ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN for IBB GOVERNORATE SUB-PROJECT (612.7 km)

03/07/2014
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN for IBB GOVERNORATE SUB-PROJECT (612.7 km)

Prepared by:

Dr. Adnan Alsanoy  Mr. Adam Abdulwadood
<table>
<thead>
<tr>
<th>EXECUTIVE SUMMARY</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SUB-PROJECT DESCRIPTION</td>
<td>19</td>
</tr>
<tr>
<td>1.1. Location and Objectives</td>
<td>19</td>
</tr>
<tr>
<td>1.2. Proposed works</td>
<td>21</td>
</tr>
<tr>
<td>1.3. Specific Characteristics of the Alignments</td>
<td>21</td>
</tr>
<tr>
<td>2. LEGAL AND INSTITUTIONAL FRAMEWORK</td>
<td>60</td>
</tr>
<tr>
<td>2.1. World Bank Environmental Safeguards and Policies</td>
<td>60</td>
</tr>
<tr>
<td>2.2. Yemen Environmental Policies and Legislations</td>
<td>61</td>
</tr>
<tr>
<td>3. BASELINE CONDITIONS – EXISTING ENVIRONMENT</td>
<td>64</td>
</tr>
<tr>
<td>3.1. Physical Resources</td>
<td>64</td>
</tr>
<tr>
<td>3.1.1. Physical Region</td>
<td>64</td>
</tr>
<tr>
<td>3.1.2. Geology and Soils</td>
<td>65</td>
</tr>
<tr>
<td>3.1.3. Land Use</td>
<td>65</td>
</tr>
<tr>
<td>3.1.4. Climate</td>
<td>64</td>
</tr>
<tr>
<td>3.1.5. Water Resources</td>
<td>66</td>
</tr>
<tr>
<td>3.1.6. Air Quality and Noise</td>
<td>67</td>
</tr>
<tr>
<td>3.1.7. Flora</td>
<td>67</td>
</tr>
<tr>
<td>3.1.8. Fauna</td>
<td>67</td>
</tr>
<tr>
<td>3.1.9. Proposed Protected Areas</td>
<td>68</td>
</tr>
<tr>
<td>3.1.10. Cultural and Historical Resources</td>
<td>69</td>
</tr>
<tr>
<td>3.1.11. Population</td>
<td>71</td>
</tr>
<tr>
<td>3.1.12. Poverty Status</td>
<td>72</td>
</tr>
<tr>
<td>3.1.13. Services and Facilities in the Sub-Project Area</td>
<td>73</td>
</tr>
<tr>
<td>4. ENVIRONMENTAL AND SOCIAL IMPACTS</td>
<td>74</td>
</tr>
<tr>
<td>4.1. Impact scoping</td>
<td>74</td>
</tr>
<tr>
<td>4.2. Specific Impacts During the Backlog Road Repairs and Maintenance</td>
<td>77</td>
</tr>
<tr>
<td>4.2.1. Impact of Construction and Domestic Waste Generation, Storage and Disposal</td>
<td>77</td>
</tr>
<tr>
<td>4.2.2. Impact of Landslides, Soil Erosion, and Visual Intrusion</td>
<td>78</td>
</tr>
<tr>
<td>4.2.3. Deterioration of the Ambient Air Quality</td>
<td>78</td>
</tr>
<tr>
<td>4.2.4. Impact of Increased Noise Levels and Vibration</td>
<td>79</td>
</tr>
<tr>
<td>4.2.5. Disruption of Water Supply</td>
<td>79</td>
</tr>
<tr>
<td>4.2.6. Disruption of Runoff Water and Drainage Systems</td>
<td>79</td>
</tr>
<tr>
<td>4.2.7. Deterioration of Groundwater Quality</td>
<td>80</td>
</tr>
<tr>
<td>4.2.8. Damage to Fauna and Flora, Deterioration of Local Ecosystem</td>
<td>80</td>
</tr>
<tr>
<td>4.2.9. Disruption of Traffic</td>
<td>81</td>
</tr>
<tr>
<td>4.2.10 Health and Safety Conditions</td>
<td>81</td>
</tr>
<tr>
<td>4.2.11. Cultural and Historical Resources</td>
<td>82</td>
</tr>
<tr>
<td>4.2.12 Social Impacts</td>
<td>83</td>
</tr>
<tr>
<td>5. ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES</td>
<td>110</td>
</tr>
<tr>
<td>5.1. General</td>
<td>110</td>
</tr>
<tr>
<td>5.2. Mitigation Measures for Project Activities During Both the Backlog Repairs and Regular Maintenance Phases</td>
<td>111</td>
</tr>
<tr>
<td>5.2.1. Generation, storage and disposal of construction and domestic waste</td>
<td>111</td>
</tr>
<tr>
<td>5.2.2. Landslides, Soil Erosion, and Visual Intrusion</td>
<td>111</td>
</tr>
<tr>
<td>5.2.3. Deterioration of Air Quality</td>
<td>112</td>
</tr>
<tr>
<td>5.2.4. Increased Level of Noise</td>
<td>112</td>
</tr>
</tbody>
</table>
5.2.5. Disruption of Water Supply ................................. 113
5.2.6. Disruption of The Runoff Water and Drainage Systems .................. 113
5.2.7. Deterioration of Groundwater Quality ............................... 113
5.2.8. Stress on Fauna and Flora ........................................ 115
5.2.9. Disruption of Traffic .................................................. 115
5.2.10. Deterioration of Health and Safety Conditions ......................... 115
5.2.11. Cultural and Historical Resources .................................. 115
5.2.12. Social Impacts .............................................................. 116
6. ENVIRONMENTAL AND SOCIAL MONITORING ACTIVITIES ........ 117
  6.1. Monitoring Arrangements .............................................. 117
  6.2. Reporting ................................................................. 117
7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN – ESMP .... 118
  7.1. General .......................................................... 118
  7.2. Responsibilities and Procedures ..................................... 118
8. SOCIAL CONSULTATIONS .................................................... 127
  8.1. Consultations Program .................................................. 127
  8.2. Consultation With Men ................................................ 127
  8.3. Consultations with Women ............................................. 130
  8.4. Recommendations ....................................................... 132
ANNEXES ................................................................. 133
  Annex 1: Sample of Screening Report Template ........................... 133
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>T 1</td>
<td>Names, Length, and Types of Roads - Ibb Governorate</td>
<td>14</td>
</tr>
<tr>
<td>F 1</td>
<td>Location of Ibb Governorate in Yemen</td>
<td>15</td>
</tr>
<tr>
<td>F 2</td>
<td>Location of the Project Road Alignments - Ibb Governorate</td>
<td>15</td>
</tr>
<tr>
<td>T 2</td>
<td>Characteristics of the Twenty Five Road Sections Identified During Site Surveys</td>
<td>16</td>
</tr>
<tr>
<td>T 3</td>
<td>World Bank Safeguard Policies Triggered</td>
<td>31</td>
</tr>
<tr>
<td>F 3</td>
<td>Topographic map of the Ibb Governorate</td>
<td>33</td>
</tr>
<tr>
<td>F 4</td>
<td>Annah Valley</td>
<td>38</td>
</tr>
<tr>
<td>F 5</td>
<td>Al-Door Valley</td>
<td>38</td>
</tr>
<tr>
<td>T 4</td>
<td>Population and Settlements of Ibb Governorate (2013 estimated)</td>
<td>40</td>
</tr>
<tr>
<td>T 5</td>
<td>Poverty Status of Ibb Governorate</td>
<td>41</td>
</tr>
<tr>
<td>T 6</td>
<td>Access to Basic Public Services in Ibb Governorate</td>
<td>42</td>
</tr>
<tr>
<td>T 7</td>
<td>Impact Assessment Scoping Matrix for the backlog repair phase of the project</td>
<td>69</td>
</tr>
<tr>
<td>T 8</td>
<td>Relevant Clauses in Standard Construction Contracts</td>
<td>104</td>
</tr>
<tr>
<td>T 9</td>
<td>Summary of Environmental and Social Management Plan procedures</td>
<td>113</td>
</tr>
<tr>
<td>T 10</td>
<td>Summary of ESMP during the Backlog Works and Repair Phase</td>
<td>113</td>
</tr>
<tr>
<td>T 11</td>
<td>Summary of Monitoring Activities During the Backlog Works and Repairs Phase</td>
<td>117</td>
</tr>
<tr>
<td>T 12</td>
<td>The Surveyed Villages and the Number of Respondents</td>
<td>118</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>BL</td>
<td>Beneficiary List</td>
</tr>
<tr>
<td>BOQ</td>
<td>Bill of Quantity</td>
</tr>
<tr>
<td>BP</td>
<td>Bank procedures</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>CSO</td>
<td>Central Statistical Organization</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Authority</td>
</tr>
<tr>
<td>EPC</td>
<td>Environment Protection Council</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>GALSUP</td>
<td>General Authority for Land Survey and Urban Planning</td>
</tr>
<tr>
<td>GARWSP</td>
<td>General Authority for Rural Water Supply</td>
</tr>
<tr>
<td>GOY</td>
<td>Government of Yemen</td>
</tr>
<tr>
<td>GP</td>
<td>Good Practices</td>
</tr>
<tr>
<td>HC</td>
<td>Hydro Carbon</td>
</tr>
<tr>
<td>MoAI</td>
<td>Ministry of Agriculture and Irrigation</td>
</tr>
<tr>
<td>MoF</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>MoWE</td>
<td>Ministry of Water and Environment</td>
</tr>
<tr>
<td>MPWH</td>
<td>Ministry of Public Works and Highways</td>
</tr>
<tr>
<td>MSL</td>
<td>Mean Sea Level</td>
</tr>
<tr>
<td>NEAP</td>
<td>National Environmental Action Plan</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NO</td>
<td>Nitrogen Oxides</td>
</tr>
<tr>
<td>NWRA</td>
<td>National Water Resources Authority</td>
</tr>
<tr>
<td>OP</td>
<td>Operational Procedure</td>
</tr>
<tr>
<td>RAP</td>
<td>Rural Access Program</td>
</tr>
<tr>
<td>RAPCMO</td>
<td>Rural Access Program Central Management Office</td>
</tr>
<tr>
<td>RMF</td>
<td>Road Maintenance Fund</td>
</tr>
<tr>
<td>ROW</td>
<td>Right of Way</td>
</tr>
<tr>
<td>SEA</td>
<td>Sectoral Environmental Assessment</td>
</tr>
<tr>
<td>SO₂</td>
<td>Sulphur Oxide</td>
</tr>
<tr>
<td>TSP</td>
<td>Total Suspended Particulates</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

1. Introduction

The Environmental and Social Management Plan (ESMP) for Ibb Governorate is financed under Road Asset Management Project (RAMP), and managed by the RMF Implementation Unit (IU). This ESMP contains the results of the environmental and social impact assessment undertaken for the Backlog Works and Repairs Phase as well as Routine Maintenance of the project for Ibb governorate roads. It complies with the World Bank’s Environmental and Social Safeguards Policies and the Relevant Yemen Regulations. Due to the scope of work limited to backlog repairs and maintenance activities, the project is classified as category B.

The ESMP document identifies and assesses the environmental and social impacts of the sub-project. Moreover, the report identifies the necessary mitigation measures and elaborates the necessary management and monitoring plans to ensure that impacts are dealt with and mitigation measures are followed during the maintenance activities. The Environmental and Social Management Plan (ESMP) follows at the end of the executive summary and in chapter 7.

