HAJDEH & MAKHADA-RASIAN-ALHAIAJEM-WADI AL MA'A
RURAL ROAD (37.94km),
TAIZ GOVERNORATE, YEMEN

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA)
Executive Summaries

May 2014
## Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>Revision name</th>
<th>Revision outcome</th>
<th>Reviewer</th>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>20/02/2014</td>
<td>Initial Release</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>14/04/2014</td>
<td>First Revision</td>
<td>Comments addressed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>25/04/2014</td>
<td>Second revision</td>
<td>Upgrade</td>
<td>Dariusz Kobus</td>
<td>N/A</td>
</tr>
<tr>
<td>03</td>
<td>10/05/2014</td>
<td>Third revision</td>
<td>Comments addressed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>26/05/2014</td>
<td>Fourth revision</td>
<td>Final check</td>
<td>Dariusz Kobus</td>
<td></td>
</tr>
</tbody>
</table>

**Prepared by:** Linda Khalil - Slim

**Quality Review by:**

**Contributors:** Charbel Rizk  
Nasser Gubail  
Abdulnaser Al Muwadea
Executive Summary

Introduction
An Environmental and Social Impact Assessment (ESIA) study has been prepared for the Rural Access Program (RAP) under a contract signed between the Ministry of Public Works and Highways and Jouzy, on November 5th, 2013. It has been prepared in accordance with the World Bank Operational Directive (OP 4.01), Environmental Assessment. It also complies with the World Bank’s relevant safeguards policies and the relevant Yemen regulations.

In addition, this ESIA report has been prepared with evidence that the project does not trigger any of the World Bank mandated Social Safeguard Policies. It justifies that all land requirements under the said project are met through voluntary donations with no displacement/re-location of project affected populations.

Description of the Project
Hajdeh & Makhatah-Rasian-Alhaijem-Wadi Al Ma’a rural road is located in the districts of Maqbanah and Shara’b Al Rawnah Districts of the Governorate of Taiz. The total length of the road is 37.94 km. Its elevation ranges from 715m above MSL to 1182m above MSL. The project consists of rehabilitating an existing dirt road comprising a track, 4 to 6m wide. In many inhabited areas along the alignment, the width is reduced to less than 4m. The road passes through terraced agriculture lands and non-arable lands. It crosses Rasian watercourse and passes near Issa Shrine, a cultural heritage site dating back to around 500 years. The main objective of improving Hajdeh & Makhatah-Rasian-Alhaijem-Wadi Al Ma’a rural road is to improve livelihood and to reduce the isolation of the rural population.

The design alignment is based on the existing alignment. The road will be widened to 6m asphalt with a 1m shoulder built on each side of the road where possible. At some pinch point, and in case it is technically unfeasible, the road will keep its same width. A voluntary land donation process has been prepared and signed by the landowners as a contribution to the road. The process is managed by the Beneficiary Committee and is documented in the annexes attached to the end of this ESIA report.

The main works that will be necessary for the construction of the road are: earthworks as a result of the re-profiling of the horizontal and vertical profiles of the roads, filling, grading, leveling of sub-grade, asphalting, construction of channels for runoff drainage, retaining walls/gabions for soil stabilization and construction of culverts for stream water crossings.

605 plots owned by 362 persons are affected by the widening and the rehabilitation of the road. These plots cover an area of 54,592m² divided into 39,191m² of agricultural lands and 15,400m² of non-arable lands. The loss of land acquisition is less than 10% for all the owners. Consequently, there is no need for a resettlement plan especially that all the concerned persons agreed to donate land.

Legal and administrative framework
The World Bank Safeguard Policy triggered is the Environmental Assessment OP 4.01. As the land needed for the project was voluntarily donated (see the annexes Nos. 2 to 5), the WB Safeguard Policy on Involuntary Resettlement OP 4.12 is not triggered. The project was classified as category B. This category is justified because the expected adverse environmental and social impacts will be limited in most cases, temporary and for the most part reversible.
The most relevant law in Yemen related to environment is Law 26, Protection of the Environment (1995). It is worth mentioning that Yemen ratified a large number of International Environmental Agreements and Conventions.

