table>
| 1        | Air quality including odors | Site inspection with the photo documentation; Air quality testing | • Ambient Air quality parameters: PM$_{10}$, PM$_{2.5}$, SO$_2$, NO$_x$, CO, Ozone and HC  
• Compliance with dust abatement measures | Once prior to the start of construction works to establish the baseline and once during the construction phase during the dry season. | Contractor through approved third party. | Resident engineer | Testing done by accredited laboratories. Additional cost 2000 US $  
Camera: 250 US $ |
| 2        | Noise | Site inspection measuring the level of noise | • Compliance with the time limitations;  
• Switching off the equipment not in use;  
• Use of protective gear | Weekly | Contractor | Resident engineer | Hand held device for noise level measuring: 200 US $ |
| 3        | Water resources | Site inspection with photo documentation; Water testing  
Inspection:  
• debris accumulation in water drainage areas;  
• Alteration of water courses;  
• Signs of spillage of hazardous materials  
Water testing:  
P$H$, Turbidity, Electrical Conductivity (EC), Color, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Biological Oxygen Demand | Inspection:  
• Bi-weekly during the rainy season, and after sporadic rains  
• Once a month during the dry periods  
Water testing: 1 time prior to the start of construction works; 1 time 2 weeks prior to project completion | Contractor through approved third party. | Resident engineer | Testing done by accredited laboratories. Additional cost 3000 US $ |
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(BOD), Polychlorinated Biphenyls (PCBs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Soil</td>
<td>• Site inspection with photo documentation; • Soil testing</td>
<td>Inspection: signs of soil erosion, evidence of spills of fuel and lubricants Soil testing: pH, temperature, organic content, poly-aromatic hydrocarbons (PAHs); Faecal coliforms and Total coliforms</td>
<td>• Inspection: bi-weekly; • Soil testing in case of accidental spills</td>
<td>Contractor through approved third party.</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>5</td>
<td>Solid and hazardous wastes</td>
<td>• Site inspections • Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation;</td>
<td>Storage conditions of hazardous materials; • Disposal at designated sites • Contracts with approved waste disposal contractors • Receipts form disposal sites (if available) • Photo documentation</td>
<td>Inspection: bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td></td>
<td>Traffic</td>
<td>Site inspections</td>
<td>Site surveillance for the presence of fencing/barriers and warning signs, and traffic speed limitations</td>
<td>Monthly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>6</td>
<td>Flora &amp; Fauna</td>
<td>Site inspections</td>
<td>• Degree of habitat disruption due to construction activities • Degree of workers</td>
<td>Inspection: bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
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</tbody>
</table>
| 8        | Topography and surface drainage | • Inspection and photo evidence  
• Location of storage areas;  
• Ceasing construction activities during heavy rainy events;  
• Re-vegetation of cleared areas  
• Records of liquid waste disposal. | Inspection: bi-weekly | Contractor | Resident engineer | No additional costs |
| 9        | Handling Complains | • Maintaining records of filed complaints and responses  
• Time of response to the complaint;  
• Number of complaints | Monthly | Resident engineer | PMT | No additional costs |
| 10       | Public health and safety | • Inspection and photo evidence  
• Maintaining records of injuries and accidents with cause and location  
• Provision and use of personal protective equipment to workers  
• Installing construction and warning signs | Inspection: bi-weekly | Contractor | Resident engineer | No additional costs |

Total cost US$ (Operation/Maintenance phase) 8,450 US$
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air quality</td>
<td>Air quality monitoring</td>
<td>Ensure the bridge in the operational condition and there are no hold ups of traffic that can produce excessive exhaust emissions; Inspection on the dust generation by the vehicles</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>2</td>
<td>Noise</td>
<td>Noise level monitoring</td>
<td>Ensure the noise levels are within the acceptable limits</td>
<td>During maintenance and repairs</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>3</td>
<td>Water resources</td>
<td>Surveillance; Water testing</td>
<td>• Ensure the drainage channels and culverts are clear of debris • Visual inspection for the signs of spillage • Water quality testing: pH, Turbidity, Electrical Conductivity (EC), Color, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Polychlorinated Biphenyls (PCBs)</td>
<td>Surveillance: • Bi-weekly during the rainy season • Monthly during the dry season Water testing: in case of accidental spills</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>4</td>
<td>Soil</td>
<td>Surveillance; Soil testing</td>
<td>• Ensure the drainage channels and culverts are clear of debris • Visual inspection for the</td>
<td>Surveillance: • Bi-weekly during the rainy season</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>signs of spillage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil testing: pH, temperature, organic content, poly-aromatic hydrocarbons (PAHs)</td>
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<tr>
<td></td>
<td></td>
<td>Monthly during the dry season</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Soil testing in areas of the accidental spills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Solid and hazardous wastes</td>
<td>Waste disposed at designated areas</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surveillance; Maintaining records of quantities of waste and location of its disposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flora &amp; Fauna</td>
<td>Surveillance</td>
<td>Condition of the manholes and ditches; Level of re-vegetation; Absence of ponds</td>
<td>Surveillance: Bi-weekly during the rainy season Monthly during the dry season</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disposal of debris during maintenance and repairs</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td>7</td>
<td>Topography and surface drainage</td>
<td>Surveillance</td>
<td>Presence of warning signs at maintenance site</td>
<td>During maintenance and repair works</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>8</td>
<td>Access and traffic</td>
<td>Surveillance</td>
<td>Adequate warning about scheduled maintenance works; Timely and adequate disposal of waste</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>9</td>
<td>Health and Safety</td>
<td>Surveillance; Maintaining records of quantities of waste and location of its disposal</td>
<td>Adequate warning about scheduled maintenance works; Timely and adequate disposal of waste</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>10</td>
<td>Handling Complaints</td>
<td>Record keeping on received complaints</td>
<td>Number of complaints and responses</td>
<td>Quarterly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>11</td>
<td>Physical cultural resources</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
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<tr>
<td>Total cost US$ (Operation/Maintenance phase)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>800 US$ per year</td>
</tr>
</tbody>
</table>

Total cost US$ (Operation/Maintenance phase) 800 US$ per year
Public Consultations

Objectives of the Consultations
WB policies require that broad and open public consultations be held with the project affected peoples (PAPs) on the project. These consultations are to ensure that PAPs are provided with the opportunity to engage in the rehabilitation planning process, to raise questions and receive input and responses to their concerns. Due to the current security situation in the project area and taking into utmost consideration the safety of the people as public meetings may be targeted by terrorist, the public meeting approach was not achievable.

Consultation Process
Individual interviews were conducted with the residents of the area to obtain sound information on the possible impacts on the local communities. Accordingly, a questionnaire was prepared in order to cover the key environmental and social aspects related to the project. The questionnaire was then addressed to the local individuals in the surrounding community randomly to have their opinions and thoughts regarding the rehabilitation activities.

In addition, the draft ESMP and its translated executive summary were published on the RBD’s website to allow for feedback and wider dissemination of information related to the planned activities under this project. A translated summary of the ESMP will be disclosed at the project site for feedback and comments if any.

Findings of the Consultations
People interviewed were the passersby living in close proximity to the project area; the total number of the interviewed people is 5. Due to the years of political instability and security concerns in the area women have rather restricted freedom of movement and are rarely seen outside their homes. The following are the main findings of the consultation process which took place on 28th of January 2017:

1. All respondents agreed that the reconstruction activities will have a strong positive impact from the social perspectives on the locals.
2. No claims from any respondents were recorded or alleged regarding the ownership of the land where the rehabilitation activities to take place; all agreed that is governmental land property.
3. No vegetation cover, crops, plants, trees, etc. will be removed in order to execute the rehabilitation activities.
4. No infrastructure will be affected negatively due the reconstruction activities.
5. Information about a grievance mechanism was introduced to interviewed individuals and a translated GRM form was also provided. All interviewed people were informed that they can submit their complaint to either site engineer, or to community leader or to PMT during construction.
6. The respondents do not anticipate any damage to the buildings or infrastructure during the rehabilitation activities;
7. No change to demographics or social structure will be induced by the project activities;
8. Local residents do not use any part of the land required for the project for personal purposes.
9. The respondents interpreted the question of relocation as their improved mobility rather than physical relocation of people.

The filled questionnaires and photos from the interviews are presented in Annex 2.

**Grievance Redress Mechanism**

Bank procedures require that Grievance Redress Mechanisms (GRMs) be established and operational prior to commencement of the project, and that they continue to operate for one year following completion of the works for third party settlement of disputes. This GRM should take into account the availability of judicial recourse as well as traditional and community dispute resolution mechanisms.

Accordingly, a hard copy of the translated application of the GRM was provided to interviewed people and informed them that the same application will be posted at the project site to ensure any grievance can be addressed in an amicable manner. Resolving complaints at community level is always encouraged to address the problem that a person may have during implementation and/or operational phase. Please refer to Annex (3) for more details.

In any case, the PMT must maintain records of grievances and complaints, including minutes of discussions, recommendations and resolutions made.

**Distribution of GRM Forms**

During individual interviews, information about a grievance mechanism was introduced to interviewed individuals and a translated GRM form was also provided. The community leaders’ information (mobile phone number) and PMT contact information (office and mobile phone numbers) will be available before implementation starts. There will be signs posted at the entrance of the bridges (Refer to Annex 3 for more details).

**Conclusion and Recommendations**

The ESIA concludes that the proposed repair of Omar bin Abdul Aziz Bridge in Al Anbar Governorate will have an overall significant beneficial impact on the environment and affected population. The implementation and the monitoring of the recommended mitigation measures especially during the construction phase will ensure that potential negative environmental impacts are addressed.
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<th>Description</th>
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<tr>
<td>amsl</td>
<td>above mean sea level</td>
</tr>
<tr>
<td>AXO</td>
<td>Abandoned explosive ordnance</td>
</tr>
<tr>
<td>EHS</td>
<td>Environment, Health and Safety</td>
</tr>
<tr>
<td>ERW</td>
<td>Explosive remnants of war</td>
</tr>
<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
</tr>
<tr>
<td>EPID</td>
<td>Environment Protection and Improvement Directorate</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GRM</td>
<td>Grievance Redress Mechanism</td>
</tr>
<tr>
<td>Ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
</tr>
<tr>
<td>IDA</td>
<td>International Development Association</td>
</tr>
<tr>
<td>Km</td>
<td>Kilometer</td>
</tr>
<tr>
<td>MM</td>
<td>Modified Mercalli Scale</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>OP</td>
<td>Operational Procedure</td>
</tr>
<tr>
<td>PMT</td>
<td>Project Management Team</td>
</tr>
<tr>
<td>ROW</td>
<td>Right of Way</td>
</tr>
<tr>
<td>TDS</td>
<td>Total Dissolved Solids</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solids</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>UNCBDD</td>
<td>United Nations Convention on Biological Diversity</td>
</tr>
<tr>
<td>UNCCD</td>
<td>United Nations Convention to Combat Desertification</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>UXO</td>
<td>Unexploded ordnance</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
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</table>
1 INTRODUCTION
According to the Environmental and Social Management Framework (ESMF) which was prepared for the Emergency Operation for Development Project (EODP) and disclosed locally in Iraq and on the World Bank’s InfoShop, a limited site specific and simplified Environmental and Social Impact Assessment (ESIA) should be prepared, cleared and publically consulted upon prior to the commencement of any construction activities for bridges crossing permanent surface waters such as rivers and lakes as part of the roads and bridges component.

This Environmental and Social Impact Assessment (ESIA) was prepared in accordance to the Terms of Reference for Repair for Omar Bin Abdul Aziz Bridge in Al Anbar Governorate According to the World Bank (WB) environmental safeguards the project is categorized as Category B.

This ESIA identifies key environmental and social impacts of the project activities during both the rehabilitation and the operational phases, and defines the necessary mitigation measures addressing potential negative impacts, as well as monitoring procedures during construction and operation. An Environmental and Social Management Plan (ESMP) is prepared and embedded in this Limited ESIA which should be followed and implemented by all relevant parties.

The objectives of the ESIA are to:

- Identify the baseline environmental and social conditions;
- Identify the potential adverse impacts during the rehabilitation/construction and operational phases of the project related to the specific project activities;
- Propose mitigation measures in order to minimize the adverse impacts identified;
- Prepare the ESMP that will allow the adequate implementation of the proposed mitigation measures.
- Hold consultation with the communities to get their input on the project activities.
- Inform the local community about the revised project activities and the environmental measures, socio-economic measures, information on residents’ rights who might be negatively affected by some project activities and bridge operations.
- Inform the local community of the existence of a Grievance Redresses Mechanism (GRM) system through which they might lodge complaints and expect prompt and fair consideration.
2 PROJECT DESCRIPTION

2.1 Project Goal
The main goal of the Repair of Omar Bin Abdul Aziz Bridge in Al Anbar Governorate is to facilitate travel and commerce and access to essential service including health care and education and movement of agriculture products.

2.2 Location of the Bridge
The Ramadi Barrage is located in the city of Ramadi in Anbar Governorate about 100 km west of Baghdad. Oman Bin Abdul Aziz Bridge crosses Warrar Channel connecting the Euphrates River with the Habbaniah Lake which serves as regulator to discharge the excess water from Euphates during floods.

The bridge is connecting the Al-Tamim Neighborhood area on the west and Warrar neighborhood to the east of central Ramadi. The bridge is located 1.9 km upstream of the Al-Houz Bridge to be used as an alternative route during the rehabilitation of Oman Bin Abdul Aziz Bridge. The Bridge crosses Warrar Channel connecting the Euphrates River with the Habbaniah Lake which serves as regulator to discharge the excess water from Euphates during floods.

Figure 1: General Location of the Project in Al Anbar Governorate

---

3 http://www.reach-initiative.org/maps
2 Red circle marks the location of the project
2.3 Technical Description of the Bridge

Omar Bin Abdul Aziz Bridge opened for traffic in 2010. The bridge connects Warrar Residential flats with Al-Tamim neighborhood in the Ramadi City.

The total length of the bridge is 216m. (9 spans, 24m long each). It has a width of 12m (9m carriage way and 1.50 m side walk from each side). The super structure consists of concrete girders 24m long and 1.20m depth and reinforced concrete deck. Thedetailed main features of the bridge are listed below:
- Total length: 216m.
- Total width: 12m.
- Width of carriage way: 9m.
- Width of side walk: 1.50m each side.
- Spacing Between Girders (Pre-Cast Pre-Stressed): 1.55m C/C.
- Super Structure: 8 pre-cast pre-stress girder, 1.2m depth.
- Depth of cast in place deck: 20cm.
- Thickness of asphalt: 6cm.
- Actual Length of Girder: 23.95m.
- Size of rubber pad: 200*300*74mm.
- Size of expansion joint: T-80.

Bridge design was prepared and works were executed according to the standard specifications for Roads and Bridges (1983), (B.S) 5400, AASHTO (ASD 2002) and Iraqi standard specification for loadings.

2.4 Current Condition of the Bridge
The bridge was completed in December 2010. In November 2015, it was subject to bomb attack and was put out of service. At present, the bridge isn’t in use and suffers damages in its first, second, fourth, fifth, and ninth spans as per numbering on the engineering design of the bridge presented in Annex 4. Additionally, the bridge cross beam, concrete pads, girders, and expansion joint are also damaged. The piers and the girders are completely destroyed and the debris are in the water channel as can be seen in the figure below.
2.5 Project Activities
The proposed rehabilitation works include:

- Demolishment and removal of first, second, fourth, fifth, and ninth damaged spans (1500 m² deck),
- Rehabilitation of 40 damaged girders,
- Rehabilitation of 80 failure rubber pads, asphalt, etc.,
- Treatment of cracking on the damaged piers and the concrete pads and installation of new rubber pads (80 rubber pads),
- Installation of pre–cast pre-stressed girders (40 girders),
- Surfacing of deck slab (0.20m depth),
- Installation of lighting,
- Setting the expansion joints
- Installation of hand rail.