The ESIA report was carried out according to the guidelines set out in the Environmental and Social Impact Assessment Framework (ESIAF) document prepared for the implementation unit within the RMF. The environmental and social review guidelines stipulated in the OP 4.01, impact screening and scoping checklists, and consultations with both male and female groups for Ibb governorate roads were the main tools used during the preparation of this ESMP report.

2. Project Objectives

The overall project objective is to alleviate poverty in the area by improving access to basic services such as schools, health centers and markets, and by creating local employment through road maintenance works. This will be achieved by upgrading the existing paved roads to prevent their deterioration, improving traffic safety at critical locations, by improving slope stability at mountainous roads, cleaning cross drainage and side ditches and removing illegal speed bumps and replacing them with new safety speed bumps.

The backlog maintenance works of the proposed project will meet the future demand for better transportation and communication between many districts and villages of Ibb Governorate. In addition, keeping in view an anticipated overall development in the center and inland region of the country, it will reduce travel time and the cost of freight traffic between districts, cities and villages.

Furthermore, the importance of maintaining 612.7 km of roads is to serve the population of the governorate of about 2,700,000 inhabitants.

3. Project Description

The Road Asset Management Project (RAMP) sub-project of Ibb governorate is composed of twenty-five roads with the total length of 612.7 km. These roads connect many villages with the district centers and with the Ibb city. They also connect Ibb governorate with Taiz, Al- Dale'a,
Hodaidah governorates. The target roads consist of six main roads, twelve secondary roads, and seven tertiary roads.

These roads run in different regions such as, mountainous, hills, valleys, agricultural and flat lands, flat-rolling-mountainous and pure mountainous. The mountainous terrain of the roads alignments includes very high slopes and sharp curves.

The scope of works include structural excavation, gabions construction, construction of stone masonry for culverts and walls, installation of safety barriers and handrails, cleaning blocked drainage, repairs of riprap, road resurfacing, crack sealing, repairs and cleaning of shoulders, installation of pipe culverts, pavement marking, installation of subsoil filter drains, installation of road signs. All rehabilitation and backlog works of this sub-project will be conducted within the Right Of Way (ROW). No additional land acquisition is required. The duration of the backlog works and repairs phase of the project is 48 months.

4. Legal and Institutional Framework

The ESMP of this sub-project is carried out to meet the requirements of the Environment Protection Law (EPL) No. 26 of 1995 in Yemen that sets the framework for protection of the environment, natural resources, society and health. The provisions of this framework law are implemented through the Executive Regulations (By-Law 148-2000), issued by a decree of the Council of Ministers. According to the Law 26 described above, the EMP is required for road maintenance works.

In addition, this ESMP report has been prepared in conformity with World Bank Operational Policy OP/BP/GP 4.01. The policy OP / BP/ 4.12 is not triggered for this sub-project because no widening or re-alignment would occur during construction and repair works and there will be no economic or physical displacement.

5. Baseline Conditions

A detailed field study was carried out by environmental, social and gender specialists for the purpose of assessing the existing environmental and social condition. Baseline of environmental and social conditions were studied and presented in the ESMP. The information was collected from the existing reports, papers and publications, as well as the field surveys.

Physical Region and Land Use

The terrain types of these roads vary between mountainous to rolling and some of them are mixed of flat-rolling-mountainous. The road alignments pass through the agricultural land. Most of the terrains have vegetative cover. Agricultural and pastures activities are the major land use characteristic at the project area. The land use of the province also includes mining such as clay mineral (for making cement and refractory bricks), zeolite (for detergents), and basalt stones (used in construction and as decorative stones).
Geology and Soils
The underlying geological strata in the Ibb governorate are largely volcanic rocks created in the Tertiary and Quaternary Volcanism. Sedimentary processes are particularly active along valleys.

Climate
Ibb Governorate is characterized by moderate climate during the year. It has a cool continental climate, and is one of the wettest areas of Yemen; typically receiving 800–1200 mm of rain. There is little rain from November to February, but for the rest of the year there is at least 100mm of rain per month. Temperatures are warm, averaging about 30 °C during the day but nights are quite cool.

Water Resources
Ibb Governorate is considered rich in water. The rain falls during most parts of the year. Yemenis for centuries have been constructing terraces to utilize highlands for cultivation, which are also useful in controlling soil erosion. Field visits to project alignments region, several systems were found for water harvesting; direct discharge to terraces from mountain tops, irrigation system, and water wells.

Air Quality and Noise
No air quality monitoring data for the project area was found. The air quality in Ibb governorate is considered unique due to its dense vegetation and the highest mountains especially in rural areas. Based on field visit, it was noticed that the air quality along the road is good.

Noise: The field survey indicated that the current noise levels along the roads alignments are low and do not exceed 50dB due to relatively low traffic volume and speed as well as lack of noisy activities along the road alignment.

Flora
The most significant feature in Ibb governorate is the rich vegetation. There are different kinds of flora in the governorate in most part of the sub-project area. The vegetation is used by the residents for their daily uses, for firewood and as rangeland for livestock. The plants species includes acacia, Aloe Sabaea Schweinf, Cadia purpurea, Ficus cordata, etc. None of these species are under protection or threat.

Fauna
The rich vegetation of the valleys, mountains, and plains of As Saddah, Al Shīr, Al Odain, An Nadera, Athareb is home to predators such as lions and tigers. Other wild animals include monkeys, rabbits, foxes, reptiles and birds. The most common livestock in the area are goats and sheep, cows, camels and donkeys.

Proposed Protected Areas:
Annah, Al-Door, and Banna Valleys are three wadis in Ibb governorate, which are proposed to be declared natural protected areas. These areas are characterized by rich biodiversity. Annah and Al-Door valleys are located within Al-Oudain area. Annah valley is away by about 3 km south of Al Oudian center. It is considered one of the largest valleys in Yemen. Likewise, Al-Door Valley is located within Al-Oudain area neighboring Wadi Annah. The two wadis form a series. This valley
is considered one of the famous wadis in Yemen. On the other hand, Banna valley is located within As-Saddah district starting from the areas such as, Areab, Qa’a Al-Haql, Amam, Obaha, Bii Alhareth. The water flows from these areas and passes in a winding strait for about 3 km and then goes down into Wadi Banna. The shortest distance from the road alignment to the proposed nature protected areas is 150m.

Cultural and Historical Resources
Many historical and cultural sites were found near the project area. The most interesting and ancient historical site is Thafar historical City. It is about 500 meters from Thafar crossing. There are many other historical and cultural sites in the governorate such as, Arwa Queen Mosque and some historical spots in Jebla district, Ba’adan Castle, Al-Taqar Castle.

Socio-Economic
Majority of the local population depends on agricultural revenue and commerce, and external transfer. Agricultural practices are centered around the traditional means of tillage and transportation using animal-drawn (camels, donkeys, and oxen) ploughs. The most important agricultural crops are fruits, vegetables and grains. Other socio-economic activities include intensive livestock and poultry, in most areas of the province where there is arable land, which is used for crops in rainfall seasons and for pastures in non-agricultural seasons.

6. Environmental and Social Impacts Assessment
The impact analysis for both the backlog repairs and maintenance works indicates that overall, beneficial impacts of the project on physical resources, safety, job creation and local economic development are expected to outweigh negative impacts. All potentially adverse impacts arising during rehabilitation works could be mitigated satisfactorily.

The following potential negative environmental and social impacts were identified:

- Generation, storage, disposal of construction and domestic waste
- Landslides, soil erosion
- Increased level of noise
- Deterioration of Agricultural Lands,
- Deterioration of air quality
- Temporary disruption of traffic circulation and
- Temporary disruption of social and economic activities.

The project activities that are likely to cause more deterioration of environmental quality and social integrity include generation, storage and disposal of debris and construction waste, trucking of construction materials, earth works, and resurfacing of roads.

These activities are predicted to have minor negative impacts on the siltation, soil erosion, slope stability, surface runoff, noise, agricultural land, air quality, habitats changes, vegetation, wild life movement and landscape.
Trucking and construction materials are predicted to cause increase of noise levels and vibration, and deterioration of air quality. Road resurfacing is predicted to lead to increase noise levels, deterioration of air quality and reduced safety during the repairs works.

Storage of diesel and oil, and refueling of vehicles is expected to cause contamination risk to agricultural land, surface and groundwater, and safety of project workers. The setting up and operation of labor camps may create minor increase of noise levels and deterioration of vegetation and landscape.

Since this project does not involve the construction of new roads, the negative impacts associated with resettlement and land acquisition are not expected.

Therefore, the maintenance activities will create positive environmental and social impacts. The positive environmental impacts include: reduced soil erosion and siltation of surface water, and improved slope stability and surface runoff. Likewise, the social positive impacts include employing locals in the maintenances activities, easy access to markets to get goods, providing traffic safety.

7. **Environmental and Social Mitigation Measures (ESMM)**

Mitigation measures will eliminate or reduce the negative impacts of the project. The objective of the ESMM is to address the identified negative impacts shown in the screening and scoping impact analyses. All these mitigation measures should be ensured and approved under the terms of reference and contract for construction and supervision, and as necessary by the agreement with communities that will be stated in the SFA. Therefore, the mitigation plans include measures in order to reduce and mitigate the potentially adverse impacts and strengthening the positives ones.

The key mitigation measures proposed include: proper management prepared by contractor, temporary storage and safe disposal of construction waste, construction of retaining walls and gabions, water spraying during operations causing dust emissions, control measures for waste fuel, oil and lubricants, reduction of noise and dust levels through restricting working hours and proper maintenance of equipment, rehabilitation of areas used for construction detours and sites used for temporarily storage of construction materials, provision of alternative access to residents and roadside businesses. All costs associated with the mitigation measures for environmental and social impacts should be incorporated into the overall project budget. It is estimated to reach 90,000 USD in addition to items included in the BoQ.

8. **Environmental and Social Monitoring**

The monitoring activities will aim at verifying compliance of project activities with the mitigation measures. It will be the responsibility of the Supervision consultant supported by the environmental and social specialist. Tables A and B present monitoring activities, and specifies monitoring indicators, frequency, responsibilities and costs during the backlog works and repairs phase, and monitoring phase respectively. Monitoring activities will rely primarily on field observations, feedback from stakeholders and other affected people, and documentation of their reactions to the
project works and their perception of the adequacy of the mitigation measures. Photographic documentation will be required in the continuous and regular monitoring.

The sub-project officer at Road Asset Management Project Implementation Unit (RAMP-IU) shall conduct site inspections every 2-6 weeks to monitor the compliance of the project activities, the contractor and the supervising consultant with the applications of all mitigation measures for environmental and social impacts. The expected cost of the monitoring activities is 96,000 USD.

The Environmental and Social Specialists within the RAMP are responsible for overall monitoring of the environmental and social issues resulting from the project activities, and review of monthly reports on contractor compliance. The results of the monitoring will be archived in a project dossier for the WB Audit.

9. Environmental and Social Management Plan (ESMP)

The Environmental and Social Management Plan (ESMP) summarizes the findings of the field assessment. It presents the key impacts identified, mitigation measures and monitoring arrangements. It is presented in a tabular format in chapter 7 of this report (see also tables A and B). The objective of this ESMP is to establish a procedural framework and mechanism for implementing and monitoring the environmental and social mitigation measures for the expected negative impacts and to monitor the efficiency of these mitigation measures. The estimated cost of implementing mitigation measures is 94,000 USD.