The central organization responsible for the coordination of decisions and actions related to the road projects is the Ministry of Public Works and Highways (MoPWH) that administers among others, the Rural Access Program. Several organizations are also directly involved in road related projects such as, the Ministry of Water and Environment (MoWE), the Ministry of Agriculture and Irrigation (MAI), the Ministry of Finance (MoF), the General Authority for Land Survey and Urban Planning (GALSUP), the Local Councils and many existing Non Governmental Agencies (NGOs).

As the Project was classified under Category B, affected groups and local NGOs should be consulted at least once about the project’s environmental aspects and their views taken into account.

Baseline Data

Physical Environment

Topography and Land Use
The Hajdeh & Makhatah-Rasian-Alhaiajem-Wadi Al Ma’a rural road is located at an elevation that varies between 715 and 1182m above MSL. The topography is accentuated in some locations with slopes reaching 16%.

Geology and Soil
The rocks are, in their majority volcanic. Due to the high difference in temperature between day and night, rocks are breaking down and the widening of the road may lead to erosion. In the design of the Project, retaining walls were allocated at critical points.

Climate and Precipitation
The Taiz governorate has an arid to semi-arid climate, characterized by cold nights and hot days. Its elevation ranges between 700-1500m above MSL. Mean temperatures range between 17 to 25 degrees centigrade. The hottest month is July and the coldest is December. Relative humidity is between 31-51%. The area is characterized by an average yearly rainfall of 450mm. Rainfall, however can reach 600mm. It rains all year round but the highest wet season starts from May, intensifies towards the end of July-August and stops in October. The dry season extends from November to March. The rainfall recharges the groundwater but also runs on the ground surface in the valleys (Wadis).

Hydrology and Runoff
Several temporal water streams cross the existing road the major one being Rasian river. A hydrological study was conducted and different culverts were located at the water crossings to prevent disruption of the natural watercourses.

Water Harvesting
Water harvesting allows the farmers to supplement the amount of rainfall with runoff water collected from uncultivated areas and roads and conveyed to the cultivated lands. Farmers usually build bumps on the roads to canalize water to their lands.

Air Quality
Unfortunately, no data exists on the air quality in the project area. Due to the absence of industries, the level of exhaust emissions in the air is expected to be low. However, from the site visit, one can note the high level of dust covering all the vegetation along the road.
Noise
Typical existing noise levels near the project site are generally limited because the project site is located in a relatively underdeveloped area. Cars encountered were relatively old and slowly driven at low gear due to the rough terrain. Noise comes from the engines, transmission, exhaust and suspension of the vehicles and from frictional contact between the tires and the hard road. On the other hand, weekly markets are held in some villages. People from adjoining villages visit the market for shopping. The movement and gathering of the people cause high levels of noise.

There are two schools (Zeid Bin Haritha and 7 July), which are considered as noise sensitive facilities as they are located in the vicinity of the road.

Waste Disposal
From the site visit and discussions with the residents in the area of the Project, it was noticed that the common practice is to discard solid waste in pits near houses and burn it when it accumulates. Meanwhile a blowing wind may spread waste in the surrounding environment. The nearest common non-sanitary waste disposal facility is a waste dump in Taiz, at some 25 km distance from the site.

Biodiversity
In the considered Project, the road already exists although unpaved and not very wide. The lands that will be affected by the widening of the road are mainly non-arable or cultivated by cereals and fodder crops. Cattle, goats, donkeys and camels can be found in the area. During the site visit, the observed fauna and flora are not those of particular interest and no protected or endangered species were identified. The road does not affect any sensitive, specially designated area or protected species.

Socio-Economic Conditions
Population and Economic Activity
The population served directly by the road belongs to 6 Sub-districts and is estimated at some 85,529 persons. The population served indirectly by the Project belongs to Beni Salah, Al – Ashgob, Mirab, Al Aasd, Al Haiagem, Bani Swmaia Sub-Districts and is about 394,702. The life expectancy is 65 years. Around 50% of the inhabitants of the project area can be classified below the poverty line and 40% under the food poverty line (ref. National Poverty Survey, 2002).