2.6 Clearance of UXO/ERW
The area has received clearance from the Iraqi Armed Forces for the absence of UXO/REW. However, in case of accidental discovery the personnel should be immediately evacuated and armed forces contacted. The works could be resumed only after removal of the munitions.

2.7 Construction Equipment
The following table presents the types and numbers of construction equipment that are expected to be used during the rehabilitation of Omar Bin Abdul Aziz Bridge and their relevant operation periods.
Table 1: Equipment expected to be used in the Rehabilitation/Construction

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Type of Equipment</th>
<th>Quantity</th>
<th>Operation Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 – ton crane</td>
<td>2</td>
<td>60 days</td>
</tr>
<tr>
<td>2</td>
<td>Compressor (diesel) 370 Airman</td>
<td>2</td>
<td>60 days</td>
</tr>
<tr>
<td>3</td>
<td>Jack – hammer (low noise)</td>
<td>2</td>
<td>20 days</td>
</tr>
<tr>
<td>4</td>
<td>Shovel (Kawasaki 70) or equivalent</td>
<td>2</td>
<td>5 months</td>
</tr>
<tr>
<td>5</td>
<td>Typical lorry with tipping, skipping Body to load of transport the demolished material</td>
<td>4</td>
<td>7 days</td>
</tr>
<tr>
<td>6</td>
<td>Truck mixer</td>
<td>4</td>
<td>7 days</td>
</tr>
<tr>
<td>7</td>
<td>Asphalt grinder</td>
<td>1</td>
<td>7 days</td>
</tr>
<tr>
<td>8</td>
<td>Bitumen tanker</td>
<td>1</td>
<td>7 days</td>
</tr>
<tr>
<td>9</td>
<td>Asphalt finisher</td>
<td>1</td>
<td>10 days</td>
</tr>
<tr>
<td>10</td>
<td>Compactor (steel &amp; rubber tube)</td>
<td>2</td>
<td>10 days</td>
</tr>
<tr>
<td>11</td>
<td>Welding machine (set)</td>
<td>2</td>
<td>6 months</td>
</tr>
<tr>
<td>12</td>
<td>Diesel generator 30 K.V.A</td>
<td>2</td>
<td>6 months</td>
</tr>
<tr>
<td>13</td>
<td>Grader (Komatsu)</td>
<td>1</td>
<td>2 months</td>
</tr>
<tr>
<td>14</td>
<td>Pickups &amp; sedan cars</td>
<td>3</td>
<td>6 months</td>
</tr>
<tr>
<td>15</td>
<td>Air shot, bell, bugger</td>
<td>3</td>
<td>6 months</td>
</tr>
</tbody>
</table>

2.8 Construction site facilities
The construction site will consist of prefabricated offices and parking areas for administration and technical staff. This will also include areas for materials testing and storage, and equipment cleaning and maintenance. The need for residential accommodation is likely to be relatively minor with only accommodation for the night guards, as priority for workers will be given to local people.

The estimate of the staffing requirements is presented in the Table below:

Table 2: Estimate of Staffing Requirements

<table>
<thead>
<tr>
<th>Type</th>
<th>Job Title</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Staff</td>
<td>Secretary</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>IT support</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Serving personnel</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Security personnel</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Parking attendants</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Logistics Coordinator</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Warehouse/storage coordinator</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>HR officer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Procurement officer</td>
<td>1</td>
</tr>
<tr>
<td>Technical Staff</td>
<td>General Manager/Team Leader</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Senior Road Engineer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Materials Engineer</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>Job Title</td>
<td>Number</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Road Engineer</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Structural Engineer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Geo-technical Engineer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Drainage Engineer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Pavement Engineer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Quantity Surveyor</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>HS&amp;E specialist</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Social expert</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Quality Assurance Engineer</td>
<td>1</td>
</tr>
<tr>
<td>Construction Crew</td>
<td>Machinery and equipment operators</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Unskilled labor</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>57</strong></td>
</tr>
</tbody>
</table>

Temporary camps may be needed at specific sites where there will be a short-term concentration of equipment, materials and labor. The temporary camps are envisioned to be located within the ROW and will not require the temporary land acquisition.

### 2.9 Land Acquisition

The project comprises the rehabilitation of the existing facilities with no additional structures to be constructed. Therefore, the project will not require any permanent or temporary land acquisition. Accordingly OP 4.12 will not be applied for this project.

The construction camp is envisioned to be located within the ROW on governmental property with the area of the construction camp not to exceed 300 m² mostly comprising of the offices and storage facilities. The construction camp is not envisioned to have any residential facilities, with the exception of the facilities for the guards. Parking and machinery yards are to be located within the ROW.
2.10 Project Duration
The total project duration is 10 months. The breakdown of project activities is presented in the Table below: It is worth mentioning that certain activities will take place simultaneously.

Table 3: Duration of Construction Activities

<table>
<thead>
<tr>
<th>#</th>
<th>Activity</th>
<th>Duration (man days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cleaning post-combat debris</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>Piles and columns construction</td>
<td>145</td>
</tr>
<tr>
<td>3</td>
<td>Girders installation</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>Cleaning road cracks</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>Structural repairs of the approaches</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>Paving</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Installation of guardrails and lighting</td>
<td>48</td>
</tr>
<tr>
<td>8</td>
<td>Installation of communication lines</td>
<td>42</td>
</tr>
<tr>
<td>9</td>
<td>Installation of traffic and warning signage</td>
<td>24</td>
</tr>
</tbody>
</table>

The total number of personnel, including technical and administrative staff, skilled and unskilled labor is approximately 57 persons. The personnel employed on this project are envisioned to be mostly local and national.
3 BASELINE CONDITIONS

3.1 Physical Environment

3.1.1 Land Use
The bridge is surrounded by residential area. The nearest residential units are at approximately 200m from both sides of the bridge. The area immediately adjacent to the bridge is vacant as shown in the following figure.

![Figure 4: Land use in the vicinity of OmarBin Abdul Aziz Bridge (Google Earth)](image)

3.1.2 Regional Geology and stratigraphy
Geologically the project is located in the Rutba geological zone. The sedimentary cover of the Rutba zone starts with Infracambrian section 300-1500m thick. The Pallaeozoic section thickens from 3500m in the North to 8500m in the South. Triassic, Jurassic and Lower Cretaceous sediments are absent in the northern part and are up to 1000m in the south-east. Upper Cretaceous sediments are up to 800m thick. Palaeogene and Neogene sediments are up to 500m thick.

In the project location the geological formation is composed of thin-bedded, black bituminous limestone, dolomitic limestone and black papery shale with streaks of thin black chert as shown in the following figure.
3.1.3 Topography
The area is mostly a plane surface with the slopes gradient of 10-20 m per kilometer and the elevations ranging between 100 and 200 m amsl. It is usually covered with the desert pavement, and in most areas is characterized as Hamada land surface.

3.1.4 Seismology
Tectonically Iraq is located in a relatively active seismic zone at the northeastern boundaries of the Arabian Plate. Seismic zoning of Iraq is divided into four zones listed below:

- The areas of no damage zone of MM = III and less covering mainly the stable shelf region.
- The minor damage zone with intensities IV- V covering the Zagros Foothills and the Mesopotamian Geosyncline.
- The moderate damage zone with intensity range of VI-VII which actually covers the Zagros Tauros thrust zones.
- The major damage zone with intensity of VIII located on the Zagros thrust outside the Iraqi borders.

The project area is located in the no damage zone with the seismic activity of I -II on MM scale as can be seen in the following figure.

---

3.1.5 Water Resources and Floods

The project is located on the Warrar Irrigation Channel diverted from the Euphrates River. The Euphrates River is the largest river in the Middle East in terms of catchment area and length, and the second largest in terms of water volume. It originates in the mountains of Turkey on the Armenian plateau at an altitude of 3,000-3,500 m above sea level. It is formed by the confluence of two rivers: Karasy River (470 km long and 22,000 km² catchment area) and Murad River (650 km long and 40,000 km² catchment area). The total length of the Euphrates River from the source of the Murad River to its confluence with the Tigris River is 2,940 km, 1,159 km of which runs within Iraq. The catchment area is 388,000 km².

Most of the Euphrates stream-flow originates from precipitation in the Armenian Highlands, and in particular the Keban Hills. In Syria, the Sajur, Balikh and Khabour Rivers and some intermittent streams contribute water to the Euphrates. Their contributions depend on the intensity and volume of precipitation and, increasingly, on water use and drainage in upstream irrigation areas. In Iraq, there are no major

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6 UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. Inventory of Shared Water Resources in Western Asia. Beirut.
surface water contributions to the Euphrates except for rare runoff events generated by heavy storms. The discharge of the Euphrates varies annually corresponding to climate variability. The discharge measured at Hit stations located approximately 2 km north of the bridge for the period of 1932-1998 which is considered as near natural flow of the river is in Table below:

<table>
<thead>
<tr>
<th>Period</th>
<th>Mean (BCM)</th>
<th>Minimum (BCM)</th>
<th>Maximum (BCM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932-1998</td>
<td>27.1</td>
<td>9.0</td>
<td>63.0</td>
</tr>
<tr>
<td>1938-1973</td>
<td>30.6</td>
<td>15.1</td>
<td>63.0</td>
</tr>
<tr>
<td>1974-1987</td>
<td>23.1</td>
<td>9.3</td>
<td>31.2</td>
</tr>
<tr>
<td>1988-1998</td>
<td>22.4</td>
<td>9.0</td>
<td>46.6</td>
</tr>
<tr>
<td>1974-1998</td>
<td>22.8</td>
<td>9.0</td>
<td>46.6</td>
</tr>
</tbody>
</table>

The Ramadi Barrage regulates the Euphrates flow regime by discharging excess flood water into Lake Habbaniyeh through the Warrar Regulator. After temporary storage in the lake, the water is either released back into the Euphrates or diverted to Lake Razzaza (2,000 km²) through the Mujarra Regulator which was built in 1957. This stream supplies Habariya Lake with excess water from the Euphrates during flood period. The length of this stream is 8.5 km which is designed to discharge up to 2800 m³/s. Water stored in Habaniya Lake can brought back to the river Euphrates when required through Dhiban stream which is located 42 km south of Ramadi city. In case of continuous flood flow, Habaniya lake cannot accommodate huge volumes of water and thus it was connected to Razazah lake and then to Abudibis marsh to release excess water. Water quality parameters in Al-Habbaniyah Lake are as follows: temperature (15-33°C), pH (7-9), dissolved oxygen (6-11mg/L), BOD5 (0.5-1.8), electrical conductivity (200-2280 S/cm), TDS (147-1520 mg/L), TSS (68-3200), turbidity (5-51), nitrate (0.7-20 mg/l), phosphate (77-220 μg/l), and chlorophyll-a (0.9-130 μg/l).

As regards the groundwater, alluvial deposits in the marshlands in the lower Mesopotamian Plain in Iraq create a shallow aquifer. Recharge mainly occurs during winter and through infiltration of Euphrates and Tigris river water. Generally, water flows into the groundwater during high flows when the water level of the rivers exceeds the groundwater table.

Small-scale irrigation from river water in Iraq may produce minor quantities of recharge from irrigation return flow in shallow aquifers. In the west and south-west of the Iraqi Jezira, groundwater movement in the Miocene Fatha Formation is directed

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toward the Euphrates. The discharge quantities are, however, insignificant in comparison to the total river flow.

Generally, the salinity of the groundwater increases from north to south. It increases from the recharge sources at the high land areas (less than 1000 mg/l), towards the discharge areas along the Mesopotamia Zone and Al-Jazira Zone (more than 10000 mg/l). Groundwater quality is mainly bicarbonated at the recharge areas, and becomes sulphuric at the discharge areas. The groundwater quality in the project area is slightly brackish with the salinity of 1000-3000 ppm. The groundwater depth in the project area ranges from 30-40 m below surface as shown in the figure below.
3.1.6 Soils
The area consists of potentially fertile soils characterized as heavy alluvial soils, with some organic content and a high proportion of clays. The soil classification is 68.4%

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silty loam, 20.9% silty clay loam and 10.7% is clay soil. The channel bed is composed of fine sand, silt and clays with rather high sedimentation load.

3.1.7 Climate
The climate in the project area is "desert." In a year, the average rainfall is 115 mm. The driest month is June, with 0 mm of rain. The greatest amount of precipitation occurs in February; with a total average of 23 mm. Details are shown in the following figure.

![Average Rainfall (mm Graph for Ar Ramadi)](image)

**Figure 8: Average Precipitation in Ramadi (2002-2012)**

The average annual temperature is 22.4 °C July is the warmest month of the year. The temperature in July averages 34.5 °C. The lowest average temperatures in the year occur in January, when it is around 9.3 °C. Details are shown in the following figure.

---


The predominant wind direction is north-east in the months of November through April, and predominantly north-west in the months of May through October. The mean average wind speed is 10-12 km/h with the wind gusts reaching up to 26-28 km/h.

3.1.8 Air Quality
At present, there is no information on ambient air quality in the project area as no measurements on air quality were performed previously. The area is predominantly agricultural. The roads are in rather bad conditions partially destroyed due to the recent war. The main source of pollution is dust generated from traffic movement in addition to that generated by windy conditions during dry periods.

3.1.9 Noise
Similarly, no information on noise levels is available for the project area. However, the noise level associated with the vehicle movement and limited agricultural activities.

---

Figure 9: Average Temperature in Ramadi (2002 – 2012)

The predominant wind direction is north-east in the months of November through April, and predominantly north-west in the months of May through October. The mean average wind speed is 10-12 km/h with the wind gusts reaching up to 26-28 km/h.

3.1.8 Air Quality
At present, there is no information on ambient air quality in the project area as no measurements on air quality were performed previously. The area is predominantly agricultural. The roads are in rather bad conditions partially destroyed due to the recent war. The main source of pollution is dust generated from traffic movement in addition to that generated by windy conditions during dry periods.

3.1.9 Noise
Similarly, no information on noise levels is available for the project area. However, the noise level associated with the vehicle movement and limited agricultural activities.

---

3.2 Biological Environment

3.2.1 Terrestrial Ecosystems

The project is located in an ecosystem classified as Arabian Desert and East Sahero-Arabian Xeric Shrub-lands. This desert ecosystem, which is located on the Arabian Peninsula and extends from Oman into Iraq, has little biological diversity. A portion of this eco-region is overlapped by the Syrian desert (518,000 km²) that covers parts of Iraq, Jordan, Syria, and Saudi Arabia as well as the Nafud desert (65,000 km²) which extends into Iraq from northern Saudi Arabia\(^\text{13}\).