10. Social Consultations

Social consultations were carried out with both male and female members of the local communities present in the project area.

Consultation with male beneficiaries from selected local communities along road alignments were carried out from January 2014 to February 2014. One hundred and six sites were selected within the twenty-five roads. A total of 143 beneficiaries from these sites were randomly selected and interviewed. Due to the fact most of the respondents are illiterate; data was collected by face-to-face interviews. The interview started with general talk and a brief explanation about the nature and objectives of the study to gain the trust and confidence of the respondents and to ensure the most reliable responses.

During the Social Consultations that were carried out with the local people, most of the locals expressed their willingness to cooperate with the contractor as well as interest to work with the contractor as workers.

The locals reiterated the need for road maintenance to improve road safety and reduce damage to agricultural lands resulting from floods and limited number of box culverts. Other comments were related to the need to include local workers in the maintenance works, provision of safety measures at dangerous curves, implementation of works without delays, and removal of random speed bumps. It is worth noting that this round of consultations included representatives from the civil society organizations and women participants.
Likewise, consultations with women were carried out in June 2013 by the female consultant through field visits and interviews in different villages along the road alignments. 72 women were interviewed along the project areas. About 75% of the respondents were married and illiterate women. During the consultation process, questionnaires were also used to solicit respondents’ views, concerns, and feedback on the road maintenance activities. The main environmental and social concerns of roads from the point of view of the women are the following:

- Lack of beneficiaries’ involvement in the road maintenance activities.
- Lack of local authorities’ cooperation in road maintenance activities.
- Lack of community awareness of the positive impacts for road maintenance works.
- Lack of community awareness of the negative impacts for bad road uses, which represented by: overloading, throwing waste in both sides of the roads especially in the markets, and making illegal bumps.
- Lack of supervision by authorities overseeing road safety.

The main recommendations received was to put traffic signs at places at school crossings for school children and students as well as at points where women and animals cross to fields and around health centers. They emphasized that it is important to involve beneficiaries in the maintenance activities in order to contribute in poverty reduction as well as ensuring the cooperation of locals. The respondents also recommended setting up a group of residents responsible for traffic control around schools during school time, and to build speed bumps near entrances to villages.

11. Conclusion

Backlog Maintenance Works and Repairs Phase, and the Standard Maintenance Phase are associated with some potential negative impacts. Most of them are of a temporary nature and can be mitigated with appropriate measures. The Contractor is responsible for adhering to these mitigation measures and implementing them throughout the duration of his contract in coordination with the supervising consultant and the RAMP. The latter will ensure adequate monitoring. The total expected costs of the mitigation measures and monitoring costs is estimated at 190,000 USD. The monitoring costs include full time social and environmental monitoring specialist, travel and equipment costs. When properly and consistently applied, these measures are expected to minimize the potential impacts to negligible levels.
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generation, storage, disposal of construction and domestic waste</td>
<td>• Waste minimization</td>
<td>• Maintaining a record of type, quantity, and disposal location of solid and liquid waste</td>
<td>Contractor, Supervision</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Storage of construction waste in locations pre-agreed with the local communities</td>
<td>generation</td>
<td>Consultant</td>
<td>(96,000 USD for all monitoring activities)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Avoid disposal in environmentally sensitive areas e.g. the streams of Annah, Al-Door, and Banna Valleys</td>
<td>• Site inspections</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Waste disposal in designated locations</td>
<td>• Frequency: Twice a month for each road under repairs</td>
<td>Expected additional USD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Waste from cleaning of blocked drainage should be disposed at vacant land agreed with the local</td>
<td></td>
<td>180,000 costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>populations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Coarse and fine waste materials should be used as filling, construction and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>stabilization material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Handling of liquid waste in sealed containers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid and liquid waste management plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Landslides, soil erosion, and Visual intrusion</td>
<td>• Construction and repairs of retaining walls</td>
<td>• Site inspection and photographic documentation of excavation and maintenance activities</td>
<td>Contractor</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restoration of riprap and stone pitching</td>
<td>• Photographic documentation of planting and re-vegetation activities</td>
<td>Supervision Consultant</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provision of open area ~1m wide, behind cut side channels, to store temporarily</td>
<td>• Frequency: Once a week for each road under repairs</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>fallen debris</td>
<td></td>
<td>Expected additional USD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase the mass thickness of rock fill for additional stability</td>
<td></td>
<td>180,000 costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restoration of drainage systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Planting trees in sensitive zones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restoration of vegetative cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table A. Environmental and Social Management Plan: Mitigation Measures during backlog works and repairs stage.
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Deterioration of air quality</td>
<td>• Usage of well-maintained equipment</td>
<td>• Visual observation and photographic documentation of equipment induced emissions and dust clouds from works and trucks</td>
<td>Contractor</td>
<td>Will be part of the works contract. Expected additional costs: 10,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Using good quality fuel to reduce exhaust emissions.</td>
<td>• Frequency: Once a week for each road under repairs</td>
<td>Supervision Consultant</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water spraying for dust control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cleaning of vehicle tires</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Covering of trucks carrying fine grade construction materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Avoiding earthworks near schools during the school hours.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Increased level of noise</td>
<td>• Usage of quiet/well-maintained equipment</td>
<td>• Site supervision, inspection and documentation to ensure the implementation of mitigation measures</td>
<td>Contractor</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Expected additional cost: 5,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limiting noisy activities to normal daylight hours</td>
<td>• Frequency: Once a week for each road under repairs</td>
<td>Supervision Consultant in coordination with the Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provision of speed limit signs at critical locations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Informing local population about noisy road works</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Obtain permits for siting and operation of any new quarrying or borrow pit areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Planting trees in sensitive zones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Disruption of water supply</td>
<td>• Protecting water supply systems during works</td>
<td>• Close supervision and documentation of pipe re-location activities</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Expected cost 20,000 USD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fixing the damaged riprap after compacting the top soil along the eroded side ditches</td>
<td>• Monitoring any interruptions of water supplies to local communities caused by project works</td>
<td>Supervision Consultant in coordination with the Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Coordination with land owners on scheduling maintenance activities</td>
<td>• Frequency: Once a week for each road under repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensuring no interruption of water supply during works</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Frequency: Once a week for each road under repairs.
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
</table>
| 6   | Disruption of the runoff water and drainage systems | - Proper side sloping of the road to prevent the accumulation of water on the road surface  
- Re-vegetation of disturbed soils  
- Keeping the drainage ditches and culverts unblocked | - Site inspection and photo documentation of water harvesting activities and re-vegetation activities  
- Checking on culverts particularly following rainfall events  
**Frequency:** Twice a month during the rainy season for each road | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the contract. Bidders will be able to cost this item in their bids. Additional cost (revegetation): 7,000 USD  
Cost of full time environmental and social monitoring specialists, camera and vehicle. |
| 7   | Deterioration of groundwater quality | - Storage of liquid materials (especially hydrocarbons) in sealed containers.  
- Application of liquid fuels and oils in sealed and paved areas with sump.  
- Refueling in sealed locations  
- Development and implementation of Waste management plan. | - Monitoring water quality of the groundwater wells  
- Monitoring of fuel and oil handling and storage.  
**Frequency:** Once every month for each road under repairs | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract. Bidders will be able to cost this item in their bids. Expected additional costs: 20,000 USD (incl. water sampling and analysis)  
Cost of full time environmental monitoring specialist, camera and vehicle. |
| 8   | Damage to fauna, flora and the proposed protected areas | - Placing speed limit signs and planting trees at critical locations and known animal crossing pathways  
- Road works to be conducted outside of the birds spawning and nesting season  
- Waste and spoil cannot be dumped near sensitive areas (Al-Door and Bana valleys)  
- Keeping culverts unblocked to facilitate amphibians crossing  
- Spraying of water to reduce dust emissions during road works  
- Restoring affected land along the road alignment to the preconstruction status  
- Preventing leakages of fuel | - Site inspection and photographic documentation of the condition of culverts  
- Monitoring of re-planting activities  
- Checking records of spillages and animal killings  
**Frequency:** Once every two weeks for each road under repairs | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract. Expected additional costs: 10,000 USD  
Cost of full time environmental monitoring specialist, camera and vehicle. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Disruption of traffic</td>
<td>• 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</td>
<td>• Site inspection and photographic documentation&lt;br&gt;<strong>Frequency:</strong> Weekly (including photo evidence) for each road under repairs</td>
<td>Contractor in coordination with Supervision Engineer&lt;br&gt;Supervision Consultant</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Additional costs: 2,000 USD&lt;br&gt;Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>10</td>
<td>Deterioration of health &amp; safety conditions</td>
<td>• Provision and use of personal protective equipment to workers&lt;br&gt;• Installing construction and warning signs&lt;br&gt;• Retaining walls and gabions to prevent landslides&lt;br&gt;• Speed limit bumps in settlements&lt;br&gt;• Installing barriers in sharp curves</td>
<td>• Inspection and photo evidence&lt;br&gt;• Maintaining records of injuries and accidents with cause and location&lt;br&gt;<strong>Frequency:</strong> Weekly for each road under repairs</td>
<td>Contractor&lt;br&gt;Supervision Consultant</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.&lt;br&gt;Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>11</td>
<td>Damage to cultural and historical sites</td>
<td>• Do not block access to cultural and religious sites, wherever possible&lt;br&gt;• Use of manual equipment when working next to cultural, religious or historical sites&lt;br&gt;• Mark graves by sign posts and notify workers about them</td>
<td>• Site inspection/supervision and photographic documentation of cultural and historical sites.&lt;br&gt;<strong>Frequency:</strong> Monthly for each road under repairs</td>
<td>Contractor in coordination with Supervision Engineer&lt;br&gt;Supervision Consultant</td>
<td>Part of the contract. Bidders will be able to cost this item in their bids.&lt;br&gt;Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>12</td>
<td>Social Impacts</td>
<td>• Coordinating with the public schedule of maintenance activities in residential areas&lt;br&gt;• Employ local workers&lt;br&gt;• Provide alternative access roads/by-passes&lt;br&gt;• Traffic management&lt;br&gt;• Workers’ camps have to be located away from settlements&lt;br&gt;• Camps must be equipped with sealed septic tanks and waste containers.</td>
<td>• Site inspection and documentation of community activities along roads.&lt;br&gt;• Inspections of worker camps&lt;br&gt;<strong>Frequency:</strong> Bi-weekly for each road under repairs</td>
<td>Contractor in coordination with Supervision Engineer&lt;br&gt;Supervision Consultant</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.&lt;br&gt;Expected additional cost: 5,000 USD&lt;br&gt;Cost of full time social monitoring specialist, camera and vehicle.</td>
</tr>
</tbody>
</table>