Health Facilities
According to the socio-economic survey, the health facilities in the Project area are very limited in terms of equipment and personnel. Most of the residents have to go to Taiz for medical consultation. In the present conditions and even in critical health cases such as difficulties during delivery of babies, cars cannot drive at a speed higher than 5-10 km/hour. Consequently, the road is a main obstacle for access to health services. In total there are 62 health facilities in the project area.

Education
There are 19 schools in the villages along the road as noticed during site visit and discussions with the residents. It should be noted that the main barrier to education is the distances to the schools under the present road conditions especially for the secondary education level.
Employment
Agriculture is the main source of income for the population served by the road, the main agricultural crop being Corns. Kat is grown only in Al Hajajim area. Soils are fertile but agriculture is mainly rain fed and consequently, yields are very limited and almost nil in a dry year. This has lead to the abandonment of agriculture and to expatriation. From the site visit; one can notice the high number of abandoned lands. The project area is known for the high number of emigrants that left the area looking for job opportunities. The main income of the population in the area comes from money transfers.

Archaeology and cultural heritage
One site of some archaeological significance was identified within the Project site, Maqam Issa (Issa Shrine). The site, however, is not affected by the road works as it is at a distance of around 300m to the proposed road alignment. During execution of works, if other archaeological sites are encountered, authorities should be contacted.

Potential Social and Environmental Impacts
A scoping matrix (adopted from the SEA-RAP2) was used to identify impacts that should be given attention. Input from the public consultation was considered and incorporated in the list of potential impacts. These impacts were classified in terms of: Type (negligible, uncertain, positive, negative), Effect (direct, indirect), Change (temporary, permanent), Extent (localized, extensive) and Degree (minor, major reversible or major irreversible).

None of the impacts identified were evaluated as major irreversible. Most impacts are considered negligible. Impacts of more significance are short-term and reversible except for the land used in widening the road which although minor in long term and irreversible.

Impacts are listed below in order of significance starting from permanent irreversible to temporary reversible:

Project activities identified as causing potentially permanent irreversible impacts:
1. Permanent land acquisition (A-1.2)
   a. Widening the road (A-1.2.1)
   b. Pinch points (A-1.2.2)
   c. Changes of alignment (A-1.2.3)
   d. Waste dumping (A-1.2.4)
2. Slope stabilization (A-1.4)
3. Disposal of Cut Material and Surplus Fill (A-1.6)
4. Borrow Pits and Quarry Areas (A-1.7)

Project activities identified as causing potentially temporary reversible impacts:
1. Dust and Potential Pollution form Construction Machinery, Stored Materials and Spoil Heaps (A-3.1)
2. Alteration of water harvesting patterns (A-2.4)
3. Cross-Drainage and Scour effects (A-2.5)
4. Noise Nuisance from Construction Works (A-3.3)
5. Management of Construction site compound (A-1.5)
   a. Management of Petroleum Products (A-1.5.2)
   b. Solid and Liquid Waste Disposal (A-1.5.1)
   c. Living and Sanitation facilities (A-1.5.3)
6. Discharge to sensitive areas (A-2.6.6)
7. Destruction and re-location of utility services (A-5.3)
8. Temporary land acquisition (A-1.3)
   a. Location and operation of the Site compound (A-1.3.1).
   b. Diversion and haul roads (A.1.3.2)

No cumulative impacts of the project are expected. The baseline conditions do not indicate any possibility of significant cumulative impacts. Similarly, no other infrastructure projects, that could give rise to cumulative impacts, are expected during the road project implementation.

During the construction phase, the project will have minor negative impacts and positive impacts through income generation created by the hiring of local workers. However, during operation, the majority of the impacts will be positive.

Mitigation measures

The Mitigation measures include actions needed to mitigate the previously identified negative impacts and enhance the positive impacts. The mitigation measures make sure that the construction, and maintenance of the road are compatible with the protection of the existing environment and maintain the welfare of the people affected by the Project. The cost of mitigation measures is expected to reach 50,000 USD (excluding items included already in the BoQ). The majority of the proposed mitigation activities is part of the works and listed in the BOQ Environmental Works. In addition, the General Contract Specifications and Regulations contain specific environmental, health and safety requirements for proper management of construction waste, waste fuel, oil and lubricants, noise and dust levels, and use and proper maintenance of equipment.