The region has very limited floristic diversity. Vegetation is very diffuse but fairly evenly distributed, with some interruptions of near sterile dunes. Typical vegetation is presented in the Table below:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Calligonum crinitum</em></td>
<td>None</td>
<td>LC</td>
</tr>
<tr>
<td><em>Cornulaca arabica</em></td>
<td>Saltbrush</td>
<td>LC</td>
</tr>
<tr>
<td><em>Cyperus conglomeratus</em></td>
<td>Dune grass</td>
<td>LC</td>
</tr>
<tr>
<td><em>Dipterygium glaucum</em></td>
<td>Alqa</td>
<td>LC</td>
</tr>
<tr>
<td><em>Limeumarabicum</em></td>
<td>None</td>
<td>LC</td>
</tr>
<tr>
<td><em>Zygophyllum mandavillei</em></td>
<td>Bean caper</td>
<td>LC</td>
</tr>
<tr>
<td><em>Acacia ehrenbergiana</em></td>
<td>Sallam</td>
<td>LC</td>
</tr>
<tr>
<td><em>Prosopis cineraria</em></td>
<td>Ghaf</td>
<td>LC</td>
</tr>
<tr>
<td><em>Calligonum comosum</em></td>
<td>Arta</td>
<td>LC</td>
</tr>
<tr>
<td><em>Danthonia forskalli</em></td>
<td>Hassaniya</td>
<td>LC</td>
</tr>
</tbody>
</table>

The biodiversity of this region is the least known in the country. Common desert birds found in this eco-region are listed in the table below:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ammomanes cincture</em></td>
<td>Bar-tailed Lark</td>
<td>LC</td>
</tr>
<tr>
<td><em>Eremophilabilopha</em></td>
<td>Temminck's Lark</td>
<td>LC</td>
</tr>
<tr>
<td><em>Bubo bubo</em></td>
<td>Eurasian Eagle Owl</td>
<td>NT</td>
</tr>
<tr>
<td><em>Lanius mackinnoni</em></td>
<td>Mackinnon's Shrike</td>
<td>LC</td>
</tr>
<tr>
<td><em>Pterocles senegallus</em></td>
<td>Spotted Sandgrouse</td>
<td>LC</td>
</tr>
<tr>
<td><em>Cursoria cursor</em></td>
<td>Cream-coloured Courser</td>
<td>LC</td>
</tr>
<tr>
<td><em>Oenanthe deserti</em></td>
<td>Desert Wheatear</td>
<td>LC</td>
</tr>
<tr>
<td><em>Rhodospiza obsoletus</em></td>
<td>Desert Finch</td>
<td>LC</td>
</tr>
</tbody>
</table>

The mammalian species recorded in the region are shown in the Table below:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>National Report on Biodiversity in Iraq, July 2010</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7: List of Mammals in the Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acomys cahirinus</td>
<td>Spiny mouse</td>
<td>LC</td>
</tr>
<tr>
<td>Allactaga euphratica</td>
<td>Euphrates jerboa</td>
<td>LC</td>
</tr>
<tr>
<td>Gerbillus andersoni</td>
<td>Anderson’s gerbil</td>
<td>LC</td>
</tr>
<tr>
<td>Gerbillus mesopotamiae</td>
<td>Mesopotamian gerbil</td>
<td>LC</td>
</tr>
<tr>
<td>Hyena hyaena</td>
<td>Striped Hyena</td>
<td>LC</td>
</tr>
<tr>
<td>Otonycteris hemprichii</td>
<td>Desert long-eared bat</td>
<td>LC</td>
</tr>
<tr>
<td>Paraechinus aethiopicus</td>
<td>Desert Hedgehog</td>
<td>LC</td>
</tr>
<tr>
<td>Rhinolophus ferrumequinum</td>
<td>Greater horseshoe bat</td>
<td>LC</td>
</tr>
<tr>
<td>Rhinolophus hipposideros</td>
<td>Lesser horseshoe bat</td>
<td>LC</td>
</tr>
<tr>
<td>Triaenops persicus</td>
<td>Persian trident bat</td>
<td>LC</td>
</tr>
</tbody>
</table>

The amphibian and reptilian species recorded in the region are presented in the tables below:

Table 8: List of Amphibians in the Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bufo arabicus</td>
<td>Arabian Toad</td>
<td>LC</td>
</tr>
<tr>
<td>Pseudemidalea viridis</td>
<td>CrapaudVert</td>
<td>LC</td>
</tr>
</tbody>
</table>

Table 9: List of Reptilian Species

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>IUCN Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolichophis jugularis</td>
<td>Large Whip Snake</td>
<td>LC</td>
</tr>
<tr>
<td>Eryx jayakari</td>
<td>Arabian Sand Boa</td>
<td>LC</td>
</tr>
<tr>
<td>Hemidactylus hajarensis</td>
<td>Persian gecko</td>
<td>LC</td>
</tr>
<tr>
<td>Hemorrhois nummifer</td>
<td>Asian Racer</td>
<td>LC</td>
</tr>
<tr>
<td>Macroprotodon mauritianicus</td>
<td>False Smooth Snake</td>
<td>LC</td>
</tr>
<tr>
<td>Mesalina bahaladinicuratorum</td>
<td>Small-spotted Lizard</td>
<td>LC</td>
</tr>
<tr>
<td>Natrix tessellata</td>
<td>Dice Snake</td>
<td>LC</td>
</tr>
<tr>
<td>Ophisops elegans</td>
<td>Snake-eyed Lizard</td>
<td>LC</td>
</tr>
<tr>
<td>Phrynocephalus arabicus</td>
<td>Arabian Toadhead Agama</td>
<td>NT</td>
</tr>
<tr>
<td>Platycetes elegans</td>
<td>Elegant Racer</td>
<td>LC</td>
</tr>
<tr>
<td>Stenodactylus arabicus</td>
<td>Arabian Short-fingered Gecko</td>
<td>LC</td>
</tr>
<tr>
<td>Varanus griseus</td>
<td>Desert Monitor</td>
<td>LC</td>
</tr>
<tr>
<td>Walterinnesia aegyptia</td>
<td>Desert Cobra</td>
<td>LC</td>
</tr>
</tbody>
</table>

The status and actual presence of the species mentioned above in the project area is unknown.
3.2.2 Freshwater Ecosystems

The riparian vegetation predominantly comprises reeds and rushes that grow in the wetland areas and includes poplars, willows and tamarisk trees along river channels, banks, and beside irrigation ditches throughout the country. The freshwater habitats of the Tigris-Euphrates River Eco-region are surrounded by desert xeric shrub lands and therefore are considered as important corridors for the wildlife. The typical riparian and aquatic vegetation is presented in the Table below:

**Table 10: Typical Aquatic and Riparian Vegetation in the Project Area**

<table>
<thead>
<tr>
<th>Species</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeluropus lagopoides</td>
<td>Xanthium sp.</td>
</tr>
<tr>
<td>Alhagigraecorum</td>
<td>Typhadomingensis</td>
</tr>
<tr>
<td>Aster tripolium</td>
<td>Cyperuslaevigatus</td>
</tr>
<tr>
<td>Atriplex sp.</td>
<td>Tamarix sp.</td>
</tr>
<tr>
<td>Bacopamonnieri</td>
<td>Vallisneria sp.</td>
</tr>
<tr>
<td>Capparisspinosa</td>
<td>Seidlitziarosmarinus</td>
</tr>
<tr>
<td>Carthamus oxyacanthus</td>
<td>Emexspinosa</td>
</tr>
<tr>
<td>Ceratophyllum demersum</td>
<td>Halocnemumstrobilaceum</td>
</tr>
<tr>
<td>Myriophyllum spicatum</td>
<td>Prosopisfarcta</td>
</tr>
<tr>
<td>Seidlitziarosmarinus</td>
<td>Hydrillaverticillata</td>
</tr>
<tr>
<td>Chara sp.</td>
<td>Prosopisjuliflora</td>
</tr>
<tr>
<td>Cynanchum acutum</td>
<td>Schismusbarbatus</td>
</tr>
<tr>
<td>Phragmites australis</td>
<td>Juncus sp.</td>
</tr>
<tr>
<td>Potamogeton crispus</td>
<td>Salicorniaharbacea (Linnaeus)</td>
</tr>
<tr>
<td>Potamogeton lucens</td>
<td>Schoenoplectuslitoralis</td>
</tr>
</tbody>
</table>

The fauna of the freshwater eco-systems is dominated by cyprinids, approximately 75% of the eco-region’s species and native fauna is represented by genus Barbus considered as economically important species. The most common species are presented in the Table below:

**Table 11: List of Freshwater Fish Species**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Economic Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenualosailisha</td>
<td>River shad</td>
<td>High</td>
</tr>
<tr>
<td>Alburnoides bipunctatus</td>
<td>Ripple minnow</td>
<td>Moderate</td>
</tr>
<tr>
<td>Barbubbarbalus</td>
<td>Common barbel</td>
<td>High</td>
</tr>
<tr>
<td>Barbusesocinus</td>
<td>Pike barb</td>
<td>High</td>
</tr>
<tr>
<td>Barbusrugosus</td>
<td>Largescaled barb</td>
<td>High</td>
</tr>
<tr>
<td>Barbussubquincunciatus</td>
<td>Leopard barbel</td>
<td>High</td>
</tr>
<tr>
<td>Cyprinion kais</td>
<td>Kais kingfish</td>
<td>None</td>
</tr>
<tr>
<td>Typhlogarrawiddowsoni</td>
<td>Iraq blind barb</td>
<td>None</td>
</tr>
<tr>
<td>Liza abu</td>
<td>Freshwater mullet</td>
<td>High</td>
</tr>
<tr>
<td>Liza klunzingeri</td>
<td>keeled mullet and back keeled mullet</td>
<td>Low to moderate</td>
</tr>
<tr>
<td>Cobitistaenia</td>
<td>stone loach</td>
<td>Low to moderate</td>
</tr>
</tbody>
</table>

---

3.2.3 Status of Habitats
The project area does not contain any globally important habitats or ecosystems. There are no Nature Reserves or other legally protected areas in the vicinity of the project or in a close proximity. The area is well away from any sites of special ecological value. It is also distanced from “leading lines” that identify migration routes, and distant from Important Bird Areas (IBAs).

No conservation practices are exercised in the project area apart from the control of hunting to the extent they are controlled and monitored throughout the country.

At present, two endangered species are associated with the eco-region of the project: Steppe Eagle (*Aquila nipalensis*) and Euphrates Soft-shelled Turtle (*Rafetus euphraticus*). However, their actual presence in the project area is highly doubtful.

The habitats both terrestrial and aquatic are modified habitats due to human exploitation for extended period of time.

3.3 Land Acquisition
As the works consist of the repair and rehabilitation of an existing bridge, there will be no need to purchase additional land. Furthermore, there are no livelihoods in the project vicinity that are likely to be adversely affected by the project, hence neither involuntary nor voluntarily relocation of people is necessary or expected. Accordingly OP 4.12 will not be applied for this project.

3.4 Socio-Economic Baseline Conditions
Covering almost all of western Iraq, AlAnbar is Iraq’s largest governorate, but also the most sparsely populated. Desert dominates the landscape, particularly in Al-Rutba district. The governorate borders Saudi Arabia, Syria and Jordan. Below are some indicators of the socio-economic baseline of Al Anbar17.

- Area: 138,228 km² (32% of Iraq)
- Population: 1,365,985 persons (5% of total)
- Gender Distribution: Male: 50%; Female: 50%
- Geo Distribution: Rural: 48%; Urban: 52%

![Illustration showing percentage distribution of the population in Al Anbar](image)

17 Source: GoI COSIT (est. for 2007)
The population of Ramadi City is estimated as 375,000 persons.

Over half (52%) of households in Al Anbar Governorate are in Iraq’s lowest expenditure quintile – one of the highest concentrations of poverty in Iraq. Over a quarter (27%) of children in the governorate are chronically malnourished. High proportions of households in Ramadi (19%), Hit (33%) and Rawa (27%) source their drinking water straight from a stream, river or lake, and poor electricity supplies affect large numbers of people in Ramadi, Hit and Falluja.

Illiteracy rate is one of the highest in the country. In the city of Ramadi the illiteracy rate for aged 10 and over is almost 13.4%.

The number of households in Ramadi living below the poverty line (2.2 US $ per day) is 32.9%.

Access to sanitary network is 82.4%. No sanitary landfills in the area, only authorized dumping sites; municipal waste collection rate is 43.1%.

Agriculture provides a quarter of jobs in the governorate. Unemployment in the governorate is lower than average at 14%, but this rises to 21% in the governorate capital, Ramadi. In addition, half of all jobs in the governorate are unwaged, with two thirds of these in agriculture where the family members are involved in the activity without the regular wages.

At present, according to the assessment of the Ministry of Health of Iraq only 10% of the existing healthcare facilities are operational. In Ramadi city, about 82.3% of population have access to the medical and healthcare services.

Ramadi stands on an important trade route leading across the desert to Jordan and the Mediterranean Sea. The main Amman–Baghdad road passes through the city. A railway line also runs through the southern outskirts of Ramadi, heading east to Baghdad and west to Haditha and the Syrian border.

No sites of historical, cultural or religious importance are located in the project area.

3.5 Traffic Level

3.5.1 Alternative road
Currently and during rehabilitation works, Al-Houz Bridge located around 2.3km south of Omar Bin Abdul Aziz Bridge and parallel to it can be used as alternative as shown in the figure below. The traffic flow on the Al-Houz Bridge is expected to be quite high since it will be accommodating all traffic diverted from the Omar Bin Abdul Aziz Bridge and Al Qasem Bridge.
The Bridge is currently un-trafficable and the vehicles are using alternative roads

### 3.5.2 Roads Infrastructure

One of the main roads leading north from Baghdad heads to Samarra and Tikrit, also passing Bayji on its way to Mosul. From Tikrit, a primary road heads northeast to Kirkuk. A main road also crosses the province at Bayji, running northeast to Kirkuk and southwest to Haditha in Al Anbar province and on the Al-Qaim border crossing with Syria. Iraq's major north-south rail line passes through Salah al-Din, with service from Baghdad to Mosul via Tikrit. Salah al-Din has 9 airfields with runways longer than 1800m.
4 LEGAL ASPECTS

4.1 National Legislation

Legislation comprises the laws and legal acts referring to different aspects of the environmental protection; legislation most relevant to the project scope is presented below.

4.1.1 General Environmental Legislation

The Law for the Protection and Improvement of Environment No. 27, 2009: The Law necessitates the provision of the Environmental Impact Assessment (Article 18) for any new developmental project in the country. The Law addresses the issues of regulation of air pollution and noise reduction, protection of soils, biodiversity conservation, management of hazardous waste, protection of the environment from pollution resulting from exploration and extraction of oil and natural gas, establishment of an environmental protection fund. Additionally, the law specifies the necessity of protection of water resources from pollution and regulates the discharge of effluents independently of their origin. Also, the law specifies the punitive measures for violation of the specified regulations. Under the Law No. 27 of 2009, the project is classified as Category B project.

Protection of Wild Animals and Birds No. 21 of 1979 states that Ministry of Agriculture issues the list of protected species of animals and birds, prohibited zones, hunting seasons, hunting gears and methods (Article 5).

Regulating Exploitation and Protection of Aquatic Life No. 46 of 1976 regulates breeding and protection of aquatic life, fishing seasons, fishing methods and gear, prohibits the use of chemicals and explosives for fishing.

4.1.2 Water Resources

Ministry of Water Resources Law No. 50 of 2008: The Law provisions for establishing the Ministry of Water Resources and creating the legal and technical framework for institutionalization of water resources management in the country. The main tasks of the Ministry are: organize the water distribution and manage the flood risks; conduct studies aimed at encouraging projects for irrigation, supply reclamation, dams and groundwater; manage, operate and maintain these projects; coordinate with the competent planning and consumer sectors in line with the sustainable development; introduce modern technologies and Geographic Information Systems (GIS) for developing efficient working methods. Article 2 states “preserve ground and surface water from pollution, giving priority to the environmental aspect, and revive and maintain marshlands and other water surfaces.”

Public Health Law No. 89 of 1981, amended by Resolution No.54 of 2001: In addition to addressing various issues related to the population health, the Law stipulates the provision of the safety of drinking water and drinking water quality standards.
Regulation for the Provision of Water Resources, No. 2, 2001. Chapter 2 provides instructions on disposal of or recycling of wastewater. It also prohibits either discharge of effluent by private or public into public water, unless after the obtainment of an approval to discharge those wastes as per the criteria and specifications set out by the Environment Protection and Improvement Directorate (EPID). EPID is also allowed to issue environmental restrictions pertaining to the quality of public water as well as the quality of water discharged into public water, sewage systems, or rainwater.

The Regulation for the Protection of Rivers No. 25, 1967: the act regulates wastewater discharges and provides physical, biological, and chemical guidelines for water quality. Also, the regulation provisions for protection of public water bodies from pollution.

Law No. 27 of 1999 concerning the establishment of the General Authority for Water and Sewage provides instructions to the local authorities on provision of drinking and processing of raw water and the discharge of sewage and rainwater in all parts of Iraq beyond the boundaries of the Municipality of Baghdad.