**Expected additional mitigation costs:** USD 94,000  
**Expected monitoring costs:** USD 96,000  
**Total expected costs of ESMP:** USD 190,000
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
</table>
| 1   | Generation, storage, disposal of construction and domestic waste | • Waste minimization  
• Storage of construction waste in locations pre-agreed with the local communities  
• Avoid disposal in environmentally sensitive areas e.g. the streams of Annah, Al-Door, and Banna Valleys  
• Waste from cleaning of blocked drainage should be disposed at vacant land agreed with the local populations  
• Waste disposal in designated locations  
• Handling of liquid waste in sealed containers | • Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation  
• Site inspections  
• Frequency: Once a month for each road under maintenance | Contractor, Supervision Consultant | Cost of part time environmental and social monitoring specialists, camera and vehicle |
| 2   | Landslides, soil erosion, and Visual intrusion         | • Repairs of retaining walls  
• Restoration of riprap and stone pitching  
• Cleaning and repairs of drainage systems  
• Restoration of vegetative cover | • Site inspection and photographic documentation of maintenance activities  
• Photographic documentation of planting and re-vegetation activities  
• Frequency: Once a month for roads under maintenance | Contractor, Supervision Consultant | Cost of part time environmental and social monitoring specialists, camera and vehicle |
| 3   | Deterioration of air quality                          | • Usage of well-maintained equipment  
• Water spraying for dust control  
• Using good quality fuel to reduce exhaust emissions  
• Cleaning vehicle tires  
• Covering of trucks carrying fine grade construction materials | • Visual observation and photographic documentation of equipment induced emissions and dust clouds from works and trucks  
• Frequency: Once a month for roads under maintenance | Contractor, Supervision Consultant | Cost of part time environmental and social monitoring specialists, camera and vehicle |
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
</table>
| 4   | Increased level of noise          | • Usage of quiet/well-maintained equipment  
• Informing local population about noisy road works  
• Limiting noisy activities to normal daylight hours  
• Provision of speed limit signs at critical locations | • Site and documents inspections  
• *Frequency: Once a month for each road under maintenance*  | Contractor  
Supervision Consultant in coordination with the Contractor | Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 5   | Disruption of water supply        | • Protecting water supply systems during works  
• Coordination with land owners on scheduling maintenance activities  
• Ensuring no interruption of water supply during works. | • Monitoring any interruptions of water supplies to locals caused by project works  
• *Frequency: Once a month for each road under maintenance*  | Contractor in coordination with Supervision Engineer  
Supervision Consultant in coordination with the Contractor | None  
Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 6   | Disruption of the runoff water and drainage systems | • Keeping the drainage ditches and culverts unblocked | • Checking on culverts particularly following rainfall events  
• *Frequency: Once a month during the rainy season for each road under maintenance*  | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the contract.  
Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 7   | Deterioration of groundwater quality | • Storage of liquid materials (especially hydrocarbons) in sealed containers.  
• Application of liquid fuels and oils in sealed areas with sump.  
• Refueling in sealed locations | • Monitoring of fuel and oil handling and storage.  
• *Frequency: Once a month for each road under maintenance*  | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract.  
Cost of part time environmental monitoring specialist, camera and vehicle. |
| 8   | Damage to fauna, flora and the proposed protected areas | • Keeping culverts unblocked to facilitate amphibians crossing  
• Preventing leakages of fuel  
• Road works should be conducted outside of the birds spawning and nesting season  
• Waste and spoil cannot be dumped near sensitive areas (Al-Door and Bana valleys) | • Site inspection and photographic documentation of the condition of culverts  
• Checking records of spillages and animal killings  
• *Frequency: Once a month for each road under maintenance*  | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract.  
Cost of part time environmental monitoring specialist, camera and vehicle. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Disruption of traffic</td>
<td>• Informing the public about schedule of maintenance works</td>
<td>• Site supervision-inspection and photographic documentation</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Will be part of the contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• On the spot traffic management</td>
<td>• Frequency: Monthly for each road under maintenance</td>
<td>Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>10</td>
<td>Deterioration of health &amp; safety conditions</td>
<td>• Provision and use of personal protective equipment to workers</td>
<td>• Inspection and photo evidence</td>
<td>Contractor</td>
<td>Will be part of the contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Installing construction and warning signs near markets, schools, health centres, pastures, firewood sites</td>
<td>• Frequency: Once every month for each road under maintenance</td>
<td>Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Removal of random speed bumps</td>
<td>• Site inspection and photographic documentation</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Part of the contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintaining barriers in sharp curves and along steep slopes</td>
<td>• Frequency: Monthly for each road under maintenance</td>
<td>Supervision Consultant</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>11</td>
<td>Damage to cultural and sites historical</td>
<td>• Do not block access to cultural and religious sites, wherever possible</td>
<td>• Site inspection and photographic documentation</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Will be part of the contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of manual equipment when working next to a cultural or religious and historical sites.</td>
<td>• Frequency: Monthly for each road under maintenance</td>
<td>Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>12</td>
<td>Social Impacts</td>
<td>• Coordinating with the public the schedule of maintenance activities in residential areas</td>
<td>• Site inspection and documentation of community activities along roads.</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Will be part of the contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Awareness workshop on road maintenance</td>
<td>• Frequency: Once a month for each road under maintenance</td>
<td>Supervision Consultant</td>
<td>Cost of part time social monitoring specialist, camera and vehicle.</td>
</tr>
</tbody>
</table>
1. **SUB-PROJECT DESCRIPTION**

The Road Asset Management Project (RAMP) project of Ibb governorate is composed of twenty-five roads with total length of 612.7 km. The target roads consist of six main roads, twelve secondary roads, and seven tertiary roads. These roads connect many villages to the districts centers and to Ibb city and connect Ibb governorate with Taiz, Al- Dale'a, and Al Hodaidah governorates.

**Table 1: Names, Length, and Types of Roads - Ibb Governorate**

<table>
<thead>
<tr>
<th>No.</th>
<th>Road</th>
<th>Lengths in km</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Al Oudain – Al-Garahi with branches</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ibb -As Sabrah -Qa’atabah</td>
<td>74.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ar rawdah-Matam -Sohban</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>4</td>
<td>Nagd Al Soqa-Al Athreb</td>
<td>17.25</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ibb -Jeblah</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ibb - Al Oudain</td>
<td>26.7</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Al Rebat - Thafar-Bait Alashwal</td>
<td></td>
<td>11.5</td>
</tr>
<tr>
<td>8</td>
<td>Kitab-Ibb</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Ibb-Alganad</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ketab - Al sadah- Al Nadirah</td>
<td>28.4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Al Oudain – Mothaikhra</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>An Naderah – Damit (first phase)+ Khwal Alshaer</td>
<td>28.3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Akmat Al Amgaood - Mothaikhra</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>As Saddah – Al Radhaee</td>
<td>26.7</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Al Meskah – Al Halkeen+ Bait Halbob</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>16</td>
<td>Mafraq Hobish + Branches</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ibb – Hobish</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Yarim-Erian-Rehab (First phase)</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Nagd Al amqa- Al Daleel</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Dhafar-AlShakhab-Gabal Ammar (First phase)</td>
<td></td>
<td>23.7</td>
</tr>
<tr>
<td>21</td>
<td>Ariab -Bani Al Hareth(First phase)</td>
<td></td>
<td>28.5</td>
</tr>
<tr>
<td>22</td>
<td>As Saddah-Al Meskah</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>23</td>
<td>Ring oad Of Ad dalil</td>
<td>9.25</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Yarim-Aras</td>
<td>8.2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Yarim-Bani Muslem</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>225.25</strong></td>
<td><strong>263.55</strong></td>
</tr>
</tbody>
</table>

1.1. **Location and Objectives**

The Ibb governorate is located in the inland south of Yemen. The roads run in different regions such as: mountainous, hills, valleys and agricultural and flat lands, flat-rolling-mountainous and pure mountainous. The mountainous terrain of the roads alignments includes very high slopes and sharp curves. Locations of target roads are shown on location map below (Figure 1).

The project development objective is to upgrade the existing paved roads and to prevent its future deterioration. The project will also improve traffic safety at critical locations, improve side-slope stability at mountainous locations, clean cross drainage and side ditches and remove the illegal speed bumps and build new safe speed bump. Overall, it will alleviate poverty in the area by creating local employment through road works, improving access to basic services such as schools, health centers and markets.
Figure 1: Location of Ibb Governorate in Yemen

Figure 2: Location of the Project Road Alignments - Ibb Governorate
1.2. Proposed Works

The scope of the sub-project works, as estimated by the technical Engineer, include structural excavation, gabions construction, construction of stone masonry for culverts and walls, installation of safety barriers and handrails, cleaning blocked drainage, repairs of riprap, road resurfacing, crack sealing, repairs and cleaning of shoulders, installation of pipe culverts, pavement marking, installation of subsoil filter drains, installation of road signs. All rehabilitation and backlog works of this project will be conducted within the Right of Way (ROW). No additional land acquisition is required.

It is expected that the rehabilitation and maintenance period should not exceed 48 months.

1.3. Specific Characteristics of the Alignments

The specific characteristics of each road of the Ibb sub-project are summarized in the following table. Roads characteristics are also illustrated by photographs (plates 1 through 25). General views along each road are shown in the following plates.

<table>
<thead>
<tr>
<th>Road No.</th>
<th>Road Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Al-Oudain – Al-Garabi with Branches: 40 km – Main Road</td>
</tr>
</tbody>
</table>

This alignment starts at Al-Odain district in a low area surrounded by mountains and hills. It passes through mountainous chains and valleys. It runs in a mountainous terrain toward the west till it ends in Al-Garahi district in Al-Hodaidah governorate. This road is connected to some feeder roads to Al-Hazm district. It is 7 m wide and 40 km long, main asphalt paved road with side ditches and shoulders. It is characterized by mountainous terrain with fertile agricultural lands and many landslides in different locations along the road. The area along the road is rich with vegetation. There are many tube and dug wells along the road. General views along road are shown in plate 1, page 30.

The road is located within Al-Odain district (Ibb) and Al-Garabi district (Al-Hodaidah), connecting high density areas to the main national roads network. The main villages along the road are - Hiran – Al-Shali, Sheber Valley, Al-Garsi, Al-Mazahen, Al-Shahari, Derkhal, Al-Marate'a and Hour. It is used mainly by trucks. The main land uses are agricultural, grazing, commercial, firewood sites, commercial, and housing.

Main environmental and social issues are:
- Slope stability of mountainous cuts with fallen stones and soil during rain seasons.
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources shall be considered.
- Location is environmentally sensitive because there are several water springs and rich vegetation at the end of the Annah Wadi Crossing. Pollution may occur from inadequate solid and liquid waste from project activities.
### Ibb -As Sabrah -Qa'atabah: 74.3 km – Main Road

This alignment from Ibb to Qa'atabah is a main asphaltic road. At the start point the road way consists of a total paved width of 20m for a length of about 5 km and the rest of the road is 7 m wide. It has side ditches and shoulders. It starts at Ibb City and runs toward Ad Dalî Governorate. The road alignment runs through flat-rolling-mountainous terrain and it is characterized by sharp curves at few locations. There are many tube and dug wells along the road. General views along road are shown in plate 2, page 31.

The road is very crucial because it connects two governorates, Ibb and Ad-Dalî. It connects many villages of the two governorates. It connects high density populated area to main national network. It passes in As-Sabrah district and the main villages along the road are Nagd Al-Gomae', Al-Qafalah, As-Sabrah, Mahmoud Mount, and Qareen. The main land uses are agriculture, grazing, commercial, houses and facilities along the road. The scope of works includes shoulder repairs, cleaning blocked culverts, repairs of riprap, road resurfacing, crack sealing, installation of road signs, installation of safety barriers and handrails.