Environmental and Social Management Plan

An Environmental and Social Management Plan (ESMP) was prepared for the Project. It aims at addressing the environmental safeguards required during the Project implementation. The presence of a proper environmental management plan is extremely useful so that recommendations in terms of mitigation and monitoring are effectively implemented. The ESMP is essentially a guidance document to be continually referred to during the construction and operation of the Project. The ESMP for the Project is summarized in the following table.

Environmental and Social Monitoring Plan

The Monitoring Plan is a vital aspect of the Environmental and Social Management Plan (ESMP) to ensure that mitigation measures are being performed and that they are effective. The main purposes of the monitoring plan are the warning of responsible authorities of unforeseen negative impacts or when an impact indicator approaches a critical level and the provision of information such as the responsible agencies, frequency, location and indicators for each measure. The total cost of the monitoring plan is estimated at 35,000 US$ for the total duration of the execution works of the road.

Social Consultations

Consultations with men and women in the project area were conducted separately during the preparation of this ESIA. Results of the men consultations can be summarized as follows:
1. All residents are convinced of the positive economic, social and health impacts of the road widening and paving on their lives.
2. None of landowners donated land more than 10% of their total land holding and the majority of them just donated less than 1% of their landholding.

3. Land donation is voluntary.

4. Different plots are owned by one same owner

5. Because of the rugged terrain, and dependence on the Monsoon, land revenues are low. The population hopes to increase revenues after the completion of the road works as they will be able to supply crops with water they bring from the valleys by means of tankers.

6. Some residents expressed their concern over the suspension of the project without completing the process of asphalting. Their land will be excavated and lost without a result; they wanted the project to be completed in all its phases.

7. Transport is expensive especially for the sick.

8. Some residents showed lack of confidence in the implementation of the project as they were promised implementation several times long time ago.

9. Most residents showed their willingness to help during the implementation process.

10. Most of the population did not express displeasure with the problems that accompany the implementation process such as the noise and dust, and the temporary disruption of some services.

Women Consultation

The aim of this consultation was to solicit the views and concerns of women on the construction of the road and incorporate them into this ESIA and the contract documents of the Project. A gender expert undertook the consultations in four villages along the road, interviewed women from different levels and discussed with them the expected impact and the appropriate mitigation measures with regard to daily activities.

Results of the women consultations can be summarized as follows:

- In Wadi Al Sohi village, women expressed their concerns because of the increasing risk of accidents and the safety of their children especially outside the school gates, and they pointed out the need for the installation of signs and speed bumps in order to reduce vehicles speed.

- In Al Joraebib village many women were worried about the danger on their lives near the mosque of the valley because the vehicle’s speed might be faster as a result of the road maintenance. Particularly, women get the water from this place, usually with the company of their children. They proposed to put signs and speed bumps in this region.

- In Alarwoth village some women asked for the installation of speed bumps in Al Arakeb area in the center of the village.
### Table 1: Environmental and Social Management Plan (ESMP) during the construction phase