The regulations define the permissible discharge limits to both natural waters and sewers. Some of the values are presented in the Table below:
### Table 12: Effluent Discharge Parameters

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Limits for Discharge into Water Bodies</th>
<th>Limits to discharge into Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Temperature</td>
<td>&lt;35°C</td>
<td>45°C</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>60 mg/L</td>
<td>750 mg/L</td>
</tr>
<tr>
<td>pH</td>
<td>6 - 9.5</td>
<td>6 - 9.5</td>
</tr>
<tr>
<td>BOD</td>
<td>&lt;40</td>
<td>1000</td>
</tr>
<tr>
<td>COD</td>
<td>&lt;100</td>
<td>N/A</td>
</tr>
<tr>
<td>Nitrate</td>
<td>50 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Phosphate</td>
<td>3 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Free Chlorine</td>
<td>Trace</td>
<td>100 mg/L</td>
</tr>
<tr>
<td>Lead</td>
<td>0.1 mg/L</td>
<td>0.1 mg/L</td>
</tr>
<tr>
<td>Copper</td>
<td>0.2 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.005 mg/L</td>
<td>0.001 mg/L</td>
</tr>
<tr>
<td>Sulphate</td>
<td>if the ratio of the discharge is to the amount of source water is 1:1000 or less, the sulphate concentration should not exceed 400 mg/L</td>
<td>300 mg/L</td>
</tr>
<tr>
<td>Total hydrocarbons &amp; derivatives</td>
<td>For the river with continuous flow, 5mg/L provided the ratio of discharge to source water is 1:500</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### 4.1.3 Waste Management

**Instructions No. 2 of 2014 on Environmental Protection from Municipal Waste:**

These Instructions, consisting of 5 articles, aim at protecting the urban environment with a proper management of wastes, such as solid materials, recyclable and non-recyclable derived from domestic, commercial and professional activities, from the cleaning of streets, gardens, farms and public places, and construction waste. The Ministry of Municipalities and Public Works and the Municipality of Baghdad are responsible for collecting and transporting waste materials in places for the treatment and disposal; for creating the necessary supplies and equipment; for identifying appropriate locations and the development of containers to throw municipal waste; for distributing of special bags for waste producers; and for identifying waste collection dates. The aforementioned Ministry and Municipality have to decide on how to treat the reusable materials and dispose of others through landfills. Special provisions are established for waste weighing more than 50 kilograms and for farms owners and investors in farming.

**Directive No. (67) of 1986 Regulating the Debris Collection Areas:** debris disposable should be done in areas with stable geology and avoid siting near particularly vulnerable or sensitive ecosystems and groundwater and surface water resources.
4.1.4 Air Quality

*Clean Air Act No.1 of 2004* provides the guidelines for prevention and control of air pollution, as well as the applicable national standards of the most common air pollutants.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Iraqi Standard</th>
<th>WHO Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration</td>
<td>Averaging Time</td>
</tr>
<tr>
<td>CO</td>
<td>10 ppm</td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td>35 ppm</td>
<td>1 hour</td>
</tr>
<tr>
<td>SO₂</td>
<td>0.1 ppm</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>0.04 ppm</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>0.018 ppm</td>
<td>1 year</td>
</tr>
<tr>
<td>NO₂</td>
<td>0.05 ppm</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>0.04 ppm</td>
<td>1 year</td>
</tr>
<tr>
<td>O₃</td>
<td>0.06 ppm</td>
<td>1 hour</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>150 g/m³</td>
<td>24 hours</td>
</tr>
<tr>
<td>PM₂₅</td>
<td>65 g/m³</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>15 g/m³</td>
<td>1 year</td>
</tr>
<tr>
<td>Total Suspended</td>
<td>350 g/m³</td>
<td>24 hours</td>
</tr>
<tr>
<td>Particles</td>
<td>150 g/m³</td>
<td>1 year</td>
</tr>
<tr>
<td>Falling Dust</td>
<td>10 t/km²/month - residential zone</td>
<td>30 days</td>
</tr>
<tr>
<td></td>
<td>20 t/km²/month - industrial zone</td>
<td>30 days</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>0.24 ppm</td>
<td>3 hours</td>
</tr>
<tr>
<td>Pb</td>
<td>2 g/m³</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>1.5 g/m³</td>
<td>3 months</td>
</tr>
<tr>
<td></td>
<td>1 g/m³</td>
<td>1 year</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.003 g/m³</td>
<td>1 year</td>
</tr>
<tr>
<td>Dioxin</td>
<td>0.6 pico g/m³</td>
<td>1 year</td>
</tr>
</tbody>
</table>

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.
4.1.5 Ambient Noise and Vibration
Noise Prevention Law No. 21 of 1966 aims to prevent the excessive noise in public places. The regulations prevent broadcasting in public places that may disturb peace between 10 p.m. and 8 a.m.

Instruction No. 2 of 1993 details the levels of noise emitted from sound equipment in tourist facilities. Additionally, it sets the maximum permissible noise limits of 70 dB (A) for industrial and commercial activities and 55 dB (A) for residential activities.

Directive No. 4 of 1993 concerning occupational health, protection of workers against vibration: Pursuant to Sections 3 and 105 of the Public Health Act (No. 89 of 1981), establishes work place procedures designed to minimize vibration and any harmful effects that it might have on workers. Stipulates maximum total daily limits for exposure to vibration.

4.1.6 Occupational Health and Safety
Instructions No. 3/1985 Concerning Occupational Safety: Provides for the enforcement of occupational safety provisions at places of work.

- Regulates that all work places are to appoint a person in charge of occupational safety and an occupational safety committee.
- Provides for the appointment and duties of the person responsible for occupational safety and for the occupational safety committee at each workplace.
- Establishes the functions and duties of employers and employees with regard to occupational safety.

Law No. 6 of 1988 concerning the National Commission for Occupational Hygiene and Safety governs the enforcement of occupational health and safety regulations.

- Provides for inspections of places of employment and inspections reports.
- Establishes the duties and responsibilities of employers vis-a-vis occupational health and safety.
- Establishes the functions of safety commissions at places of work.
- Regulates the responsibilities and duties of workers with respect to occupational health and safety.

4.1.7 Cultural resources
Law No.55 of 2002 for The Antiquities & Heritage of Iraq defines all movable and immovable antiquities, archeological properties, and artifacts. The Law provides regulations on communication channels upon discovery of the unregistered antiquities and the measures to be undertaken for the preservation of the historical and archeological sites.
4.1.8 Land acquisition

**Acquisition Law No.12 of 1981** governs the expropriation of property through acquisition and entitlement for compensation and replacement costs, cancellation of legal rights and other issues of acquisition for the public benefit.

4.1.9 International Conventions and Treaties

The number of international conventions and treaties have been signed and ratified by the Iraqi Government.

- UN Convention for Biological Diversity (UNCBD);
- UN Convention to Combat Desertification (UNCCD);
- RAMSAR Convention on Wetlands;
- UNESCO World Heritage Convention;
- United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol.

4.1.10 Applicable Engineering Standards

At present, there is no national Building Code in Iraq and the most commonly used are the ACI 318 codes comprising:

- General requirements.
- Inspection.
- Materials.
- Durability requirements.
- Concrete quality, mixing and placing.
- Formwork, embedment and construction joints.
- Details of reinforcement.
- Analysis and design—general considerations.
- Strength and serviceability requirements.
- Flexure and axial loads.
- Shear and torsion.
- Development and splices of reinforcement.
- Two-way slab systems.
- Walls.
- Footings.
- Precast concrete.
- Composite concrete flexural members.
- Pre-stressed concrete.
- Shells and folded plate members.
- Strength evaluation of existing structures.
- Earthquake-resistant structures.
- Structural plain concrete.
- Appendix A: Strut and tie models.
Appendix B: Alternative provisions for reinforce and pre-stressed concrete flexural and compression members.

Appendix C: Alternative load and strength reduction factors.

Appendix D: Anchoring to be concrete.

Appendix E: Steel reinforcement information.

Appendix F: Equivalence between SI-metric, MKS-metric and U.S. customary units of nonhomogeneous equations in the code

Geotechnical requirements are taken from IBC code:

- Geotechnical investigations (1803): Classification and identification of soil are conforming to ASTM D2487, ASTM D4318, ASTM D422 and ASTM D4829 standards respectively.
- Excavation, grading and fill (1804): They are defined according to ASTM D1557 standards and the Controlled Low-Strength Material (CLSM).
- Damp-proofing and waterproofing (1085): The requirements of the story of above a grade plane, under floor spaces, follow the requirements of FEMA/FIA-TB-11. Ground water control, Damp-proofing the mortar used comply with ASTM C887.
- Presumptive load-bearing values of soil (1806): It concerns determining the load combinations, presumptive load-bearing values and lateral load resistance.
- Foundation walls, retaining walls and embedded posts and poles (1807): Masonry foundation walls with reinforcement and the concrete masonry comply with ASTM C90. While, clay masonry complies with ASTM C62 or ASTM C216.
- Foundations (1808): The criteria for foundation design, design for expansive soils, slab-on-ground foundation, stabilization, and foundation on or adjacent to slopes, pools, and concrete foundations are presented in this section.
- Shallow foundation (1809): All requirements for design and construction for shallow foundations (such as supporting soils, stepped footings, depth and width of footings, frost protection and location of footings) are listed. Moreover, plain concrete footings, masonry-unit footings, steel grillage footings, timber footings, and footing seismic ties are also listed.
- Deep foundations (1810): The analyses and design details and installations of deep foundations are given. These details include geotechnical investigation, use of existing deep foundation elements, and special type of deep foundations.

Materials: Testing must be done to any materials used in concrete constructions to define if the materials are of the specified quality. Materials are:

- Cement: Different types of cement are used in buildings (such as Portland, blended hydraulic, expansive hydraulic, hydraulic, flash and natural pozzolan,
slag and silica fume). All types of cement must conform to the relevant specifications of ASTM C150, ASTM C595, ASTM C845, ASTM C1157, ASTM C618, ASTM C989 and ASTM C1240 respectively

- Aggregates added to cement to produce concrete of adequate strength and durability. Aggregates are conformed to each of the following specifications: normal weight (ASTM C33) or lightweight (ASTM C330). Coarse aggregate must have maximum size due to one of the following: 1/5 the narrowest dimension between sides of forms, or 1/3 the depth of slabs, or 3/4 the minimum clear spacing between individual reinforcing wires or bars, bundled tendons, bundles of bars, or ducts

- Water used in mixing concrete must conform to (ASTM C1602). Drinking water is also suitable to be used for mixing concrete. Water has excessive impurities that may not affect the setting time, volume stability and concrete strength and may cause corrosion of reinforcement. Water use in mixing concrete must have limited quantities for sulfates, chlorides, solids and alkalis

- Admixtures that are used to reduce water and time setting modifications must conform to (ASTM C494). Types of admixture are air-entraining (must conform to ASTM C260), flowing concrete (must conform to ASTM C1017) and expansive cement use in concrete (must conform to ASTM C845)

- Steel reinforcement includes deformed and plain reinforcements. Deformed reinforcement bars have different types such as: Carbon steel conforms to ASTM A615; Low-alloy steel conforms to ASTM A706; Stainless steel conforms to ASTM A955 and Roll steel and axel steel conforms to ASTM A996. While, plain reinforcement types are plain bars for spiral reinforcement must conform to (ASTM A615, A706, A955, or A1035); plain wire for spiral reinforcement must conform to (ASTM A1064), and headed studs and its assemblies must conform to (ASTM A1044) [24].
4.1.11 WB Safeguard Policies

The main safeguard policy triggered by this project is OP/BP 4.01 Environmental Assessment.

The project does not require permanent or temporary land acquisition. Therefore OP/BP 4.12 Involuntary Resettlement is not triggered.

**OP/BP 4.01 Environmental Assessment**

This policy is triggered if a project is likely to have significant adverse environmental impacts in its area of influence. According to the World Bank WB OP 4.01 the project is classified as Category B. Category B projects have mostly site-specific adverse environmental impacts. The examples include:

- Small scale irrigation and drainage projects
- Small-scale, relatively clean (gas or light diesel oil fired) thermal power plants, micro hydro power plants, and small sanitary landfills;
- Rehabilitating or maintaining an existing infrastructure (e.g., roads, power, transmission and irrigation networks)

For all Category A and B projects proposed for IBRD or IDA financing, during the EA process, the borrower consults project affected groups and local nongovernmental organizations (NGOs) about the project’s environmental aspects and takes their views into account.

Any separate Category B report for a project proposed for IDA financing is made available to project-affected groups and local NGOs. Public availability in the borrowing country and official receipt by the Bank of Category A reports for projects proposed for IBRD or IDA financing, and of any Category B EA report for projects proposed for IDA funding, are prerequisites to Bank appraisal of these projects.

The Environmental Assessment takes into account the natural environment (air, water, and land); human health and safety; and social aspects (involuntary resettlement, physical cultural resources, etc.) in addition to trans-boundary and global environmental aspects.

This operational policy states the roles of the Bank and the Borrower:

The Bank mainly screens and sets the environmental assessment category and advises the borrower in terms of the Environmental Assessment requirements. The Bank reviews the findings and recommendations of the EA to determine whether they provide an adequate basis for processing the project for Bank financing. When the borrower has completed or partially completed EA work prior to the Bank's involvement in a project, the Bank reviews the EA to ensure its consistency with this policy. The Bank may, if appropriate, require additional EA work, including public consultation and disclosure.
The Borrower assists the bank in proper screening and will be responsible for carrying out environment assessment in compliance with the Bank’s rules and national laws. The Borrower will also be responsible in consulting project affected persons and local Non-Governmental Organizations. The Borrower will disclose the draft/final documents and respond to any feedback provided from the Bank and/or the Public/stakeholders.

4.1.12 BP 17.50 WB Disclosure Policies
This WB Policy supports decision making process by the Borrower and WB through allowing public access to information on environmental and social aspects of projects. Disclosure of key project documents, including executive summaries in English and the local language, is mandated:

- In Country – prior to project appraisal in local language and in English
- In the WB Info Shop before project appraisal in English with the Executive Summary in English and in the local language

4.1.13 Environmental, Health, and Safety Guidelines
The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to IFC, become project- or site-specific requirements. The guidelines applicable to the project are Environmental, Health, and Safety General Guidelines. EHS recommend adopting the WHO standards for acceptable emission levels as presented in the Table 13 in Chapter 4.1.4.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.
5 ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT

5.1 Impacts Significance Evaluation during Rehabilitation/Construction Phase

The assessment of the potential adverse impacts on different environmental parameters during the construction phase was done using the Leopold Matrix: on the horizontal axis, the actions which cause environmental impact, and on the vertical axis, the existing environmental receptors which may be affected by those actions. M is the magnitude in the sense of degree, extensiveness, or scale. S is the significance of the proposed actions on the specific environmental characteristics and conditions. Magnitude and significance are presented on scale from 1 to 10, 1 being the least and 10 being the highest.
## Table 14: Impacts Significance Evaluation Matrix – Construction Phase

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Scale</th>
<th>Cleaning</th>
<th>Assembly work</th>
<th>Pile Driving</th>
<th>Pile cap construction</th>
<th>Columns construction</th>
<th>Graders installation</th>
<th>Deck erection</th>
<th>Waste Disposal</th>
<th>Construction Camp</th>
<th>Paving</th>
<th>Machinery &amp; Transportation</th>
<th>Crack Cleaning</th>
<th>Guardrails installation</th>
<th>Electric cables installation</th>
<th>Lighting poles installation</th>
<th>Signage installation</th>
<th>Total Impact Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>M</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>Moderate</td>
</tr>
<tr>
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<td>S</td>
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<tr>
<td>Surface water</td>
<td>M</td>
<td>7</td>
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<td>Moderate</td>
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<td>Groundwater</td>
<td>M</td>
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<td>Air</td>
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</tr>
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<td>5</td>
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<td>9</td>
<td>1</td>
<td>1</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>M</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>6</td>
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<td>Freshwater habitat</td>
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</tr>
<tr>
<td>Receptor</td>
<td>Scale</td>
<td>Cleaning</td>
<td>Assembly work</td>
<td>Pile Driving</td>
<td>Pile cap construction</td>
<td>Columns construction</td>
<td>Girder's installation</td>
<td>Deck erection</td>
<td>Waste Disposal</td>
<td>Construction Camp</td>
<td>Paving</td>
<td>Machinery &amp; Transportation</td>
<td>Crack Cleaning</td>
<td>Guardrails installation</td>
<td>Electric cables installation</td>
<td>Lighting poles installation</td>
<td>Signage installation</td>
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<td>Terrestrial habitat</td>
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<td>Land use</td>
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<tr>
<td>Health &amp; Safety</td>
<td>M</td>
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<td>7</td>
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</tr>
<tr>
<td>Disruption of regular activities</td>
<td>M</td>
<td>5</td>
<td>3</td>
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<td>3</td>
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<td>Minor</td>
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<td></td>
</tr>
<tr>
<td>Cultural Physical Resources</td>
<td>M</td>
<td>3</td>
<td>4</td>
<td>2</td>
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</tr>
</tbody>
</table>
The majority of impacts are expected to be minor to moderate and a short-term.