**Main environmental and asocial issues are:**

- Slope stability of steep cuts with fallen stones and soil in few spots along the road during rain seasons.
- Provision of safety measures.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Waste disposal at the entrance of Ibb city for about 10 km distance.
- Renew white centerline pavement marking
- Socio-economic issues such as coordination with locals and maintain good relations with community, management of contractor camp, replacement and/or protection of the existing water supply, electrical facilities and cultural resources shall be considered.
- Pollution may occur from inadequate solid and liquid waste management especially near Maitam Wadi. This area is environmentally sensitive due to the presence of many water springs, dug and tube wells.

### Ar Rawdah- Sohban – Maitam: 19 km – Tertiary Road

The existing alignment is classified as a tertiary asphaltic road. It is a 7m wide paved road with side ditches and side shoulders. The road runs through rolling-mountain terrain. It is characterized by acute and gentle curves and high slopes. Geology of the area along the road is volcanic tuff rocks and modern sedimentation. Topography is mostly agricultural fertile terraces and some spots of pastures. There are two rocks mines along the roads which used for getting rocks as construction materials where retaining walls of the road are damaged. There are many tube and dug wells along the road. General views along road are shown in plate 3, page 32.

The road is located within As Sayyani district, connecting medium density populated area to the main national network. It connects many areas to both Ib-Taiz Road and Ibb-As Sabrah -Qa'atabah Road. Main villages along the road are Al Amoqi – Al Shukami – Al Mesena'ah – Al Uqair – Al Surih – Al Naqel, Shobban, and Hadarah. Main land uses are agricultural, grazing, commercial and housing.
Main environmental and social issues are:

- Slope stability of mountainous areas as a result of rock mining by local people who use them in construction. This activity leads to rock falls which damage the walls of the road in some locations. The road is also affected by falling soil and stones during rainy seasons,
- Provision of safety measures for acute curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources as well as increasing noise levels near schools, health center and populated areas.

Nagd Al Soqa-Al Athreb: 17.25 km – Secondary Road

The existing alignment is classified as a secondary asphaltic road. It is a 7m wide asphalt paved road with side ditches and shoulders. The road runs through pure mountain terrain. It is characterized by dangerous curves and high slopes and soil erosion. There are barriers in some dangerous curves and there is a need to barriers for other dangerous curves and slopes. Geology of the area along the road is basalt rocks and more recent sedimentation. Topography is mostly mountainous with rich vegetation cover and some spots of agricultural land and pastures. There are many tube and dug wells along the road. General views along road are shown in plate 4, page 33.

The road is located within Ba’adan district connecting medium density areas to the main national network. The main villages along the road are Bani Mansoor and Alkathreb areas. The land is mostly mountainous mainly used for agricultural, grazing, commercial and housing purposes.

Main environmental and social issues are:

- Slope instability of mountainous portions due to falling stones and soil during rainy seasons,
- The illegal speed bumps that have been built by the locals at several locations
- Provision of safety measures for dangerous curves which cause accidents
- Cleaning and removal of accumulated debris and waste from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.

Ibb –Jeblah: 5.3 km – Secondary Road

This alignment starts in Ibb City at the junction of Ibb-Jeblah and ends in Jeblah City. It runs through flat to rolling terrain. It is classified as a secondary asphaltic road. It is a 7m wide stone paved road, at the beginning, for about 500m length and the rest of the road is asphaltic paved with side ditches. It is characterized by flat terrain passing through beautiful agricultural terraces with some gentle curves. There are many tube and dug wells along the road. General views along road are shown in plate 5, page 34.

The road is located within Jeblah district, connecting villages and highly populated areas to the main national network. It connects the villages to Ibb city. The main villages are Waraf, Al Rabadi, Alnaktab, Aqamat Jeblah, Aqamat Issa, and Mafraq Jeblah. The main land uses on both sides of the road are agricultural terraces, housing, facilities, and commercial.
### Main environmental and social issues are primarily related to:
- Provision of safety measures of some curves.
- Cleaning and removal of accumulated debris and waste from drainage ditches and culverts.
- Domestic waste disposal in many locations along the road.
- Socio-economic issues such as: coordination with the local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources as well as difficult access to markets.

### Ibb - Al Oudain: 26.7 km – Main Road

This alignment starts at Ibb city going westward to Al-Oudain district center. At the start point, it is 12m wide and consists of two lanes. After about 6 km in the Mashowarah area, it narrows to a width of 7m. It is a secondary asphalt paved road with side ditches and shoulders. The road is runs through very rich vegetation cover especially in Al-Door wadi and creates a very beautiful sight. This valley is considered a natural reserve but not nationally recognized. It runs through rolling-mountainous terrains and is characterized by gentle and acute curve and gentle slopes. There are many tube and dug wells along the road. General views along road are shown in plate 6, page 35.

The road is located within Al-Odain district, connecting villages and highly populated areas to the main national network. It connects the villages of the district to Ibb city. The road is crucial because it is used to transport many agricultural products of the area to different area in Yemen. Main villages are Al-Ma'asouk, Al-Hadaba Al-Ulay, Aliab, De'ras, As-Sahla, Mashwara, and Al-Door Wadi. The main land uses in both sides of the road are agricultural, housing and facilities, grazing, fire wood sites, and commercial.

### Main environmental and social issues are:
- Slope stability of mountainous cuts with falling stones and soil during rainy seasons
- Provision of safety measures of some dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Waste disposal on both sides of the road in many locations along the road especially near markets
- Socio-economic issues such as: coordination with the local community, management of contractor camp, replacement and/or protection care of the existing water supply, electrical facilities and cultural resources.
- Environmentally sensitive location because there are several water springs and rich vegetation at Al-Door Wadi Crossing. Pollution may occur from inadequate solid and liquid waste management.

### Al Rebat - Thafar-Bait Alashwal: 11.5 km – Tertiary Road

The existing alignment is classified as a tertiary asphalted road. It is a 7m wide paved road with side ditches and shoulders. It starts at Rebat Al-Kala'a area and ends at Bait Alashwal village. The road runs through rolling-flat terrain. It is characterized by gentle curves. Geology of the area along the road is Quaternary volcanism and volcanic tuff rocks. Topography is mostly agricultural fertile lands and some spots of pastures. There are many tube and dug wells along the road. General views along road are shown in plate 7, page 36.

The road is located within As-Saddah district and connects villages and low density populated area to main national network. It serves several villages along the road such as, Herabah, Bani Huqba, Qrabah, Bait Alashwal, Thafar, and Rebat Al-Kala'a. Main land uses are agricultural, grazing, commercial and housing.
Main environmental and social issues are:
- Provision of safety measures.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply and cultural resources in Thafar city.

Kitab-Ibb: 41 km – Main Road

The existing alignment is classified as a main asphaltic road. It starts at Kitab city and runs towards the south reaching Ibb City. More than 85% of the road alignment runs through mountainous terrain and it is characterized by flat-mountainous terrains with very high slopes and sharp curves such as, Somara slope and few landslides such as the landslides in Gareen Areeb village. It is an asphaltic pavement of about 7m wide with side shoulders and ditches. There are many tube and dug wells along the road. General views along road are shown in plate 8, page 37.

This alignment is very vital. It connects many governorates, eg Ibb with Dhamar. It serves many areas and connecting villages and highly populated areas to main the national network. The main villages along the road are Al-Aredah, Hiwa Mountain, Jaleel, Al-Manzel, Shounen Al Nawba, Gareen Areeb, Al-Aredahr, and Qern Ali. Land along the road is mostly mountainous and some spots on both sides of the road are pastures and agricultural land. The main land uses are agriculture, grazing, commercial, houses and facilities commercial and housing.

Main environmental and social issues are:
- Slope stability of mountainous cuts with falling stones and soil during rainy seasons, especially in Somara slope. There are landslides to side ditches, blocked culverts.
- Provision of safety measures of some dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Pollution may occur from improper solid and liquid waste management.
- Socio-economic issues such as: coordination with the local community, management of contractor camp, replacement and/or protection care of the existing water supply and cultural resources such as, Somara castle.

Ibb-Alganad: 34 km – Main Road

This road is classified as a main asphalted road. This alignment starts at Ibb city and runs toward Taiz city. It runs through flat-rolling–mountainous terrains. It is a 7m wide asphaltic paved road with side ditches and shoulders. The road is characterized by high slopes and sharp curves starting in Al-Nagd Al-Ahmer going down into the plains. The road passes Al-Qaeda City toward the south reaching the end point of the road in Alganad. There are many tube and dug wells along the road. General views along road are shown in plate 9, page 38.

The road connects Ibb governorate with Taiz in Alganad. It runs through many areas, connecting villages and highlypopulated area to the main national network. Main areas are Al-Nagd Al Ahmer – As Sayani, and Al-Qaeda. The main land uses of both sides of the road are agricultural, housing and facilities, grazing, fire wood sites, and commercial.
Main environmental and social issues are:

- Slope stability of mountainous cuts with fallen stones and soil during rain seasons in many locations along the road. There were landslides in some locations blocked ditches and culverts.
- Waste disposal of waste from markets and construction accumulated on the shoulders, especially near markets.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Provision of safety measures of some dangerous curves.
- Air quality is destroyed in Al-Qaeda City where sewage goes into the surface of the road.
- Socio-economic issues such as coordination with the local community, management of contractor camp, replacement and/or protection care of the existing water supply, electrical facilities and cultural resources in Alganad.

Ketab – As Saddah- An Nadirah: 28.4 km – Secondary Road

The existing alignment is classified as a secondary asphalted road. It is a 7m wide paved road with side ditches and side shoulders. The road runs through flat land at the beginning and then moves through rolling-mountainous terrain. The road starts at Ketab area passing As-Saddah district above and down Banna valley till it ends at An-Nadirah district. It is characterized by sharp and gentle curves and high slopes. Area geology along the road is basalt rocks, modern sedimentation, and volcanic tuff rocks. Topography is mostly agricultural fertile terraces and some spots of pastures. The areas along the road are characterized by rich vegetarian cover especially in As-Saddah district at Banna Wadi where locals report the presence of many kinds of wildlife. There are many tube and dug wells along the road. General views along road are shown in plate 10, page 39.

The road is located within three districts: Yarim, As Saddah, and An Nadirah. The importance of the road is that it connects two roads, Sana’a – Taiz Road and Anadirah - Damt road which ends at Ad Dali’ Governorate. It also connects villages and highly populated areas to the main national network. The main land uses on both sides of the road are wide agricultural areas and terraces, grazing, firewood sites, commercial, housing and other facilities.

Main environmental and social issues are to:

- Slope stability of mountainous cuts with fallen stones and soil during rain seasons as well as dangerous curves and slopes.
- Provision of safety measures for dangerous curves.
- Domestic and market waste disposal in As Saddah center.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Visual obstruction to drivers and narrowing of the road by trees growing adjacent to both sides of the Right of Way
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.
- Environmentally sensitive location at Banna Wadi Crossing. Pollution may occur from inadequate solid and liquid waste management due to project activities near the wadi stream.
Al Oudain – Mothaikhrah: 15.6 km – Secondary Road

The existing alignment is classified as a secondary asphalted road. It continues from Ibb – Al-Oudain road and runs through rolling to mountainous mutinous terrain. It is a 7m wide paved road with side ditches and side shoulders. The road starts at Al-Odain district going down in Anna valley and plain lands. It is characterized by very sharp curves and very high slopes. Topography is mostly agricultural fertile terraces and some spots of pastures. The areas along the road are characterized by rich plant cover especially in Anna valley. This area is considered a natural reserve but is not nationally recognized. It is characterized by many kinds of vegetables, grains, and fruits such as mango, sugarcane, banana, guava as well as beautiful sights. There is a market handicraft in Al Odain Market. There are many tube and dug wells along the road. General views along road are shown in plate 11, page 40.