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Activities</th>
<th>Implementation</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost US $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mitigation Measures</td>
<td>Monitoring Measures</td>
<td>Monitoring</td>
<td>Mitigation Measures</td>
<td>Monitoring</td>
</tr>
<tr>
<td>A.1 Land Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-1.1 Site Survey Investigation</td>
<td>No special mitigation measure is needed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| A-1.2 Permanent Land Acquisition | -Voluntary donation files prepared  
-Proper selection of dumping site  
-Selection of dumping site will be clearly demarcated with sign boards, directions | Beneficiary Committee and Environmental and Social Unit in cooperation with contractor and Resident Engineer | Environment and Social Specialist/Consultant | None                                  | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist with camera and car expenses (35,000 USD) |
| A-1.3 Temporary Land Acquisition | -Proper location of site offices and plants  
-Re-instatement of the lot to its initial condition  
-Proper Management of all solid and liquid wastes | Contractor and resident engineer                                                                 | Environment and Social Specialist/Consultant | Included in A.1-5 | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist |
| A-1.4 Slope Stabilization | -Construct retaining walls and gabions  
- Limit earthworks to the minimum required | Contractor and resident engineer | Environment and Social Specialist/Consultant | Cost included in the BoQ | Cost included in the supervision |
| A-1.5 Management of Construction site Compound | -Location of workers camp at least few kilometers from residential areas  
- Storage of hydrocarbon products in sealed containers  
- Collection, storage and safe disposal of solid and liquid waste (including sewage) | Contractor | Environment and Social Specialist/Consultant | 4,000 USD | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist |
| A-1.6 Disposal of Cut Material and Surplus Fill | -Get approval on the disposal site location  
- Transport the excess surplus material to vacant and approved areas  
- Cover the trucks with sheets  
- Prepare and implement Construction Waste Management Plan | Contractor and Beneficiary Committee | Environment and Social Specialist/Consultant | Cost included in the BoQ | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist |
<p>| A-1.7 Borrow Pits and Quarry Areas | -Get the base course from existing quarries in Taiz to prevent disruption of visual amenities | Contractor | Environment and Social Specialist/Consultant | Cost included in the BoQ |  |
| <strong>A- Hydrology and Water Resources</strong> | | | | | |
| A-2.1 Sources of construction water | - Contractor to negotiate access to water with the local communities | Contractor and Beneficiary Committee | Environment and Social Specialist/Consultant | None | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist |</p>
<table>
<thead>
<tr>
<th>Action Area</th>
<th>Description</th>
<th>Responsible Party</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
</table>
| A-2.2 Pollution from wastewater, diesel or asphalt spills from site compounds and machinery | - Do not use contaminated water for dust suppression  
- Do not keep the soil exposed in the rainy season  
- Keep liquid fuel, oil and lubricates in sealed containers.  
- Undertake ad hoc repairs ad refueling in designated sealed and lined locations with a sump  
- Develop contingency plans in the event of a spill  
- Maintain waste storage  
- Locate stockpiles away from storm water  
- Limit the height & slope of stockpiles  
- Divert the overflow around work areas  
- Inspect regularly the erosion and sedimentation controls  
- Develop contingency plans in the event of a spill | Contractor  
Environment and Social Specialist/Consultant | 5,000 USD | Cost included in salary of 1 part time social and 1 part time environmental specialist |
| A-2.3 Flood protection in Wadi | - Install culverts as per the design | Contractor | Environment and Social Specialist/Consultant | Cost included in the BOQ | Cost included in salary of 1 part time social and 1 part time environmental specialist |
| A-2.4 Alteration of water harvesting patterns | - Install irrigation steel pipes for encasing water pipes  
- Avoid irreversible destruction of water patterns | Contractor, Design Engineer Resident Engineer and Beneficiary Committee | Resident Engineer | 14,000 USD | Cost included in salary of 1 part time social and 1 part time environmental specialist |
| A-2.4 Cross drainage and scour effects | - Install culverts at designated locations and sizes as per the hydrological study  
- Install ditches and rip rap as per the design | Contractor | Environment and Social Specialist/Consultant | Cost included in the BOQ | Cost included in salary of 1 part time social and 1 part time environmental specialist |
### A-2.5 Discharge to Adjacent Lands:
- Unstable slopes
- Rock Surface
- Channel in a stack
- Graveyards
- Terraces
- Other sensitive areas

- Install Drainage culverts and lined ditches to accommodate channel flow.

<table>
<thead>
<tr>
<th>Contractor and Beneficiary Committee</th>
<th>Environment and Social Specialist/Consultant</th>
<th>Cost included under A-2.4</th>
<th>Cost included in salary of 1 part time social &amp; environmental specialist</th>
</tr>
</thead>
</table>

### A-1 Air Quality and Noise Nuisance

#### A-3.1 Dust & Potential air pollutants from construction, Machinery, stored material and spoil heaps

- Minimize the disturbance areas of land by staging the work
- Cover dusty vehicles carrying fine grade materials
- Restrict vehicle movement to defined access
- Regular spraying of water during dry and windy weather conditions
- Cover material stockpiles
- Minimize excavation and transfer in windy days
- Control drop height of excavated materials
- Minimize the height & slope of stockpiles
- Regular maintenance and inspection of the construction machinery against leakages
- Appropriate placement of stockpiles
- Daily visual inspection
- Minimize the number of fuel & chemical storage places
- Ensure proper storage of volatile fuels