5.2 Potential Adverse Impacts during Rehabilitation Phase

5.2.1 Impacts on Soil
The main potential adverse impacts on soil are:

- Soil erosion due to the excavation activities and leaving open excavated areas during rain events or in the vicinity of existing watercourses. Soil erosion is exacerbated due to removal of vegetation cover way ahead of actual construction works and in areas of excavated soil heaps due to their loose structure. Soil erosion may lead to loss of fertile land in agricultural areas and in damage to existing infrastructure like roads.

- Land contamination: due to the inadequate disposal of the effluent, solid waste, and construction debris, leakage of fuel and oil from the equipment; Accidental spillage of fuel and lubricants during transportation of the construction materials. Soil contamination presents the risk to such receptors as native vegetation, freshwater habitat in case of transporting of sediment during the rain events and local population.

The impacts are expected to be moderate.

5.2.2 Impacts on Water Resources
During construction phase, water will be needed for domestic and potable use of the staff (estimated at 60 l/d per worker), for soil watering and spraying to suppress dust and to clean the equipment and the work site offices. The water supply requirements will be provided by trucks through licensed service provider from sustainable water source. The source of this water is via the local water network in locations identified by the municipality. Normally, the same source of water is used for spraying and equipment cleaning. Drinking water is provided as bottled water. Other potential impacts on water resources may be due to the following:

- Alteration of water flow and drainage due to debris disposal in unauthorized areas blocking the natural drainage patterns. Potentially, it can cause ponding, causing a threat to public health and safety, a concentration of nuisance insects and damage to surrounding soils and vegetation. The impact is considered moderate.

- Contamination of surface water: spillages of chemicals and hydrocarbon products; removal of debris from the water channel; disposal of the raw sewage from the construction camp directly into the water courses as it is a common practice in the area; disposal of generated solid waste from the construction camp and construction debris on ad hoc basis as is also the common practice in the area. Surface water contamination can be the source of groundwater contamination due to leaching of contaminants into the soil and eventually infiltrating into the aquifer. The most sensitive receptors are the
wildlife depending on the surface water for drinking and local population using the groundwater for drinking and irrigation purposes. The impact is considered as moderate.

- Contamination of groundwater through the leachate from improperly disposed construction debris and materials containing hazardous matter. Improper wastewater disposal, such as from construction camp facilities, on soils may also percolate to groundwater causing contamination of subsurface/groundwater table.

- Contaminated wastewater by engine oils or lubricant after washing of equipment or by accidental spills may percolate to the soil thus polluting the ground waters and affecting its ecosystem. Due to the underlying rock structure mostly comprising of lime stone, the impact is considered minor due to the potential filtration of effluent before reaching the groundwater levels.

The overall impact related to water resources is considered moderate.

### 5.2.3 Impacts on Biodiversity

The **impacts on flora** populations are associated with vehicle movements beyond agreed working areas, and in some cases unplanned burning. The impact is considered minor.

The **impacts on fauna** are estimated also minor. Fauna may suffer reduction in biodiversity through destruction of dens, burrows and nests, clearance of feeding grounds, increased traffic kills.

The disruption of wildlife movement and foraging patterns are also anticipated during construction phase.

Although the project area is a residential area, there is a possibility of terrestrial **habitat fragmentation** of the remnants of natural and semi-natural environments which eventually might lead to decline in bio-diversity in flora and fauna. However, this impact is considered negligible.

The impact on freshwater and riparian habitats is considered moderate to severe. The main cause of the impact could be contamination of the surface water which will lead to reduction of the freshwater biodiversity. The cutting of reeds by the construction workers can lead to riparian habitat destruction and have the most effect on migratory birds using this type of habitat for cover.

The cleaning and dredging activities can lead to the increased turbidity and raising silt from the channel bed which can lead to an impact on the aquatic species and especially on fish species during the breeding season. The impact is considered moderate.

### 5.2.4 Impacts on Air Quality

The main sources of air pollution are:
• Cleaning activities raising dust such as debris removal;
• Increased dust levels due to excavation and transportation activities, especially transport of the debris in open vehicles. The dust and particulate matters may occur also from accumulated piles of stored inert waste material (stockpiles of ground asphalt, rubble, gravel, and also sand) at/ or near the site prior to their removal for disposal.
• Air pollutants typically associated with the combustion of fossil fuels, such as nitrogen oxides (NOx), sulfur dioxide (SO\textsubscript{2}), carbon monoxide (CO), and particulate matter (PM), volatile organic compounds (VOCs) and metals that may also be associated with emissions from vehicles, equipment, and materials.
• Increased sedimentation load raised by cleaning activities
• Additionally, soils due to downwash of the pollutants can be exposed to atmospheric pollution due to settling of the dust on the soils.

The impact is considered moderate. The main receptors are local population and since the project is distanced from populated areas the impact on the resident in the area is minor.

### 5.2.5 Noise and Vibration Impacts
The main sources of noise during construction phase are the noises produced by the operation of the construction machinery. The levels of noise of different operating machinery are as provided in the following table.

<table>
<thead>
<tr>
<th>Clearing</th>
<th>Structure Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulldozer 80</td>
<td>Crane 75-77</td>
</tr>
<tr>
<td>Front End Loader 72-84</td>
<td>Welding Generator 71-82</td>
</tr>
<tr>
<td>Jack Hammer 81-98</td>
<td>Concrete Mixer 74-88</td>
</tr>
<tr>
<td>Crane with Ball 75-87</td>
<td>Concrete Pump 81-84</td>
</tr>
<tr>
<td></td>
<td>Concrete Vibrator 76</td>
</tr>
<tr>
<td><strong>Excavation &amp; Earth Moving</strong></td>
<td>Air Compressor 74-87</td>
</tr>
<tr>
<td>Bulldozer 80</td>
<td>Pneumatic Tools 81-98</td>
</tr>
<tr>
<td>Backhoe 72-93</td>
<td>Bulldozer 80</td>
</tr>
<tr>
<td>Front End Loader 72-84</td>
<td>Cement and Dump Trucks 83-94</td>
</tr>
<tr>
<td>Dump truck 83-94</td>
<td>Front End Loader 72-84</td>
</tr>
<tr>
<td>Jack Hammer 81-98</td>
<td>Dump truck 83-94</td>
</tr>
<tr>
<td>Scraper 80-93</td>
<td>Paver 86-88</td>
</tr>
<tr>
<td><strong>Grading and Compacting</strong></td>
<td><strong>Landscaping &amp; Clean-Up</strong></td>
</tr>
<tr>
<td>Grader 80-93</td>
<td>Bulldozer 80</td>
</tr>
</tbody>
</table>
The noise emission levels are expected to exceed the EHS Guidelines for noise levels (presented in the Table below) and the noise impact is considered as moderate and poses a significant health risk to the workers using the equipment. The project is near residential areas (200 m) and the noise level reaching the residential areas will be within the EHS guideline levels as per Table 17 or just slightly exceeding them according to the wind direction; therefore, the impact on residents of the area is minor to moderate as shown in the following table.

Table 16: Noise Emission Levels dB (A) and Distance to the Equipment

<table>
<thead>
<tr>
<th>Type</th>
<th>Distance between Equipment and Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5m</td>
</tr>
<tr>
<td>Loader</td>
<td>90</td>
</tr>
<tr>
<td>Grader</td>
<td>90</td>
</tr>
<tr>
<td>Vibration Roller</td>
<td>86</td>
</tr>
<tr>
<td>Bulldozer</td>
<td>86</td>
</tr>
<tr>
<td>Sprayer</td>
<td>87</td>
</tr>
<tr>
<td>Generator</td>
<td>98</td>
</tr>
<tr>
<td>Impact drill</td>
<td>87</td>
</tr>
<tr>
<td>Impact piling</td>
<td>112</td>
</tr>
<tr>
<td>Concrete mixer</td>
<td>91</td>
</tr>
<tr>
<td>Concrete pump</td>
<td>85</td>
</tr>
<tr>
<td>Pneumatic hammer</td>
<td>84</td>
</tr>
</tbody>
</table>

However, the noise will not be continuous and no noisy activities will be allowed to take place at night to prevent any inconvenience for the nearest community. As for on-site workers, the personal protective equipment should be used in order to reduce the impact of the noise and for the all period of work.

The overall noise impact is considered to be of moderate significance. The Table below presents the EHS Guidelines for noise levels acceptable in different environments.
Table 17: EHS Maximum Acceptable Levels

<table>
<thead>
<tr>
<th>Receptor</th>
<th>One Hour Lacq (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime 07.00-22.00</td>
</tr>
<tr>
<td>Residential, institutional, educational</td>
<td>55</td>
</tr>
<tr>
<td>Industrial, commercial</td>
<td>70</td>
</tr>
</tbody>
</table>

The construction equipment inevitably produces vibration, and in some cases the vibration can be quite severe posing the health risk to the personnel handling the equipment. The impact of vibration is considered moderate.

5.2.6 Land Use Impacts
The project will not include extensive excavation in undisturbed areas and only for the replacement of the existing communications; therefore, the impact on topography is considered minor.

The project does not require temporary nor permanent land acquisition.

5.2.7 Impacts on Utilities and Infrastructure
The temporary impacts on traffic during the period of construction will be primarily of two types in the intersections connecting the entrances to the bridge and the road leading to the alternative route, especially during the movement of the vehicles transporting debris and construction activities. The impact is considered minor.

5.2.8 Impacts on Cultural, Religious and Historic Heritage Sites
At present, no cultural, religious or historic heritage sites were identified in the immediate vicinity of the project as per consultations with the Department of Antiquities of Al Anbar Governorate. However, during construction phase the chance of finding important site is possible although unlikely. In such case, the procedure for dealing with this situations as specified in the Annex 1 will be applied. The impact is considered minor.

5.2.9 Damage to the Landscape
Construction sites are inherently unsightly and may impart substantial visual impact until excess soil and abandoned materials and equipment are cleared away on completion. Other temporary damage to the landscape may accrue from excessive ground clearance beyond agreed working areas, such as borrow pits and waste disposal areas. The impact is considered minor.
5.2.10 Public Safety
The risk to public safety in both physical and the types of risk posed is considered minor. Areas of most danger to public include:

- Where heavy equipment is moving in and out of construction area;
- The sites of loading of the debris;
- At storage areas for construction materials, fuel and surplus spoil.
- Undiscovered UXO/ERW may present additional risks to public and to employees therefore the extreme caution should be exercised while moving the debris despite the fact that the area have received clearance from the armed forces.

5.2.11 Worker’s Safety
All construction sites are inherently unsafe. The substantial risks to public safety as discussed above are limited by occasional and casual acquaintance the public will generally have with the proposed construction activity. For those employed on the project the risks are more varied and omnipresent. The impacts are considered moderate. These are:

- Inhaling of hazardous substances and extended exposure to dust;
- Health risk due to the extended exposure to noise and vibration;
- Falling from the raised scaffolding;
- Accidents involving construction vehicles and equipment;
- Since the project area is located in the politically volatile region, there is a possibility of acts of terrorism, violence and kidnapping.

However, the risks to workers on construction sites are well understood and documented and providing normal, internationally accepted Health and Safety procedures are followed, they can be minimized.

5.2.12 Waste Management
During construction phase the main sources of liquid waste generation are:

- Sewage from construction camp facilities ;
- Wastewater resulting from some construction activities containing high suspended solids;
- Oil residues and industrial fluids from washing of equipment and vehicles;
- Waste oil, grease and de-greasing solvents from vehicle and equipment servicing.

The main sources of solid waste are:

- Paper, discarded packaging and crates, redundant plant, used tires and broken or failed concrete products;
- Construction debris such as removed fragments of the destroyed bridge section;
- Residential containing organic waste from construction camps.
- The main impact of the inadequate waste disposal is potential contamination of soil and surface water resources, eventually infiltrating to groundwater resources.

5.2.13 Construction Camp Impacts
The construction camp has a number of facilities that if not adequately managed might potentially be detrimental to the environment. The impacts of the construction camp are considered as moderate and limited in magnitude and duration. The construction camp activities which can cause an impact are:

- Housing of construction crew and canteen (minimal in this project);
- Storage of construction materials;
- Parking lot and maintenance area for the construction machinery and equipment;
- Septic tank for the housing and canteen and disposal of effluent;
- Accidental spillage of hazardous materials;
- Accumulation of discarded and excessive materials;
- Accumulation of construction debris and residential solid waste;

Since the project envisions employment of nationals and preferably from local population the impact of the labor influx is very minor. The number of people to be employed on the site from the local community is expected to be 28 persons, and the technical staff to be employed will be the mix of national experts and local experts. The impact on the community is anticipated to be very minor since the technical personnel employed not from the local community is expected to stay at the site only during the working hours.

The most significant impact of the construction camp is potential surface water pollution, soil contamination and consequent contamination of shallow aquifer.

5.3 Potential Adverse Impacts during Operational Phase
The assessment of the potential adverse impacts on different environmental parameters during the operational phase was done using the Leopold Matrix as in the case of construction phase impacts. Results are presented in the following table.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Operation &amp; Maintenance Activities</th>
<th>Impact Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Settling of the columns</td>
<td>Traffic Movement</td>
</tr>
<tr>
<td>River bed</td>
<td>M 4 1 6 1 5 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 3 1 5 1 2 2</td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>M 4 3 5 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 2 1 3 2</td>
<td></td>
</tr>
<tr>
<td>Surface water</td>
<td>M 1 4 7 3 6 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 1 3 4 1 4 3</td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>M 1 1 1</td>
<td></td>
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<tr>
<td></td>
<td>S 1 1 1</td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>M 4 4 4 4</td>
<td></td>
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<tr>
<td></td>
<td>S 3 3 3 3</td>
<td></td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>M 5 5 4 6 5</td>
<td></td>
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<td></td>
<td>S 5 5 3 5 5</td>
<td></td>
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<tr>
<td>Flora</td>
<td>M 3 2 3</td>
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<td></td>
<td>S 2 1 2</td>
<td></td>
</tr>
<tr>
<td>Fauna</td>
<td>M 3 3 4</td>
<td></td>
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<td></td>
<td>S 2 1 3</td>
<td></td>
</tr>
<tr>
<td>Freshwater habitat</td>
<td>M 5 3 6 3 4 4</td>
<td></td>
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<td></td>
<td>S 4 1 5 1 2 3</td>
<td></td>
</tr>
<tr>
<td>Terrestrial habitat</td>
<td>M 3 3 4 3</td>
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<td></td>
<td>S 2 2 3 2</td>
<td></td>
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<tr>
<td>Land use</td>
<td>M 1 1 2</td>
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<tr>
<td></td>
<td>S 1 1 1</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>M 2 1 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 1 1 1</td>
<td></td>
</tr>
<tr>
<td>Health &amp; Safety</td>
<td>M 2 4 3 3 4 3</td>
<td></td>
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<tr>
<td></td>
<td>S 1 4 2 2 2 4 3</td>
<td></td>
</tr>
<tr>
<td>Disruption of regular activities</td>
<td>M 2 2 3 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 2 2 3 2</td>
<td></td>
</tr>
<tr>
<td>Aesthetic value</td>
<td>M 2 2 2</td>
<td></td>
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<tr>
<td></td>
<td>S 2 2 2</td>
<td></td>
</tr>
<tr>
<td>Archeological/Cultural/Historical resources</td>
<td>M 2 2 2</td>
<td></td>
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<tr>
<td></td>
<td>S 2 2 2</td>
<td></td>
</tr>
</tbody>
</table>

In general, the impacts during operational phase are considered minor with the exception of the increased levels of noise that are evaluated as moderate.