The road is located within two districts Al-Odain and Mothaikhrah, connecting villages and medium density populated areas to the main national network. The main villages along the road are Helbab, Qurba, Anna’a Valley, Agwal, Aredat Ba’ara, and Mothaikhrah. The main land uses on both sides of the road are agricultural terraces, grazing, fire wood sites, commercial, housing and facilities.

Main environmental and social issues are:

- Visual obstruction to drivers and narrowing of the road by trees growing adjacent to both sides of the Right of Way. Slope stability is affected by falling en stones and soil during rainy seasons.
- Provision of safety measures for the dangerous sharp curves which cause accidents
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources as well as increasing noise levels near schools and health center and populated areas.
- Environmentally sensitive location at Anna Wadi Crossing. Pollution may occur from inadequate solid and liquid waste management due to project works.

An Naderah – Damt (fihshe)+ Khwal Alshaer: 28.3 km – Secondary Road

The existing alignment is classified as a secondary asphalted road. It is a 6m wide paved road with side ditches and side shoulders. The road runs through flat-rolling-mountainous terrain. The road continues from the road no. 10 at An Nadirah district. It is characterized by sharp and gentle curves and gentle slopes passing through many mountain series. There are many ditches because a lot of rain water goes down from mountains surrounded. Geology of the area along the road is basalt rocks, recent sedimentation, and volcanic tuff rocks. Topography is mostly agricultural fertile terraces, fire wood collection, and some spots of pastures. There are many tube and dug wells along the road. General views along road are shown in plate 12, page 41.

The road is located within two governorates Ibb and Ad Dalî. It connects An-Naderah districts to the tourist city, Damt where natural spas are located. The road connects many villages and medium density populated areas to the main national network. The main villages are Al-Hajrah, Aqrah – Demt Al-Akarah, Al-Hajer, Bait Al Azani, Al-Kasha, and Thee Joithom. The main land uses are agricultural, grazing, fire wood collection,
commercial, housing, tourism, and facilities.

**Main environmental and social issues are:**

- Slope stability of mountainous cuts is affected by falling stones and soil during rainy seasons near An-Naderah.
- Provision of safety measures for dangerous curves, which cause accidents.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Sand accumulation on the road surface in some locations due to the rain water transportation.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources in addition to delaying the time of traffic especially near markets.
- Pollution may occur from inadequate solid and liquid waste management due to project activities along the road.

### Akmat Al Amgaood - Mothaikhrah: 34 km – Secondary Road

The existing alignment is classified as a secondary asphaltic road. It is a 6-7m wide paved road with side ditches and shoulders. It starts at Mathai Khrah and goes up toward the south till the end of the road. This alignment runs through mountainous terrain and it is characterized by mountainous terrains with very high slopes and sharp curves along the road. Topography is mostly high mountains with very rich vegetation and there are agricultural terraces, firewood sites, and some spots of pastures. The project area is characterized by beautiful green landscapes. There are many tube and dug wells along the road. General views along road are shown in plate 13, page 42.

The road is located within Mathairah district, connecting many villages and high density populated area to main national network. The main villages are Al-Majareba, Al-Shujie, Al-Sharafi, Al-Gareen, Mothaikhrah, and Akmat Al-Amgaood. The main land uses are agricultural, grazing, fire wood, commercial, housing, tourism, and facilities.

**Main environmental and social issues are:**

- Visual obstruction to drivers and narrowing of the road by trees growing adjacent to ROW both sides Landslide to side ditches, blocked culverts
- Soil and stone accumulation of the surface of the road.
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Soil accumulation in some locations along the road because of rain water.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply and electrical facilities.

### As Saddah – Al Radhoe: 26.7 km – Secondary Road

The existing alignment is classified as a secondary asphalted road. It is 6-7m wide paved road with side ditches and shoulders. More than 95% of the road alignment runs through mountainous terrain and it is characterized by mountainous terrains with very high slopes and sharp curves along the road. Geology of the area along the road is basalt rocks, modern sedimentation, and volcanic tuff rocks. Topography is mostly high mountains with very rich vegetation and there are agricultural terraces, fire wood sites, and some spots of pastures. There are many tube and dug wells along the road. General views along road are
shown in plate 14, page 43.

The road is located within Ash Sha’ir, An Naderah and As Saddah districts connecting many villages of the two districts centers. The main villages are Al-Maqaleh, Al-Wazrah, Thee Ado, Thee Nasser, and Bait Al Saedi Sub-district. The population density of the area along the road is medium. The main land uses are agricultural, grazing, fire wood collection, commercial, housing, tourism, and facilities.

Main environmental and social issues are:

- Slope stability of mountainous cuts is affected by falling stones and soil during rainy seasons in many locations along the road. There are many dangerous slopes where many rocks and soil go down the surface of the alignment. The dangerous slopes cause and sharp curves cause many accidents.
- Provision of safety measures for dangerous sharp curves which cause accidents.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.

Al Meskah – Al Hakleen+ Bait Halbob: 21 km – Tertiary Road

The existing alignment is classified as a Tertiary asphalted road. This alignment continues from road no. 22 (As Saddah-Al Meskah) and runs through flat-rolling-mountainous terrain. It is a 6m wide paved road with side ditches and shoulders. The road runs through rolling-mountainous at the beginning and flat land near Al Hakleen area and rolling-mountainous terrain at the end in Bait Halbob village. It is characterized by sharp and gentle curves and very high slopes especially at Al-Habali Slope. Area geology along the road is generally basalt rocks and Vertical structures, and modern sedimentation.

Topography is mostly agricultural fertile terraces and some spots of pastures. The area is characterized by vegetation cover especially at Al Meskah. There are many tube and dug wells along the road. General views along road are shown in plate 15, page 44.

The road is located within As Saddah district and low density populated area to main national network. This road is crossing the road no. 20, Thafar-Al Shakhab-Gabal Ammar in Al Hakleen village. It connects villages such as, Al Meskah, Hajara, Al Hakleen, Bait Halbob, etc. The main land uses on both sides of the road are agricultural terraces, grazing, fire wood collection, commercial, housing and facilities, quarrying for building rocks.

Main environmental and social issues are primarily related to:

- Landslide to side ditches, blocked culverts
- Slope stability of mountainous cuts is affected by falling stones and soil during rainy seasons, especially in Al-Habali slope
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources especially in Al Hakleen village where ancient skulls found, locals reported.
Mafrak Hobish + Branches: 17 km – Secondary Road

This alignment is classified as a secondary asphalt road. It branches from Ibb – Sana’a Road at Mafrak Hobish on the right side of the road toward the northwest. The road ends in Al-Thalma village. It is a 7m asphaltic paved road with side ditches and shoulders. It runs between flat agricultural lands on both sides of the road. After Mafrak Hobish, another road branches toward Hobish. This 6 m asphaltic paved branch road with side shoulders and side ditches is characterized by flat terrain and gentle slopes, and passes through flat terrain mostly with fertile land. Topography of the road and branches is mostly agricultural. There are many tube and dug wells along the road. General views along road are shown in plate 16, page 45.

The road is located within Hobish district, connecting villages and highly populated areas to the main national network. Main villages are Al-Fajrah, She’b Alnajjar, Alqah, Thalma, and Bani Shabeeb. Land uses along the road are mostly agricultural, grazing, agricultural, commercial and housing.

Main environmental and social issues are:
- Landslide to side ditches, blocked culverts
- Slope stability of mountainous cuts with falling stones and soil during rainy seasons.
- Waste disposal of houses and markets in few locations along the road.
- Cleaning and removal of accumulated sand from road surface and drainage culverts.
- Provision of safety measures at dangerous curves.
- Socio-economic issues such as: coordination with local community, management of contractor camp, replacement and/or protection of the existing water supply, and electrical facilities.

Ibb – Hobish: 22 km – Secondary Road

This alignment is classified as a secondary asphalt road. It starts at Ibb city toward Hobish district. The road is a 6m asphaltic paved road with side shoulders and side ditches. It runs through rolling-mountainous terrains. It starts with a ground bridge. It goes up through very high slopes. There is a non-asphalted pavement in the road for about 500 m. The road is characterized by mountainous terrain and sharp curves and high slopes. Topography is mostly agricultural. There are many tube and dug wells along the road. General views along road are shown in plate 17, page 46.

The road connects Ibb city with Hobish district, connecting villages and high density populated area to main national network. Main villages are Al Mansoob Castle, Aljharri, Al Nozha Al Olay, Althahayyatain, Alzir, Alsayah, and Harat Kaheb. Land uses along the road are mostly agricultural, grazing, commercial and housing.

Main environmental and social issues are:
- Landslides to side ditches, blocked culverts.
- Illegal speed bumps that have been built to cover water pipes by the locals at several locations.
- Cleaning and removal of accumulated sand from road surface and drainage culverts.
- Provision of safety measures at dangerous curves.
- Socio-economic issues such as: coordination with local community, management of contractor camp, replacement and/or protection of the existing water supply, and electrical facilities.
### Yarim-Erian-Rehab (First phase): 18 km – Secondary Road

The existing alignment is classified as a secondary asphalted road. It is a 6 m wide paved road with side ditches and shoulders. It branches from Yarim city toward northwest Erian area and then to Rehab area (Al-Qafer district center). The road runs through flat-mountainous terrains. The mountains are fragile and have many types of erosion along the road. It is characterized by gentle curves and gentle slopes as well as many locations of landslides. Topography is mostly agricultural fertile lands and some spots of pastures and fairly vegetation cover. There are many tube and dug wells along the road. Pipes of water supply and harvesting across the surface of the road creating damage for the asphalt in several locations. General views along road are shown in plate 18, page 47.

The road is located within Yarim and Al-Qafer districts, connecting villages and medium density populated area to main national network. The main villages are Domran, Hajah, Al Aqamah, and Alsadah. The main land uses on both sides of the road are agricultural lands, grazing, commercial, housing, and facilities.

**Main environmental and social issues are:**

- Landslides and slope stability of mountainous cuts are affected by falling stones and soil during rainy seasons especially near Bani Muslem area.
- The illegal speed bumps that have been built by the locals at several locations
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources, increasing level of noise near populated areas.

### Nagd Al Amqa- Al Daleel: 32 km – Secondary Road

This alignment is classified as a secondary asphalt road. The road starts at Nagd Al Amqa going down into the end at Al Daleel village. It is a 6m asphaltic paved road with side ditches and shoulders. Characterized by high slopes, the road runs between mountainous terrains. Topography is mostly agricultural. General views along the road are shown in plate 19, page 48. Water supply pipes cross the road surface at many points along the road.

The road is located within Al-Makhader district, connecting villages and high density populated area to main national network. The road serves many areas such as, Al-sharaf, Al Wadi, Beda’ah, and Bohn. Land uses along the road are mostly agricultural, grazing, agricultural, commercial and housing.