<p>| Contractor | Environment and Social Specialist/Consultant | 15,000 USD | Cost included in salary of 1 part time social specialist and 1 part time environmental specialist |</p>
<table>
<thead>
<tr>
<th>A-3.2 Smoke from burning of waste materials</th>
<th>Contractor</th>
<th>Environment and Social Specialist/Consultant</th>
<th>2,000 USD</th>
<th>Cost included in salary of 1 part time social specialist and 1 part time environmental specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Do not burn waste material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Properly locate storage areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regularly transfer waste from Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A-3.3 Noise Nuisance from Construction Works</th>
<th>Contractor</th>
<th>Environment and Social Specialist/Consultant</th>
<th>5,000 USD</th>
<th>Cost included in salary of 1 part time social specialist and 1 part time environmental specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Regular maintenance of construction equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Work in day time near settlements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Work outside of school hours near schools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Make sure all personnel have and use hearing protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Prepare contingency plans to deal with noise complaints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A-4 Biological Resources</th>
<th>Contractor</th>
<th>Environment and Social Specialist/Consultant</th>
<th>5,000 USD</th>
<th>Cost included in salary of 1 part time social specialist and 1 part time environmental specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-4.1 Conversion of Degradation of a critical and non-critical Natural habitat.</td>
<td>- The Contractor is not allowed to cut trees other than those necessary to conduct the works</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>5,000 USD</td>
</tr>
<tr>
<td></td>
<td>- Unblocking of culverts to allow passage of small animals</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>5,000 USD</td>
</tr>
<tr>
<td></td>
<td>- Plant new bushes and provide necessary irrigation if bushes are destroyed during works.</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>5,000 USD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A-4.2 Damage to Biological Resources By Construction Equipment</th>
<th>- The Contractor is not allowed to cut trees other than those necessary to conduct the works</th>
<th>Contractor</th>
<th>Environment and Social Specialist/Consultant</th>
<th>See A-4.1</th>
<th>Cost included in salary of 1 part time social specialist and 1 part time environmental specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Plant new bushes and provide necessary irrigation if bushes are destroyed during works.</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>See A-4.1</td>
<td>Cost included in salary of 1 part time social specialist and 1 part time environmental specialist</td>
</tr>
</tbody>
</table>
### A-4.3 Damage to Biological Resources by Construction Workers

- The Contractor is not allowed to cut trees other than those necessary to conduct the works.
- Unblocking of culverts to allow passage for small animals.
- Plant new bushes and provide necessary irrigation if bushes are destroyed during works.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
</tr>
</tbody>
</table>

See A-4.1 Cost included in salary of 1 part time social specialist and 1 part time environmental specialist.

### A-4 Expected Impacts on Socio-Economic and Cultural Resources

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-5.1 Tribal tensions</td>
<td>No special mitigation measure needed</td>
</tr>
<tr>
<td>A-5.2 Land acquisition</td>
<td>Land donation files prepared</td>
</tr>
<tr>
<td>A-5.3 Destruction or relocation of utility services</td>
<td>Arranged relocation with locals, provide alternatives when service is shut down, contractor to make an effort to shorten the period of shutdown</td>
</tr>
<tr>
<td>A-5.4 Public health and safety at construction site</td>
<td>Barriers erected at high risk areas, installation of warning signs, provision of adequate lighting on the road</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
</tr>
</tbody>
</table>

Cost included in the BOQ. Cost included in salary of 1 part time social specialist and 1 part time environmental specialist.
### A-5.5 Road closure and detours
- Contractor to obtain approvals from the locals
  - Contractor and Beneficiary Committee
  - Environment and Social Specialist/Consultant
  - None
  - Cost included in salary of 1 part-time social specialist and 1 part-time environmental specialist

### A-5.6 Graveyards and Burials
- No special mitigation measure needed
  - None

### A-5.7 Known archaeological and Historic Sites
- No special mitigation needed
  - None

### A-5.8 Chance finds of Cultural Resources or other socio-economic resources
- If cultural resources are found, cease excavation and contact local authorities
  - Contractor
  - Environment and Social Specialist/Consultant
  - To be determined