The main impacts during operational phase are:

**Soil:** minor impacts during the regular maintenance activities during the maintenance paving and scheduled structural repairs that might involve resurfacing of the...
pavement and localized excavation. Accumulated debris and accidental spills could potentially cause the soil contamination. The impact is considered minor.

**Water resources:** scheduled dredging around the bridge columns could lead to increased re-suspension of sedimentation thus affecting the quality of water. The sedimentation will be carried downstream and increase the accumulation of the suspended materials downstream. Accidental dumping of the debris during the resurfacing prior to paving and scheduled structural repairs might cause diversion of the water flow of the river and creation of the shallow areas and localized ponds. The impact is minor.

During rainy seasons, runoff water contaminated with oil and grease may cause pollution of the river.

**Biodiversity:** the impact is considered minor, the highest danger is to the freshwater habitat. Settling of the columns and dredging could potentially affect the flow pattern and increase the water turbidity and water quality which might have an impact of freshwater biodiversity. The accidental spills of the hazardous materials and increased levels of noise during the maintenance could cause the minor impacts on both the terrestrial habitats and freshwater habitats.

**Air quality:** Environmental effects of the vehicle emissions include acidification of soil and surface waters, adverse effects on crops and animal species, and damage to buildings and structures. During the operational phase the main impacts on the ambient air quality are expected to be from the traffic emissions using the road. Traffic types include short distance trips, long distance traveling and goods transportation with cars, public transport vehicles and small, large and heavy trucks as shown in the table below.
Table 19: Traffic Flow

<table>
<thead>
<tr>
<th>No</th>
<th>Vehicle Type</th>
<th>Daily Traffic</th>
<th>Annual Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Articulated truck</td>
<td>2000</td>
<td>730,000</td>
</tr>
<tr>
<td>2</td>
<td>Delivery truck</td>
<td>1500</td>
<td>547,500</td>
</tr>
<tr>
<td>3</td>
<td>Heavy Truck</td>
<td>1900</td>
<td>693,500</td>
</tr>
<tr>
<td>4</td>
<td>Medium Truck</td>
<td>2500</td>
<td>912,500</td>
</tr>
<tr>
<td>5</td>
<td>Medium bus</td>
<td>2000</td>
<td>730,000</td>
</tr>
<tr>
<td>6</td>
<td>Mini bus</td>
<td>2000</td>
<td>730,000</td>
</tr>
<tr>
<td>7</td>
<td>Passenger car</td>
<td>2500</td>
<td>912,500</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14,400</td>
<td>5,256,000</td>
</tr>
</tbody>
</table>

**Noise and Vibration:** For the noise prediction model the climatic data and traffic data were considered. The output of the model was $L_{eq}$ of 53 dB (A) and 34 dB(A) during the day and night, respectively. It is worth noting that the residential areas are distanced 200m from the bridge. The noise levels are within the values of EHS Guidelines for noise levels as presented in Chapter 5.2.5. Noise is considered as a minor impact during operational phase.

Vibration due to traffic takes the form of a low frequency disturbance that produces physical movement in buildings and their occupants that can be transmitted through the air or the ground. Ground born vibration produced by interaction between wheels and the road surface is typically of lower frequency, 8 – 20 Hz. Poor road condition is the prime factor in determining the susceptibility of buildings to traffic vibration which will not apply to the newly constructed road.

**Land use** impacts are considered very minor and are related to inadequate waste management.

**Public Health and Safety:** Accumulation of litter from passing vehicles and the debris of the scheduled and emergency repairs if not disposed timely and at the designated dumping site might pose the threat to public health. Traffic movement could potentially be the cause of accidents involving pedestrians. The impact is considered minor.

**Utilities and Infrastructure:** the facilities are using their own sources of power, and therefore no impacts are anticipated on the electric grid in the area.

**Physical, Cultural Resources:** The impact is expected to be negligible.

**Socio-Economic impacts:** During the operational period, the project is expected to result in positive socio-economic outcomes for the local communities. However, the GRM will be kept in continued operation of a GRM for one year after completion of works and will help address the complaints of the local community through an accessible, fair and transparent means of reporting any emerging adverse impacts, and a means of obtaining mitigation.
5.4 Indirect, Cumulative, and Residual Impacts

Indirect impacts are considered to be minor due to the limited duration of the construction activities. Nevertheless, transportation of materials, excavation, clearance contribute to dust generation and vehicle and equipment emissions which settle on soils and in run off valleys during dry season consequently contributing to the transport of sediments and pollutants to the main water bodies and infiltration into the shallow aquifer. Additionally, inadequate waste management and accidental spills of hazardous materials could potentially have an impact on the groundwater quality. The impact is exacerbated by inadequate waste management practices in the project area.

The main cumulative impact anticipated through implementation of this project is the incremental effect on of construction waste disposal on the waste management in the area already suffering from the lack of disposal facilities.

The other cumulative impact is the increase of the traffic flow at the Al-Houz Bridge which will be serving as an alternative route for traffic during the construction of the Omar bin Abdul Azziz Bridge and Al Qasem Bridge.

Residual or irreversible impacts are considered to be very minor and mostly concern the use of the construction debris dumping sites as permanent municipal waste disposal areas. Another residual impact will be the increased level of noise due to traffic movement.
6 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

In order to manage the Environmental & Social impacts in line with Iraqi Government policies, and policies of funding agencies for the project, an Environmental and Social Management Plan (ESMP) was prepared. The ESMP contains management measures avoidance, mitigation, as well as enhancements that would be implemented during the construction and operation/maintenance phase of the project.

The responsibility for implementation of the mitigation measures will be mostly upon the contractor. However, the supervision and assurance that the mitigation measures are implemented will be the responsibility of the Resident Engineer (RE) who represents the Roads and Bridges Directorate (RBD) as the Project owner.

The RE will be assisted by a team of environmental and social officers who will be responsible for supervising the daily activities of the contractor and will report non-compliances to the RE in order to take necessary actions towards the contractor. Regular supervision site visits will also be conducted by the RBD Project Management Team (PMT) environmental/social officer in association with a qualified environmental and social consultant who will provide technical advice in case there is a need to modify or add new mitigation measures as work necessitates.

The costs of mitigation measures are estimated based on the average market rates for similar activities in Iraq and can be used as indicative costs. It is the sole responsibility of the contractor to estimate the costs associated with the recommended mitigation measures based on his work experience. The estimated cost of the mitigation measures for the rehabilitation phase is 10,000 US$ and that of the maintenance phase is nil as shown in the following Tables.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
</table>
| 1 Air quality | Vehicle emissions  
  - Contractor to keep vehicles and machinery properly operated and maintained.  
  - Contractor to minimize unnecessary vehicle idling.  
  - Switch off any engine as soon as it is not used.  
  Dust  
  - Minimize dust from materials (such as sand, cement) and construction activities (such as excavation) by using covers, storage, control equipment, and increasing moisture content.  
  - Prepare concrete before going to the site to avoid movement of materials (gravel, sand, cement) if possible  
  - Minimize dust from vehicle movements, using water sprays or appropriate.  
  - Avoid the burning of materials on site.  
  - Switch off any engine as soon as it is not used.  
  Hazardous Emissions  
  - Avoid storage of hazardous materials in open areas without proper covering;  
  - Provide adequate ventilation for work areas | Contractor | Resident Engineer PMT | The bidders will be able to include these costs in their bidding.  
  Additional cost for air quality testing to establish the baseline to be conducted by the third party: 1500 US $ |
| 2 Noise | Noise and vibration management  
  - Avoid or minimize transport through community areas.  
  - Switch off any engine as soon as it is not used.  
  - Working at night is prohibited.  
  - Contractor to minimize unnecessary vehicle idling  
  - Muffling of the equipment;  
  - Additional health check-ups for personnel handling the vibrating and noisy equipment | Contractor | Resident Engineer PMT | Additional cost for medical check ups 2000 US $ |
| 3 Water resources | Water run-off management (drainage plan)  
  - In the event that sediment is transported onto the road it should be cleaned using a street sweeper or by physically sweeping the street in cases of small areas to ensure the sediment is not washed into the drainage system with water runoff. | Contractor | Resident Engineer PMT | Hydrogeological Investigation: 500 US $ |
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Raw materials used in construction, which can be carried by water runoff, must be located and stored away from paths for water runoff. • Road curb inlets must be checked and cleaned to ensure the water runoff is flowing into the drainage system. • Where possible or appropriate, schedule works to avoid heavy rainfall periods (i.e. during the dry season) and modify activities during extreme rainfall and high winds. • Carry out any activities that could cause pollution in designated areas away from rivers, boreholes or other water courses. • Use topsoil to fill up potential pools to avoid stagnant water • If surface drainage is disturbing the construction process, utilizing ditches, dikes and/or sandbags to divert this drainage from entering excavations</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>Delineation of excavated areas: 300 US $; Emergency soil testing in case of accidental spills: 1000 US $</td>
</tr>
<tr>
<td>4 Soil</td>
<td>Soil management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Excavated soil (and/or topsoil) is appropriately stored, and reused for back filling in holes or trenches whenever possible. • Marking excavation with physical boundaries (barriers, tape or fence) • Preventing loose material (soil and equipment) from falling or rolling into the excavation by removing this material to a minimum of 0.5 metre from the edge of the excavation • Disposal of contaminated soil by truck to nearest authorized dumping areas. • Use topsoil to fill up potential pools to avoid stagnant water • If surface drainage is disturbing the construction process, utilizing ditches, dikes and/or sandbags to divert this drainage from entering excavations.</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td></td>
</tr>
<tr>
<td>Adverse weather</td>
<td>Site engineer is to monitor weather on a daily basis. No construction activities to be undertaken in strong winds or rains.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Construction Camp</td>
<td>Location of the camp should be agreed with the local beneficiaries Location of the camp outside known aquifer recharge zones Provision of adequate infrastructure for effluent collection; Timely disposal of effluent</td>
<td>Contractor</td>
<td>Resident Engineer PMT</td>
<td>No additional costs</td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
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</tr>
</tbody>
</table>
| 6        | Solid and hazardous wastes | - Timely disposal of solid waste  
- Provision of collection pits for collection of used machinery oils;  
- Adequate vehicle maintenance  
- Transporting wastes to the designated disposal sites | Contractor  
General:  
- Keeping the site clean and tidy:  
a. Ensure there is no loose materials or debris lying around the site including the perimeter; and  
b. Vehicles are regularly checked for cleanliness (general aspect and making sure no leaks are occurring)  
- Burning of waste is prohibited  
- Reducing construction waste related to on-site construction and off-site manufacture or fabrication.  
- Reusing the material on site (in situ or for new applications) whenever it is possible  
- Monitoring the amount of site construction waste created to make sure it does not affect the surrounding and the adjacent areas.  
- Waste is not blocking pathways  
- Construction waste will be gathered in a specific zone of the construction site  
- Contractor to evacuate any construction waste that are not possible to reuse, by truck to nearest authorized dumping site pre-agreed with the local authorities and distanced from the environmentally sensitive receptors and on a regular basis to avoid accumulation;  
- All used motor oil, lubricants, etc. are to be collected in closed bins to avoid leakage and transferred to the refinery for processing  
- All staff will avoid littering in the open. Workers to use bins to throw garbage.  
Hazardous materials:  
- Provide adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.  
- Use impervious surfaces for refuelling areas and other fluid transfer areas.  
- Provide portable spill containment and clean-up equipment on site, and train staff | Resident Engineer  
PMT | Additional costs for disposal of hazardous materials:  
3000 US $ |
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td><strong>Flora &amp; Fauna</strong></td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>Training if conducted by the third party: 400 US $</td>
</tr>
<tr>
<td></td>
<td>• Provide training to the construction crew on the impact of disturbance and damage to habitats;</td>
<td>PMT</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Monitor the construction crew and provide punitive measures for illegal hunting and/or fishing;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provide the crew with fuel for cooking to avoid burning of natural materials;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Apply waste management plan;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid cutting of the reeds or any other riparian vegetation;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td><strong>Topography and surface drainage</strong></td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>Re-vegetation cost: 1000 US $</td>
</tr>
<tr>
<td></td>
<td>• Storage areas for construction materials should be located at sites that do not permit direct runoff into watercourses and are on land sloping at less than 1.5%.</td>
<td>PMT</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Time limitation on works during rainy events;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Regular maintenance of the equipment and machinery to avoid spillage of hazardous materials;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Re-vegetation of cleared areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Timely and adequate disposal of liquid and solid waste in authorized areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td><strong>Access and traffic</strong></td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>Additional costs for marking and signage: 300 US $</td>
</tr>
<tr>
<td></td>
<td>• Set up warning signs in the workplace:</td>
<td>PMT</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o All safe footpaths are marked; construction materials are not blocking pathways</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Site entrances and exits are clearly marked for visitors and delivery drivers to see; and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o If present, site reception is clearly signposted OR all visitors are escorted to the reception.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing separate traffic routes for pedestrians and vehicles, where possible.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Designating specific parking areas for workers’ and visitors’ vehicles outside the construction area.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid or minimize transport through community areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• In compliance with national regulations the Contractor will ensure that the construction site is properly secured and construction related traffic regulated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The site will be clearly visible and the public warned of all potential hazards by</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>----------------</td>
<td>-------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td></td>
<td>Receptor</td>
<td>Responsibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health and Safety</td>
<td>Contractor</td>
<td>Resident Engineer</td>
<td>No additional costs; the cost is imbedded in mandatory HSE measures</td>
</tr>
</tbody>
</table>

- **Health and Safety Environment (HSE)**
  - There is posted material indicating the nearest police station and hospital (with accident and emergency facilities).
  - The contractor must take reasonable steps to prevent unauthorized people accessing the site.
  - Training on handling of UXO/ERW
  - Avoid the burning of materials on site.
  - Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers.
  - Providing extinguishers on work site.
  - If work involving the use of flammable materials is being carried out, stop people smoking and do not allow other work activities involving potential ignition sources to take place nearby.
  - Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence).
  - Marking excavation holes with physical boundaries (barriers, tape or fence)
  - The contractor should put up barriers or covers in the area of openings and excavations.
  - Store building materials (such as pipes, manhole rings, and cement bags) so that...
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
</table>
| 11      | Handling Complaints  
• Reducing impacts on the community through community and neighbour engagement.  
• In cases where there are minority communities speaking a different language in the area or working on site, notices are printed in the common local language.  
• Provide the proper GRM for handling complaints                                                                                                                                                                                                                                        | Resident Engineer | PMT         | No additional costs         |
| 12      | Physical cultural resources  
• In case of accidental discovery stop all works and contact the responsible authority within 24 hours;  
• Provide training to the construction crew on the mode of conduct in case of accidental findings                                                                                                                                                                                                                  | Resident Engineer | PMT         | No additional costs         |
|         | **Total cost US$ (rehabilitation phase)**                                                                                                                                                                                                                                                                                                             |                |             | 10,000 US$                 |
Table 21: Mitigation Measures during Operation Phase