**Main environmental and social issues are primarily related to:**

- Landslides and slope stability of mountainous cuts are affected by falling stones and soil during rainy seasons in many locations along the road.
- Growth of plants adjacent to both sides of the road.
- Cleaning and removal of accumulated sand from road surface and drainage culverts.
- Provision of safety measures at dangerous curves.
- Socio-economic issues such as; coordination with local community, management of contractor camp, replacement and/or protection of the existing water supply, electrical facilities, and increasing noise level near school.
Thafar-Al Shakhab-Gabal Ammar (First phase): 23.7 km – Tertiary Road

The existing alignment is classified as a tertiary asphalted road. It is a 7m wide paved road with side ditches and shoulders. The alignment branches from road no.7 (Al Rebat - Thafar-Bait Alashwal) at Thafar junction. It passes through some villages up to Ammar mountain. The road runs through flat-mountain terrain, but most of the road terrain is mountainous. It is characterized by acute and gentle curves and a dangerous slope as well as landslides. Geology of the area along the road is basaltic rashes and basalts. Topography is mostly agricultural fertile terraces and some pasture areas. In Al Shakhab mountain, there are landmines. The maintenance workers should take care of themselves in that area. There are many tube and dug wells along the road. General views along road are shown in plate 20, page 49.

The road is located within As-Saddah and An-Nadera districts connecting villages and low density areas to the main national network. The major villages along the road are Thafar, Kuhal, Bait Alwail, Bait Mashrah, Al-Hakleen, and Al-Thafeer. The main land uses on both sides of the road are agricultural terraces, grazing, fire wood, commercial, housing and facilities.

Main environmental and social issues are primarily related to:

- Landslides affect slope stability of mountainous areas with falling stones and soil during rainy seasons especially near Kuhal castle.
- Provision of safety measures for acute curves, which cause accidents.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.
- Workers’ safety.

Ariab-Bani Al Hareth (First phase): 28.5 km – Tertiary Road

The existing alignment is classified as a tertiary asphalted road. It is a 7m wide paved road with side ditches. The road alignment runs through pure mountainous terrain and it is characterized by acute curves by very steep slopes. Topography is mostly high mountains and some agricultural terraces, and firewood sites. There are two sites where rocks from the mountain can be used for construction. This alignment is also characterized by a lot of landslides along the road. The importance of this road is that it connects the villages of the area with Sana'a-Taiz Road at the top of Somara Slope. General views along road are shown in plate 21, page 50.

The road is located within Yarim and As-Saddah districts connecting villages and medium density areas to the main national network. The main villages are Al-Masabeeh, Al-Dainia, Maryoom, Mabeh, Alrajma, Al-Orr, Al-Damadya. The main land uses are agricultural, grazing, commercial, housing, tourism, and other facilities.

Main environmental and social issues are primarily related to:

- Slope stability of mountainous cuts is affected by fallen stones and soil especially during rainy seasons. There are many dangerous slopes where many rocks and soil go down the surface of the alignment. The dangerous slopes and sharp curves cause many accidents.
- Illegal speed bumps that have been built by the locals at several locations
- Provision of safety measures for dangerous curves, which cause accidents.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources shall be considered.

### As Saddah-Al Meskah: 19 km – Secondary Road

The existing alignment is classified as a secondary asphaltic road. It is a 7m wide paved road with side ditches and no shoulders. The road runs through mountainous terrain. It is characterized by sharp and gentle curves and high slopes. It crosses Banna Valley as a bridge. Area geology along the road is generally basalt rocks and vertical structures, and recent sedimentation. Topography is mostly fertile agricultural terraces. The area is characterized by rich vegetation cover and much wild life. General views along road are shown in plate 22, page 51.

The road is located within As-Saddah district connecting villages and medium density populated area to main national network. The main land uses on both sides of the road are agricultural terraces, grazing, firewood, commercial, housing and facilities.

**Main environmental and social issues are:**
- Visual obstruction to drivers and narrowing of the road by trees growing adjacent to both sides of ROW.
- Landslides and slope stability of mountainous areas with falling stones and soil during rainy seasons.
- Domestic and market waste disposal accumulation in Wadi Banna stream under the bridge.
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.
- Pollution may occur from inadequate solid and liquid waste management at Banna Valley Stream Crossing.

### Ring Oad of Al Daleel: 9.25 km – Main Road

The existing alignment is classified as a main asphalted road. It is a 24m wide paved road with two lanes, side ditches and shoulders. The road runs through mountainous terrain. It is characterized by sharp and gentle slopes. It starts at Al-Nozha village down of the mountains. Topography is mostly agricultural terraces. General views along road are shown in plate 23, page 52.

The road serves many villages, connecting medium density populated area to main national network. The main villages are Bait Anan, Al-Nozha, Awadi, etc. The main land uses on both sides of the road are agricultural terraces, grazing, fire wood, commercial, housing and facilities.

**Main environmental and social issues are:**
- Landslides to side ditches, blocked culverts.
- Provision of safety measures for dangerous curves.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources.
### Yarim-Aras: 8.2 km – Tertiary Road

The existing alignment is classified as a tertiary asphalted road. It is an 8.2 km long, 7m wide, paved road with side ditches and shoulders. It branches from Sana'a-Taiz Road in Yarim to the east in Aras district. The road runs through flat-rolling-mountainous terrain. It is characterized by gentle curves and very high slopes especially at Massod and Al-Aqaba Slopes. Topography is mostly agricultural fertile lands and some spots of pastures. There are several tube and dug wells along the road. General views along road are shown in plate 24, page 53.

The road is located within Yarim district and low density populated area to main national network. The main villages are Thee Saref, Al-Jarda, Al-Jaboba, Jabal Motair, Al-Balad, and Al-Kharaba, The main land uses on both sides of the road are agricultural lands, grazing, commercial, housing and facilities.

**Main environmental and social issues are:**

- Landslides in few locations at the end of the road to side ditches and blocked culverts.
- Provision of safety measures for dangerous curves.
- Soil and stone accumulation on the surface of the road near Thee Saref Village.
- Cleaning and removal of accumulated debris from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources, in addition to increasing noise level near schools.

---

### Yarim-Bani Muslem: 12 km – Tertiary Road

The existing alignment is classified as a tertiary asphaltic road. It is a 12 km long, 7m wide, paved road with side ditches and shoulders. It branches from Sana'a-Taiz Road in Yarim and southwest toward Bani Muslem. The road runs through rolling-flat terrain and is characterized by gentle curves. Topography is mostly agricultural fertile lands and some spots of pastures. There are several tube and dug wells along the road. General views along road are shown in plate 25, page 54.

The road is located within Yarim district and connects low density populated area to main national network. The main villages are Bait Abab, Mathkaran, Al-Sarwah, Mawah, and Al-Jurf. The main land uses on both sides of the road are agricultural lands, grazing, commercial, housing, and facilities.

**Main environmental and social issues are:**

- Provision of safety measures.
- Cleaning and removal of accumulated debris and plants from drainage ditches and culverts.
- Socio-economic issues such as: coordination with local communities, management of contractor camp, replacement and protection of the existing water supply, electrical facilities and cultural resources, in addition to increasing noise level near schools.
Plate 1: General Views of Road No. 1 Al Oudain – Al-Garahi with Road Branches

Start of road

The branch Road

Agricultural lands

Plants and trees at the end of Annah Valley

A market in beside the road

End of Road
Plate 2: General Views of Road No. 2Ibb -As Sabrah -Qa'atabah Road

- Start of Road
- Tubes Well in Maitam Valley used by Truck Water
- Accumulated Waste in the Ditches and Shoulder Erosion
- Agricultural Lands
- End of Road
Plate 3: General Views of Road No. 3 Ar Rawdah- Sohban – Maitam Road

- **Start of Road**
- **Construction rocks site Accumulated debris at surface water crossing**
- **Firewood site**
- **High Slope & Curve**
- **End of Road**
Plate 4: General Views of Road No. 4 Nagd Al Soqa-Al Athreb Road

Start of Road

Rich vegetation - wild plant

Dangerous Curve

Animals crossing the road

End of Road
Plate 5: General Views of Road No. 5 Ibb –Jeblah Road

Start of Road

Stones and soil in the shoulder

Sewage

Lighting pole & plants and trees
Plate 6: General Views of Road No. 6 Ibb - Al Oudain Road

Start of Road

Vegetation on both sides

Stones and soil accumulation

Slope and curves

SFD Sign refers to Al Oddain Natural reserve

End of Road
Plate 7: General Views of Road No. 7 Al Rebat - Thafar-Bait Alashwal Road

- Start of Road
- Wastes accumulation near the market
- Electrical adapter
- Tube well
- Agricultural lands on both sides
- End of Road
Plate 8: General Views of Road No. 8 Kitab-Ibb Road

Start of Road

Agricultural lands on both sides

Cows feed from the wastes

End of Road
Plate 9: General Views of Road No. 9 Ibb-Alganad Road

- Start of Road
- Sewage in Al Qaeda city
- A pool in and adjacent the road
- Slope and curves & stones of landslides
- A market near Al Janad historic mosque
- End of Road
Plate 10: General Views of Road No. 10 Ketab – As Saddah– An Nadirah Road

Start of Road

Pastures

Flat Terrain

Plants blocking the road

a bridge connects two banks

End of Road
Plate 11: General Views of Road No. 11 Al Oudain – Mothaikhrah Road
Plate 12: General Views of Road No. 12 An Naderah – Damt (first phase) + Khwal Alshaer Road

- Start of Road
- Scattered Wild plants
- Agricultural lands - vegetables
- Sand Accumulated creeping from a branch road
- End of Road
Plate 13: General Views of Road No. 13 Akmat Al Amgaood - Mothaikhrah Road

- **Start of Road**
- **Illegal bump & donkeys used for transporting water**
- **Soil Accumulation**
- **Rich vegetation**
- **End of Road**
Plate 14: General Views of Road No. 14 As Saddah – Al Radhaee Road

- Start of Road
- Rich vegetation on both sides
- Dangerous curves - Traces of traffic accident
- Animals grazing
- Agricultural terraces
- End of Road
Plate 15: General Views of Road No. 15 Al Meskah–Al Hakleen+ Bait Halbob Road

- Start of Road
- Wild plants
- High slope with dangerous curves
- Flat Terrain
- A school in Al Maqraba Village
- End of Road
Plate 16: General Views of Road No. 16 Mafraq Hobish + branches Road

Start of Road

Wild plants

Branch Roads

Agricultural lands

Electric Station

End of Road
Plate 17: General Views of Road No. 17 Ibb – Hobish Road

Start of Road

Electric wires

Agricultural terraces

Illegal bump

Flat Terrain & vegetation

End of Road
Plate 18: General Views of Road No. 18 Yarim-Erian-Rehab (First phase) Road

Start of Road

Agricultural lands

Pipe line of water crossing the road

Fragile terrain of the mountain leading landslides

Blocked Culverts

End of Road
Plate 19: General Views of Road No. 19 Nagd Al Amqa- Al Daleel Road

- Start of Road
- Wild plants
- Camel grazing and crossing the road
- Soil Erosions
- Waste Accumulation near the market
- End of Road
Plate 20: General Views of Road No. 20 Thafar-Al Shakhab-Gabal Ammar (First phase) Road

- Start of Road
- Dhafa Museum
- Soil Accumulated by rain
- Agricultural lands
- Telephone centre & landmines in Shakhab mountain
- Shakhab mountain
- End of Road
Plate 21: General Views of Road No. 21 Ariab - Bani Al Hareth (First phase) Road

- Start of Road
- Rocks for construction
- Landslides accumulated soil and stones
- A school
- Soil erosions
- End of Road
Plate 22: General Views of Road No. 22 As Saddah-Al Meskah Road

- Start of Road
- A bridge connecting banks of Banna Valley channel
- Debris Accumulation
- Agricultural lands
- Vegetation toward Banna Valley
- End of Road
Plate 23: General Views of Road No. 23 Ring Oad of Al Daleel Road

- Start of Road
- Landslides
- Electric wires and towers
- Wild plants
- End of Road
Plate 24: General Views of Road No. 24 Yarim-Aras Road

Start of Road

Agricultural lands

Water pipes & accumulated soil on asphalt

Massood Slope

Blocked Culverts

End of Road
Plate 25: General Views of Road No. 25 Yarim-Bani Muslem Road

- Start of Road
- Tube well where water goes down to the road surface
- Agricultural lands
- Animals grazing
- Accumulated Waste
- End of Road
2. LEGAL AND INSTITUTIONAL FRAMEWORK

2.1. World Bank Environmental and Social Safeguard Policies

The World Bank has ten operational safeguard policies which apply to various development projects which the Bank is either implementing or funding. The purpose of these policies is to ensure that social and environmental risks are prevented or at least minimized while increasing socio-economic benefits of approved projects in addition to preserving the environment.