### A-5.9 Gender considerations
- Install traffic signs and bumps for road safety near schools and for animal crossings as well as at the location of Mosque in Al-Joreaib village
  - Contractor and Beneficiary Committee
  - Environment and Social Specialist/Consultant
  - Cost included in the BOQ
  - Cost included in salary of 1 part-time social specialist and 1 part-time environmental specialist

### A-5.10 Employment
- Employ local residents when feasible
- Contract local companies when feasible
  - Contractor and Beneficiary Committee
  - Environment and Social Specialist/Consultant
  - None

<p>| TOTAL | 50,000 USD | 35,000 USD |</p>
<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Measures</th>
<th>Implementation</th>
<th>Monitoring</th>
<th>Additional Cost per average per year US $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B-1 Land Resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-1.1 Slope stabilization</td>
<td>-Regularly maintain the stabilization measures and protection works</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>Cost will be included in the maintenance BOQ</td>
</tr>
<tr>
<td>B-1.2 Agricultural land or terrace Damage during maintenance</td>
<td>-Maintain in good conditions the drainage system and the shoulders -Follow Safety, Health and</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>Cost will be included in the maintenance BOQ</td>
</tr>
<tr>
<td>B-1.3 Maintenance of contractor site compounds, materials and equipment storage</td>
<td>-Follow Safety, Health and Environmental Regulations</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td></td>
</tr>
<tr>
<td>B-1.4 Management of induced development</td>
<td>-No special mitigation measure needed</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td></td>
</tr>
<tr>
<td><strong>B.2 Hydrology and Water Resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-2.1 Water Harvesting</td>
<td>-Regular maintenance of water harvesting structures</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>Cost will be included in the maintenance BOQ</td>
</tr>
<tr>
<td>B-2.2 Blockage of cross drains/culverts - Uncontrolled discharge</td>
<td>-Regular maintenance of the drainage structures</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>Cost will be included in the maintenance BOQ</td>
</tr>
<tr>
<td>B-2.3 Erosion of road platform from drainage discharge</td>
<td>-Regular maintenance of retaining walls, gabions and rip rap</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td>Cost will be included in the maintenance BOQ</td>
</tr>
<tr>
<td>B-2.4 Pollution from Vehicle leakage or accidents with hazardous cargo</td>
<td>-Timely clean up following spills or accidents</td>
<td>Contractor</td>
<td>Environment and Social Specialist/Consultant</td>
<td></td>
</tr>
<tr>
<td><strong>B-3 Air Quality and Noise</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### B-3.1 Dust and Potential Pollution from Construction Machinery
- No special mitigation measure needed

### B-3.2 Noise Nuisance from maintenance works
- No special mitigation measure needed

### (Provisional B3.3) air Pollution from Vehicles
- MoT issues regulations for the regular maintenance of the vehicles and the use of lead free fuels
  - Contractor
  - Environment and Social Specialist/Consultant

### (Provisional B-3.4) Noise Nuisance from Vehicles
- No special mitigation measure needed

### B-4 Biological Resources

#### B-4.1 Damage to Biological Resources by Construction Equipment
- No special mitigation measure needed

#### B-4.2 Damage to Biological Resources by Construction Workers
- No special mitigation measure needed

#### (provisional B-4.3) Increased pressure on Biological Resources from induced Development
- Maintain culverts unblocked for passage by small animals
- No special mitigation measure needed
  - Cost will be included in the maintenance BOQ

### B-4 Socio-Economic and Cultural Resources

#### B-5.1 Increased Road Accidents
- Maintain speed reduction signs and bumps
  - Contractor
  - Environment and Social Specialist/Consultant
  - Cost will be included in the maintenance BOQ

#### B-5.2 Public Health and Safety during Maintenance
- Safety rules followed
- Installation of warning traffic signs
- Health and safety regulations displayed in English and Arabic in the maintenance
  - Contractor
  - Environment and Social Specialist/Consultant
  - Cost will be included in the maintenance BOQ

#### B-5.3 Socio-economic measures
- No special mitigation measure needed

#### B-5.4 Chance finds Cultural Resources or Other Socio-Economic Resources
- If found during maintenance, the local Authority should be contacted
  - Contractor
  - Environment and Social Specialist/Consultant