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Air quality including odors</strong>&lt;br&gt;• Water spraying for dust control in maintenance areas;&lt;br&gt;• Draining of ponds to prevent stagnation;&lt;br&gt;• Provide traffic regulation measures to avoid traffic congestion.</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>2</td>
<td><strong>Noise</strong>&lt;br&gt;• Advance warning to public ahead of planned maintenance and repair activities;&lt;br&gt;• Restriction on maintenance activities on working hours to 8.00-19.00 during working days and avoidance of works during holidays unless needed on emergency basis.&lt;br&gt;• Provide traffic regulation measures to avoid traffic congestion.</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>3</td>
<td><strong>Water resources</strong>&lt;br&gt;• Timely and adequate disposal of debris generated by maintenance activities and solid and liquid waste;&lt;br&gt;• Maintaining the drainage ditches and manholes unblocked on the river banks.</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>4</td>
<td><strong>Soil</strong>&lt;br&gt;• Maintaining the drainage channels unblocked;&lt;br&gt;• Draining of ponds;&lt;br&gt;• Adequate disposal of waste</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>5</td>
<td><strong>Solid and hazardous wastes</strong>&lt;br&gt;• Use of non-toxic paints for repairs;&lt;br&gt;• Storage of hazardous materials used for repairs in sealed containers;&lt;br&gt;• Disposal of waste to authorized disposal sites;&lt;br&gt;• Avoid disposal of effluent into the river.</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>6</td>
<td><strong>Traffic</strong>&lt;br&gt;• Informing the public about schedule of repair and maintenance works&lt;br&gt;• Provision of temporary alternative access roads/ by-passes&lt;br&gt;• On the spot traffic management&lt;br&gt;• Ensure traffic safety</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>7</td>
<td><strong>Flora &amp; Fauna</strong>&lt;br&gt;• Keeping the manholes and ditches clean;&lt;br&gt;• Adequate waste disposal;&lt;br&gt;• Draining of ponds;&lt;br&gt;• Re-vegetation with the plants native to the area</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>8</td>
<td><strong>Handling Complaines</strong>&lt;br&gt;• Compliance with GRM</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
<tr>
<td>Receptor</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Public hygiene and quality of water</td>
<td>• Adequate waste disposal; • Timely draining of ponds to avoid breeding of insects which could be the source of vector breeding diseases</td>
<td>Operator</td>
<td>RBD</td>
<td>Included in regular maintenance costs</td>
</tr>
</tbody>
</table>

Total cost US$ (Operation phase) | No additional costs
7 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The ESMP will be shared with the contractor who will be contractually obligated to abide by it, with financial clauses associated to this obligation. Impacts are mitigated by detailed mitigation measures.

The following tables present monitoring measures in order to perform a non-harmful implementation of the project works to the environment and to reduce the risk of negative environmental impacts as far as possible.
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
</table>
| 1        | Air quality including odors | Site inspection with the photo documentation; Air quality testing | • Ambient Air quality parameters: PM$_{10}$, PM$_{2.5}$, SO$_2$, NOx, CO, Ozone, and HC  
• Compliance with dust abatement measures | Once prior to the start of construction works to establish the baseline and once during the construction phase during the dry season. | Contractor through approved third party. | Resident engineer  
Testing done by accredited laboratories. Additional cost 2000 US $  
Camera: 250 US $ |
| 2        | Noise | Site inspection measuring the level of noise | • Compliance with the time limitations;  
• Switching off the equipment not in use;  
• Use of protective gear | Weekly | Contractor | Resident engineer  
Hand held device for noise level measuring: 200 US $ |
| 3        | Water resources | Site inspection with photo documentation; Water testing | Inspection:  
• debris accumulation in water drainage areas;  
• Alteration of water courses;  
• Signs of spillage of hazardous materials  
Water testing:  
pH, Turbidity, Electrical Conductivity (EC), Color, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Biological Oxygen Demand  
Inspection:  
• Bi-weekly during the rainy season, and after sporadic rains  
• Once a month during the dry periods  
Water testing: 1 time prior to the start of construction works; 1 time 2 weeks prior to project completion | Contractor through approved third party. | Resident engineer  
Testing done by accredited laboratories. Additional cost 3000 US $ |
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(BOD), Polychlorinated Biphenyls (PCBs)</td>
<td>Inspection: signs of soil erosion, evidence of spills of fuel and lubricants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil testing: pH, temperature, organic content, poly-aromatic hydrocarbons (PAHs); Faecal coliforms and Total coliforms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inspection: bi-weekly; Soil testing in case of accidental spills</td>
<td>Contractor through approved third party.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Soil</td>
<td>Site inspection with photo documentation; Soil testing</td>
<td>Inspection: bi-weekly; Soil testing in case of accidental spills</td>
<td>Contractor through approved third party.</td>
<td>Resident engineer</td>
<td>Testing done by accredited laboratories. Additional cost 3000 US $</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site inspections; Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation;</td>
<td>Storage conditions of hazardous materials; Disposal at designated sites; Contracts with approved waste disposal contractors; Receipts form disposal sites (if available); Photo documentation</td>
<td>Inspections bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>5</td>
<td>Solid and hazardous wastes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Traffic</td>
<td>Site inspections</td>
<td>Site surveillance for the presence of fencing/barriers and warning signs, and traffic speed limitations</td>
<td>Monthly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>7</td>
<td>Flora &amp; Fauna</td>
<td>Site inspections</td>
<td>Degree of habitat disruption due to construction activities; Degree of workers</td>
<td>Inspection: bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------------</td>
<td>-------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Topography and surface drainage</td>
<td>• Inspection and photo evidence • Location of storage areas; • Ceasing construction activities during heavy rainy events; • Re-vegetation of cleared areas • Records of liquid waste disposal.</td>
<td>Inspection: bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
<td>No additional costs</td>
</tr>
<tr>
<td>9</td>
<td>Handling Complains</td>
<td>• Maintaining records of filed complaints and responses • Time of response to the complaint; • Number of complaints</td>
<td>Monthly</td>
<td>Resident engineer</td>
<td>PMT</td>
<td>No additional costs</td>
</tr>
<tr>
<td>10</td>
<td>Public health and safety</td>
<td>• Inspection and photo evidence • Maintaining records of injuries and accidents with cause and location • Provision and use of personal protective equipment to workers • Installing construction and warning signs</td>
<td>Inspection: bi-weekly</td>
<td>Contractor</td>
<td>Resident engineer</td>
<td>No additional costs</td>
</tr>
</tbody>
</table>

Total cost US$ (Operation/Maintenance phase) 8,450 US$
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Air quality</td>
<td>Air quality monitoring</td>
<td>Ensure the bridge in the operational condition and there are no hold ups of traffic that can produce excessive exhaust emissions; Inspection on the dust generation by the vehicles</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td>2 Noise</td>
<td>Noise level monitoring</td>
<td>Ensure the noise levels are within the acceptable limits</td>
<td>During maintenance and repairs</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td>3 Water resources</td>
<td>• Surveillance; • Water testing</td>
<td>• Ensure the drainage channels and culverts are clear of debris • Visual inspection for the signs of spillage • Water quality testing: pH, Turbidity, Electrical Conductivity (EC), Color, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Polychlorinated Biphenyls (PCBs)</td>
<td>Surveillance: • Bi-weekly during the rainy season • Monthly during the dry season Water testing: in case of accidental spills</td>
<td>Operator</td>
<td>RBD</td>
<td>500 for water testing</td>
</tr>
<tr>
<td>4 Soil</td>
<td>• Surveillance; • Soil testing</td>
<td>• Ensure the drainage channels and culverts are clear of debris</td>
<td>Surveillance:</td>
<td>Operator</td>
<td>RBD</td>
<td>300 for soil</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
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<td>---------------</td>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clear of debris</td>
<td>Bi-weekly during the rainy season</td>
<td>Operator</td>
<td>RBD</td>
<td>testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visual inspection for the signs of spillage</td>
<td>• Monthly during the dry season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Soil testing: pH, temperature, organic content, poly-aromatic hydrocarbons (PAHs)</td>
<td>Soil testing in areas of the accidental spills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Solid and hazardous wastes</td>
<td>Waste disposed at designated areas</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Surveillance; • Maintaining records of quantities of waste and location of its disposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flora &amp; Fauna</td>
<td>• Surveillance</td>
<td>Surveillance:</td>
<td>Operator</td>
<td>RBD</td>
<td>No additional costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Condition of the manholes and ditches; • Level of re-vegetation; • Absence of ponds</td>
<td>• Bi-weekly during the rainy season • Monthly during the dry season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Topography and surface drainage</td>
<td>• Surveillance</td>
<td>Disposal of debris during maintenance and repairs</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Access and traffic</td>
<td>• Surveillance</td>
<td>Presence of warning signs at maintenance site</td>
<td>During maintenance and repair works</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Health and Safety</td>
<td>• Surveillance; • Maintaining records of quantities of waste and location of its disposal</td>
<td>• Adequate warning about scheduled maintenance works; • Timely and adequate disposal of waste</td>
<td>Monthly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Handling Complaints</td>
<td>Record keeping on received complaints</td>
<td>Number of complaints and responses</td>
<td>Quarterly</td>
<td>Operator</td>
<td>RBD</td>
</tr>
<tr>
<td>Receptor</td>
<td>Monitoring Activities</td>
<td>Monitoring Indicators</td>
<td>Frequency</td>
<td>Responsibility</td>
<td>Supervision</td>
<td>Total estimated Cost in US$</td>
</tr>
<tr>
<td>----------</td>
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<td>----------------</td>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Physical cultural resources</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>800 US$ per year</td>
</tr>
</tbody>
</table>

Total cost US$ (Operation/Maintenance phase)
7.1 ESMP Institutional Arrangements

In order to ensure full compliance with the environmental and social requirements which are described above, RBD PMT nominated a consultant to act as the focal point for environmental and social affairs at the central level. On the field level, RBD PMT nominated two engineers to act as environmental and social officers. Those engineers will be trained on monitoring and reporting of environmental and social impacts and how to fill the checklist to be used during field visits before implementation starts. RBD Resident Engineer will be the officially responsible staff member for ensuring environmental and social compliance. S/He will be assisted by the designated environmental and social field officers.

In addition, a qualified consultant is recruited by the PMT to provide technical assistance and capacity building to the environmental and social team both at the central level and at the field level.

PMT has responsibility/authority to stop work in case of non-conformance with E&S requirements and/or dangerous work conditions.

7.2 Reporting requirements

To ensure that the mitigation and monitoring measures are being carried out effectively with the required frequency, a clearly defined and regular (monthly) reporting and response system must be established.

All inspection and audit reports of environmental performance should be stored in the Audit and Inspection Manager (AIM) system. The AIM is an electronic database that is used to enable corrective actions identified during the inspection \ auditing process to be recorded, tracked and closed out. The information will be made available to the relevant regulatory authorities as required. In addition to the monitoring and reporting requirements documented in the relevant sections of the ESMP, the following reporting regime will be implemented:

- All incidents or accidents during the bridge rehabilitation should be reported immediately to relevant authorities.
- All corrective measures must be discussed to ensure compliance with laws and regulations.
- Reports for personnel training on environmental issues or emergency practices must be produced.
- Progress reports, environmental monitoring report and other inspections reports must be produced periodically.

The RBD PMT engineers will provide the Resident Engineer with a weekly report briefing their observations and recommendations for action. Whereas the Resident
Engineer shall prepare an environmental and social management progress report on monthly basis to RBD PMT in Baghdad. The environmental and social consultant will prepare a monthly environmental and social supervision report after conducting monthly site supervision visits. RBD PMT shall prepare a quarter environmental and social progress report which will be submitted to the WB for review and disclosure.

7.3 Capacity Development and Resources Requirements

7.3.1 Capacity Development
RBD PMT dedicated sufficient human resources to undertake the environmental and social management requirements as explained above. The assigned RBD staff at the central and field levels are competent in the field of engineering and have variable practical experience. For RBD staff who will be responsible for undertaking the environmental and social tasks, they will require some capacity development.

All construction personnel and contractors are required to undertake appropriate environmental training and induction programs including, importantly, on GRM procedures. All managers and supervisors will be responsible for ensuring that personnel under their control have the requisite competencies, skill and training to carry out their assigned tasks in accordance with the requirements of the ESMP. They will also be responsible for identifying additional training and competency requirements.

All project supervisors and managers will receive additional detailed training on the use and implementation of the ESMP. The following Table presents the proposed institutional strengthening program and capacity development requirements.

<table>
<thead>
<tr>
<th>Capacity development topic</th>
<th>Provider(s)</th>
<th>Duration</th>
<th>Estimated Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Environmental Impact Assessment</td>
<td>Private sector consultant</td>
<td>3 Days</td>
<td>3,000</td>
</tr>
<tr>
<td>Environmental and social Management in Construction Sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Iraqi Environmental Legal Requirements</td>
<td>Ministry of Environment</td>
<td>1 Day</td>
<td>2,000</td>
</tr>
<tr>
<td>3 World Bank Environmental and Social Safeguards</td>
<td>The World Bank</td>
<td>2 Days</td>
<td>10,000 (international travel and accommodation cost for RBD trainees)</td>
</tr>
</tbody>
</table>

Total Estimated Cost $15,000

18 Consolidated training for all RBD/PMT environmental/social field supervisors will be conducted to save on the training costs.
7.3.2 Required Resources

In order to ensure full compliance of the environmental and social requirements, regular site visits should be conducted. Dedicated office spaces, office equipment and supplies in addition to adequate means of transportation should be made available for the environmental and social management team at the central level and most importantly on the field level. RBD PMT should ensure the allocation of sufficient budget resources to ensure availing the required resources to achieve the required tasks.
8 PUBLIC CONSULTATIONS

8.1 Objectives of the Consultations
WB policies require that broad and open public consultations be held with PAPs on the project. These consultations are to ensure that the project affected peoples (PAPs) are provided with the opportunity to engage in the rehabilitation planning process, to raise questions and receive input and responses to their concerns. However, due to the current security situation in the project area and taking into utmost consideration the safety of the people as public meetings may be targeted by terrorist, the public meeting approach was not achievable.

8.2 Consultation Process
In order to fulfill the WB requirements, a one on one interview was adopted to obtain sound information on the possible impacts on the local communities. Accordingly, a questionnaire was prepared in order to cover the key environmental and social aspects related to the project. The questionnaire was then addressed to vehicle-road users and to the local individuals in the surrounding community randomly to have their opinions and thoughts regarding the rehabilitation activities. In addition, the translated executive summary of the draft Limited/Simplified ESIA will be published on the RBD’s website to allow for feedback and wider dissemination of information related to the planned activities under this project.

8.3 Findings of the Consultations
The following are the main findings of the consultation process which took place on 28th of January 2017. People interviewed were the passersby living in close proximity to the project area; the total number of the interviewed people is 5. Due to the years of political instability and security concerns in the area women have rather restricted freedom of movement and are rarely seen outside their homes. All respondents agreed that the reconstruction activities will have a strong positive impact from the social perspectives on the locals. The filled questionnaires and photos from the interviews are presented in Annex 2.

1. No claims from any respondents were recorded or alleged regarding the ownership of the land where the rehabilitation activities to take place; all agreed that is governmental land property.
2. No vegetation cover, crops, plants, trees, etc. will be removed in order to execute the rehabilitation activities.
3. No infrastructure will be affected negatively due the reconstruction activities.
4. Information about a grievance mechanism was introduced to interviewed individuals and a translated GRM form was also provided. All interviewed people
were informed that they can submit their complaint to either site engineer, or to community leader or to PMT during construction.

5. The respondents do not anticipate any damage to the buildings or infrastructure during the rehabilitation activities;

6. No change to demographics or social structure will be induced by the project activities;

7. Local residents do not use any part of the land required for the project for personal purposes.

8. The respondents interpreted the question of relocation as their improved mobility rather than physical relocation of people.

8.4 Distribution of the GRM Forms

During individual interviews, information about a grievance mechanism was introduced to interviewed individuals and a translated GRM form was also provided. All interviewed people were informed that they can submit their complaint to either site engineer, or to community leader or to PMT during construction. The community leaders’ information (mobile phone number) and PMT contact information (office and mobile phone numbers) will be available before implementation starts. There will be signs posted at the entrance of the bridges (Refer to Annex 3 for more details).
9 GRIEVANCE REDRESS MECHANISM

Bank procedures require that Grievance Redress Mechanisms (GRMs) be established and operational prior to commencement of the project, and that they continue to operate for one year following completion of the works for third party settlement of disputes arising from resettlement. This GRM should take into account the availability of judicial recourse as well as traditional and community dispute resolution mechanisms.

Accordingly, a GRM will be established at the project level to ensure any grievance can be addressed in an amicable manner. Resolving complaints at community level is always encouraged to address the problem that a person may during implementation and/or operational phase.

The people wishing to lodge the complaint can contact the community leader, or the contractor, or the RBD. The contact information will be provided in Arabic language on the board near the construction site.

The project grievance redressed system should be developed in consultation with communities, which might include the following for written complaints:

1. First, the affected person sends his/her grievance in writing to one of the contacts provided on the board near the construction site. The grievance note should be signed and dated by the aggrieved person. Where the affected person is unable to write, s/he should obtain assistance from the community to write the note and mark the letter with his/her thumbprint. The community should respond within 14 days.

2. Second, if the aggrieved person does not receive a response or is not satisfied with the solution provided by the community, s/he lodges her or his grievance to PMT which should respond within 14 days.

3. Third, if the aggrieved person does not satisfied with the solution of PMT, s/he can go to the court.

In any case, the PMT must maintain records of grievances and complaints, including minutes of discussions, recommendations and resolutions made.

10 CONCLUSION AND RECOMMENDATIONS

The ESIA concludes that the proposed repair of Omar bin Abdul Aziz Bridge will have an overall significant beneficial impact on the affected population. The implementation of the recommended mitigation measures especially during the construction phase will ensure that potential negative environmental impacts are addressed.
11 ANNEXES

11.1 Annex 1: Chance Find Procedure

Chance find procedures will be used as follows:

Stop the construction activities in the area of the chance find;

- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the Ministry of Culture take over;
- Notify the supervisory Engineer who in turn will notify the responsible local authorities and the Ministry of Culture immediately (within 24 hours or less);
- Responsible local authorities and the Ministry of Culture would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists from the Department of Antiquities and the Ministry of Culture (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
- Decisions on how to handle the finding shall be taken by the responsible authorities from DA and the Ministry of Culture. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the Ministry of Culture; and
- Construction work could resume only after permission is given from the responsible local authorities and the Ministry of Culture concerning safeguard of the heritage.

These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

Requirements on disclosure and translation of safeguards documentation

The Bank allows access to any information in its possession that is not on a list of exceptions.

This Bank Policy supports decision-making process by the Borrower and Bank through allowing public access to information on environmental and social aspects of projects.

Disclosure of key project documents, including Executive summaries in English and the local language, is mandated:

- In Country – prior to project appraisal in local language and in English;
• In the WB Info Shop before project appraisal in English with the Executive Summary in English and in the local language.
• Translation: National/local languages as appropriate—for example, the national language of a country, local languages used within a country, and/or language(s) understood by the people affected by, or likely to be affected by, a project.
• Most information disclosed by the Bank, including publications and reports, is disseminated through the Bank’s external website. Ensuring the online availability of updated content in languages other than English is therefore key to maximizing access to the Bank’s work by borrowers and other members of the global audience.
### 11.2 Annex 2: Public Consultations

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In your opinion, would the rehabilitation of the bridge/road have</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>positive impact on the residents of the area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Are there any claims on private land ownership in the project area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Would there be any damages to income generating crops, trees, and</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>vegetation due to the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Would there be any losses of income of local residents due to the</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Would there be any damages whether permanent or temporary which would</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>affect the livelihood of the residents due to the rehabilitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Would the rehabilitation activities require relocation of the residents</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>of the area, whether permanent or temporary?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Is there any usage by local residents of the facilities or land of the</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>facilities by the local residents?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>In your opinion, would there be any negative social impacts due to</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Would there be any changes to the demographics or social structure in</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>the project area induced by the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Would there be any damages to the structures or houses induced by the</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Will the project improve the operations of transportation and reduce the</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>isolation of the communities adjacent to the bridge/road?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Is there any need for warning and directional signage during the</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Name of the respondent:**

**Occupation of the respondent:**

**Date of interview:**
1. هل تعتقد أن عملية إعداد بناء الجسر / الطريق له أثر إيجابي من الناحية الاجتماعية على السكان القاطنين في المناطق المحيطة بالجسر / الطريق؟
   - نعم
   - كلا

2. هل هناك ادعاءات أو مطالبات من قبل السكان المحليين بتعديل الأرصف المقام عليها الجسر / الطريق؟
   - نعم
   - كلا

3. بسبب أعمال إعداد بناء الجسر / الطريق هل تم إعداد عملية إزالة للمحاصيل الزراعية أو أشجار أو أي عطاء غير مادي تم تحديده في الموانئ أو السكان المحليين؟
   - نعم
   - كلا

4. هل تضررت مصالح المواطنين القاطنين بالقرب من الجسر / الطريق بسبب أعمال إعداد بناء؟
   - نعم
   - كلا

5. هل هناك أي بناء تابع مؤقتة أو دائمة تلعب دوراً أساسيًا في التنشيط اليومي للسكانمستقرة
   - نعم
   - كلا

6. هل أن أعمال إعداد إعمار الجسر / الطريق تستوجب بإجراءات إعادة توطين لأشخاص (أو/لا) لأشخاص
   - نعم
   - كلا

7. هل تم إعداد منطقة بناء الجسر / الطريق بطريقة ما من قبل السكان المحليين، يلقن أن
   - الأراضي نابعة للدولة؟
   - نعم
   - كلا

8. هل تتوقع وجود تأثيرات اجتماعية سلبية بالمنطقة نتيجة أعمال إعداد التأهيل؟ ما هي؟
   - نعم
   - كلا

9. هل هناك تغييرات جغرافية أو سلوك في المجتمعات من خلال أعمال إعداد التأهيل؟
   - نعم
   - كلا

10. ما هي المجامع الأكثر ضعفاً وهشاشة التي من المحتمل أن تتأثر بالإعمال الإعدادية؟
نعم

س11: هل سيعزز المشروع من عمليات التنقل ونقلب من انعزالية المجتمعات الموجودة بالقرب من منطقة الجسر / الطريق؟

نعم

س12: هل يحتاج المواطنين المقيمين بالقرب من الجسر / الطريق إلى وضع إعلانات تحذيرية أو استنادية لزيادة معدات الأمن وامان المستخدمي الجسر / الطريق

نعم

الموضوع

صبر حمزة بن عبد الجزیر

الاسم: صبر حمزة بن عبد الجزیر

المهنة: معلومات

تاريخ الزيارة: 2/7/20
1. هل تعتقد أن عملية إعادة بناء الحفرة/الطريق له آثار إيجابية من الناحية الاجتماعية على السكان القاطنين في المناطق المجاورة للحران/الطريق؟

نعم / كلا

2. هل هناك إدعاءات أو مطالبات من قبل السكان المحليين بتعويض الأراضي المقام عليها الحفرة/الطريق؟

نعم / كلا

3. بسبب إعمال إعادة بناء الحفرة/الطريق هل تم عملية ازالة لمحاصيل زراعية أو أشجار أو أي عظام تجريكي تعود عائدين له المواطنين أو السكان المحليين؟

نعم / كلا

4. هل تضررت مصالح المواطنين القاطنين بالقرب من الحفرة/الطريق بسبب أعمال إعادة بناء؟

نعم / كلا

5. هل هناك أي بني تحتية مؤقتة أو دائمة تلعب دوراً اساسياً في النشاطات اليومية للسكان ستأثر بعملية تجديد الحفرة/الطريق؟

نعم / كلا

6. هل أن أعمال إعادة إعمار الحفرة/الطريق ستتسبب بإجراءات إعادة توطن لشخص(ون) لأشخاص؟

نعم / كلا

7. هل تم عملية استخدام منطقة بناء الحفرة/الطريق بطريقة ما من قبل السكان المحليين، علماً أن الأرض متاحة للدولة؟

نعم / كلا

8. هل تتفوق ونوات تأثيرات اجتماعية سلبية بالمنطقة نتيجة أعمال إعادة التأهيل؟

نعم / كلا

9. هل هناك تغييرات في الموقع أو ضرر في السكان الاجتماعي من جراء إعمال إعادة التأهيل؟

نعم / كلا

10. أي المجموع الأكثر ضعفاً وحساسية التي من المحتمل أن تتأثر بأعمال إعادة الإعمار؟
س11: هل سيزعج المشروع من عمليات النقل و بتقل من العزلانية المجتمعة الموجودة بالقرب من منطقة الجسر / الطريق؟
نعم / كلا

س12: هل يحتاج المواطنين المقيمين بالقرب من الجسر / الطريق إلى وضع إعلانات تحذيرية أو استدلالية لتزويدهم بمعلومات حول معدلات الأمان والآليات المستخدمة في الجسر / الطريق
نعم / كلا

المرفق
صورة بعض المواقع

الاسم:
المنحة:
تاريخ الزيارة: ٠١/٣٠/٢٠١٧
س: هل تعدّن أن عملية إعادة بناء الجسر / الطريق له آثار إيجابية من الناحية الاجتماعية على السكان القاطنين في المناطق المحيطة بالجسر / الطريق؟
نعم
cلا

س: هل هناك إدعاءات أو مطالبات من قبل السكان المحليين بعائدات الأرض المقام عليها الجسر / الطريق؟
نعم
cلا

س: بسبب أعمال إعادة البناء للجسر / الطريق هل تمّت عملية ازالة لمحاصيل زراعية أو اشجار أو أي غذاء طبيعي تعود عادةً على السكان المحليين؟
نعم
cلا

س: هل تضررت مصالح المواطنين القاطنين بالقرب من الجسر / الطريق بسبب أعمال إعادة البناء؟
نعم
cلا

س: هل هناك أي بيئة تمثلها مؤقتة أو دائمة تلعب دورًا أساسيًا في النشاطات الحياتية اليومية للسكان منظّمة تأهيل الجسر / الطريق؟
نعم
cلا

س: هل إن أعمال إعادة اعمار الجسر / الطريق ستستدعي درايزات إعادة لتوطين لأشخاص (وا) لأشخاص مختلفين إلى مناطق جديدة؟
نعم
cلا

س: هل تم استخدام منطقة بناء الجسر / الطريق بطريقة ما من قبل السكان المحليين. عما إذا كانت الأرض تابعة للدولة؟
نعم
cلا

س: هل توقع وجود تأثيرات اجتماعية سلبية بالمنطقة نتيجة أعمال إعادة التأهيل/.Container؟
نعم
cلا

س: هل هناك تغييرات دموغرافية أو ضرر في النسب الاجتماعي من جراء أعمال إعادة التأهيل؟
نعم
cلا

س: هل توجد مشاكل أكثرا متعلقة بمشاعر القيمة التي من المحتمل أن تكون باعمال إعادة الاعمار؟
نعم
cلا
نعم

س: 1 هل سيعزز المشروع من عمليات النقل و يقلل من العزلة التي تواجه المجتمعات الموجودة بالقرب من منطقة الجسر / الطريق؟

لا

س: 2 هل يختار الموظفون المقيمين بالقرب من الجسر / الطريق إلى وضع علامة تجارية أو استدلالية لزيادة معدلات الأمن والامان لمستخدمي الجسر / الطريق؟

لا

الموضوع

جسر خليفة سلامة

الاسم: غمار علي دار

المهنة: سكرتير

تاريخ الزيارة: 9/1/2011

111
112
نعم

س 11: هل سيعزز المشروع من عمليات النقل و يقلل من انعدامية المجتمعات الموجودة بالقرب من منطقة الجسر/ الطريق؟

نعم

س 12: هل يحتاج المواطنون المقيمين بالقرب من الجسر/ الطريق إلى وضع إعلانات تحذيرية أو استدلالية لزيادة معدلات الأمن و الأمان لمستخدمي الجسر/ الطريق

نعم

المرجع
صر عامب سالم العزيز

الاسم: سليمان عامب ضربت
المهنة: مشرف صيانة
تاريخ الزيارة: 11/7/2020
س1: هل تعتقد أن عملية إعادة بناء الجسر / الطريق له آثار إيجابية من الناحية الاجتماعية على السكان القاطنين في المناطق المجاورة للجسر / الطريق؟

كلا

س2: هل هناك ادعات أو مطالبات من قبل السكان المحليين بمدادة الأرض المقابل عليها الجسر / الطريق؟

نعم / كلا

س3: بسبب أعمال إعادة البناء للجسر / الطريق هل تمت عملية إزالة لمحاصيل زراعية أو أشجار أو أي عمالات، بناءً على تعهدات ممتهنة أو السكان المحليين؟

نعم / كلا

س4: هل تضررت مصالح المواطنين القاطنين بالقرب من الجسر / الطريق بسبب أعمال إعادة البناء؟

نعم / كلا

س5: هل هناك أي بنيّة مؤقتة أو دائماً تلعب دوراً أساسيًا في النشاطات الحياتية اليومية للسكان ستتأثر بعملية تأهيل الجسر / الطريق؟

نعم / كلا

س6: هل ان اعمال اعمار الجسر / الطريق ستشتبه بالأجراءات إعادة لتوزيع على شخص أو أكثر في المناطق الجديدة؟

نعم / كلا

س7: هل تم استخدام منطقة بناء الجسر / الطريق بطريقة ما من قبل السكان المحليين، فيما أن الأرض تابعة للدولة؟

نعم / كلا

س8: هل توقع وجود تأثيرات اجتماعية سلبية بالمنطقة نتيجة أعمال إعادة التأهيل؟ ما هي؟

نعم / كلا

س9: هل هناك تغييرات بيئية جغرافية أو ضرر في السياق الاجتماعي من جراء اعمال إعادة التأهيل؟

نعم / كلا

س10: ما هي المجمعات الأكثر ضعفاً ومشكلة التي من المحتمل أن تتأثر بالأعمال الإعمار؟
نعم، سيتم تنفيذ المشروع من عمليات التلقين ونقل من المعزالية المجتمعة الموجودة بالقرب من منطقة الجسر/الطريق؟

كلا

نعم، سيتم إعداد الموظفين المقيمين بالقرب من الجسر/الطريق لتوفير إعلانات تحذيرية أو استدلالية لزيادة مجالات الآمن والامان المستخدمين الجسر/الطريق.

كلا

الموقع
نصر بن العرعر

الاسم:
المهنة:
تاريخ الزبارة:
17/1/30
Interview with Mr. Amjad Abdullah

Interview with Mr. Talal Ismail
Interview with Mr. Amer Faisal

Interview with Mr. Mohammad Abdel Aziz

Interview with Mr. Mohammad Qasem
11.3 Annex 3: Grievance Redress Form

Reference No:

Full Name
My first name____________________
My last name____________________

Note: you can remain anonymous if you prefer or request not to disclose your identity to the third parties without your consent

I wish to raise my grievance anonymously
I request not to disclose my identity without my consent

Contact information
By Post: Please provide mailing address:

Please mark how you wish to be contacted (mail, telephone, e-mail).

By Telephone: ___________________
By E-mail _______________________

Description of Incident or Grievance:
What happened? Where did it happen? Who did it happen to? What is the result of the problem?

Date of Incident/Grievance

One-time incident/grievance (date_______)
Happened more than once (how many times? ___)
On-going (currently experiencing problem)

What would you like to see happen to resolve the problem?

Signature: _________
Date: ___________

Please return this form to: [name], [company name] __________
Address: __________: Tel.: ______ or E-mail: __________
11.4 Annex 4: Project Design