These policies are meant to increase the effectiveness and positive impacts of development projects and programs supported by the Bank. The Bank’s 10 safeguard policies are presented in table 3.1.

Table 3.1. World Bank Safeguard Policies Triggered

<table>
<thead>
<tr>
<th>No.</th>
<th>Policy</th>
<th>Reference</th>
<th>Applicability to RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental Assessment</td>
<td>OP 4.01</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Involuntary Resettlement</td>
<td>OP 4.12</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Natural Habitats</td>
<td>OP 4.04</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Cultural Property</td>
<td>OP 4.11</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Pest Management</td>
<td>OP 4.09</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Indigenous Peoples</td>
<td>OP 4.10</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Forests</td>
<td>OP 4.36</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Safety of Dams</td>
<td>OP 4.37</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Projects in Disputed Areas</td>
<td>OP 7.60</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Projects on International Waterways</td>
<td>OP 7.50</td>
<td>No</td>
</tr>
</tbody>
</table>

With respect to this sub-project, one key policy was triggered. This ESMP report has been prepared in conformity with World Bank Operational Policy OP 4.01. This policy is triggered if a project is likely to have significant adverse environmental impacts in its area of influence. Although there are many historical and cultural sites were noticed near the sub-project area, there will not be adverse impacts on those sites. The nearest road alignments to these sites are at distances that vary from 200 m, 300 m, to 2km and the nature of maintenance activities are very limited near those sites, which will not create any adverse impacts, and there is no need for triggering the policy OP 4.11. Likewise, the policy OP 4.04 regarding natural habitats will not be triggered because the maintenance activities are very limited near the proposed protected areas.

This sub-project is classified as category B as the sub-project scope of works is limited to repairs and backlog maintenance of road sections. This sub-project does not involve any construction of new roads. The realignment of existing roads and road widening would not be considered. All the maintenance activities will be limited to existing roads. The road maintenance will not involve any involuntary taking of land or involuntary restriction of access to economic assets for livelihood. Therefore, the Bank policy on Involuntary Resettlement OP 4.12 is not triggered. However, there
will be a land use for the contractor camps, which will not create any impact to locals and lands. They should be built in a vacant land far away from the residential areas and agricultural lands. The temporary land use will be managed by mutual agreement with the landowner and would be restored to its original condition after completion of works.

2.2. Yemen Environmental Policies and Legislation

Since 1990, the Government of Yemen has established institutions and responsibilities for environmental management, ratified International Conventions and continues to develop sectoral legislation and procedures. The National Environmental Action Plan (NEAP) was adopted in 1995 and the Environmental Protection Law (EPL) was enacted the same year. The NEAP established priority issues and actions in major environmental fields such as “Water Resources, Land Resources, Natural Habitats, and Waste Management”.

The Environment Protection Law (EPL) number 26 of 1995 legislates on the protection of the environment, and Environmental Impact Assessment (EIA). The provisions of this law are implemented through Executive Regulations (Bye-Law 148-2000), issued by a decree of the Council of Ministers to protect the Environment, Natural Resources, Society, and Health. According to Law No. 26, an EMP is also required for maintenance projects (information confirmed by the Environmental Protection Authority).

The most relevant laws related to road projects are presented in the table 3.2 below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Law No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Decree of the Prime Minister 94</td>
<td>Establishment of the Environment Protection Council (EPC)</td>
</tr>
<tr>
<td>1995</td>
<td>Law No.26</td>
<td>Protection of the Environment</td>
</tr>
<tr>
<td>2002</td>
<td>Law No.33</td>
<td>Water Law (9 chapters and 82 articles)</td>
</tr>
<tr>
<td>1991</td>
<td>Yemeni Constitution (articles 7, 18, 19 and 20)</td>
<td>Land Acquisition and Private Property</td>
</tr>
<tr>
<td>2002</td>
<td>Civil Law (articles 118, 119 and 120)</td>
<td>Land Acquisition and public ownership</td>
</tr>
<tr>
<td>1995</td>
<td>Law No. 21</td>
<td>State Land and Real Estate</td>
</tr>
<tr>
<td>1995</td>
<td>Law No.1 (Articles 12–16 on temporary acquisition</td>
<td>Land acquisition for the public interest</td>
</tr>
<tr>
<td></td>
<td>Articles 21, 27 provisions for land acquisition</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>Waqf Law no 23 year 1992 and The Republican Decree 99, 1996</td>
<td>Wakf/Endowment Land</td>
</tr>
<tr>
<td>1991</td>
<td>Constitution, Article 7, para (C) and Civil Law, Articles 761, 765, 770, 1159</td>
<td>Agriculture Land</td>
</tr>
</tbody>
</table>

Yemen ratified a number of International Environmental Agreements and Conventions. These are listed in table 3.3 below.
Table 3.3: List of Conventions and International Agreements that were ratified by Yemen

<table>
<thead>
<tr>
<th>Ratification Date</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>Convention Concerning the Protection of World Cultural and Natural Heritage</td>
</tr>
<tr>
<td>1992</td>
<td>Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal</td>
</tr>
<tr>
<td>1995</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>1995</td>
<td>Convention for the Protection of the Ozone Layer</td>
</tr>
<tr>
<td>1995</td>
<td>Protocol on Substances that Deplete the Ozone Layer</td>
</tr>
<tr>
<td>1995</td>
<td>Convention on the Control of the Trans-boundary Movement of Hazardous Wastes and their Disposal</td>
</tr>
<tr>
<td>1995</td>
<td>Framework Convention on Climate Change</td>
</tr>
<tr>
<td>1995</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>1996</td>
<td>United Nations Convention to Combat Desertification UNCCCD</td>
</tr>
<tr>
<td>2002</td>
<td>The Convention on the Conservation of Migratory Species of Wild Animals</td>
</tr>
<tr>
<td>2004</td>
<td>Kyoto protocol (Framework Convention on Climate Change)</td>
</tr>
</tbody>
</table>

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 agencies are directly involved in road related projects:

- The Ministry of Water and Environment (MoWE), is responsible for water supply and sanitation. Four agencies report to the MoWE:
  - The National Water Resources Authority (NWRA) manages water resources on a sustainable basis, ensures satisfaction of basic water needs and establishes a system of water allocation
  - The National Water and Sewerage Authority (NWSA) manages urban water supply,
  - The General Authority for Rural Water Supply (GARWSP) manages rural water supply, and
  - The Environment Protection Authority (EPA).

- The Ministry of Agriculture and Irrigation (MAI), is responsible for the sustainable water management in the irrigation sector and the setting up of operation and maintenance of irrigation structures. Moreover, MAI should
provide protection from floods, erosion soil and Wadi banks, maintain agricultural terraces and prevent the expansion of industrial or other infrastructure.

- The Ministry of Finance (MoF), and within it the Department of Public Domain maintains urban land records such as registers of transactions, sales, and purchase leases.

- The General Authority for Land Survey and Urban Planning (GALSUP) is responsible for all land related tasks such as planning, preparation, concession/ownership contracts, notarization and the execution of expropriation processes.

- Local Councils, represent executive authority on the level of governorates (local Administration Law number 4/2002). They play a role in the control and the solving of land donation issues

- Non-Governmental Organizations (NGOs), play roles in increasing public awareness on environmental or health matters, others support people in need.
3. BASELINE CONDITIONS – EXISTING ENVIRONMENT

This part is a description of the current conditions in Ibb Governorate sub-project prior to the project start up. Baseline data provides description of the current conditions along the roads including the physical, ecological and socio-economic aspects.

3.1. Physical Resources

3.1.1. Physical Region

The physiographic characteristics of the sub-project area are very diverse. Ibb Governorate is located in the inland south of Yemen. It is located about 194 km south of Sana'a City. It is bordered by the Taiz Governorate to the southwest, the Ad Dali’ Governorate to the southeast, the Dhamar Governorate to the north, the Al Bayda’ Governorate to the east, and the Al Hudaidah Governorate to the west.

Ibb is located on the southwestern side of the Yemeni Highlands escarpment, with dramatic drops to Taiz City and the Tihama coastline. There are also impressive views of 3,070 meters high Jebel Sabir to the south.

The proposed project consists of twenty-five roads serving about twenty districts with a total length of 612.7 km. The terrain types of these roads vary between mountainous to rolling and some of them are mixed of flat-rolling-mountainous.

![Figure 3. Topographic map of the Ibb Governorate](image-url)
3.1.2. Geology and Soils
The complex geologic setting of Yemen is the result of regional tectonic (continental drift) forces. During the Tertiary, the rifting process continued causing the Arabian Peninsula to drift northeastward, pulling away from the East African plate. The rift valleys of the present day Red Sea and the Gulf of Aden opened between Ethiopia and Yemen. As would be expected with its proximity to the Red Sea Rift Fault system, Yemen is moderately seismically active.

The underlying geological strata in the Ibb governorate are largely volcanic rocks created in the Tertiary and Quaternary volcanism. The geology of the sub-project area generally consists of basaltic rashes and basalts volcanic rocks, volcanic tuff Vertical structures, and modern sedimentation. Sedimentary processes are particularly active along valleys. Sedimentation accounts for the layering and thin-bedding of many wadi soils. Large areas of soils in the inland plains also appear to have deep caps of more recent wind- and water-deposited material. In all of these areas, the most striking differentiation of the soil profiles is produced by fluvial sedimentation.

Slope instability is observed in mountainous cuts in the road alignments causing falling stones, erosion and local landslides. This is particularly evident along road no. 8 in the Somara slope.

3.1.3. Land Use
Agricultural and pastures activities are the main land use characteristic of the project area. The land is fertile. Because of its abundant rainfall, Ibb is known as "the fertile province". Almost the whole area of the governorate outside urban centers is cultivated despite the steep terrain, and the number of crops produced in extraordinarily wide for such a small area. Qat cultivation is particularly important here. Wheat, barley, sesame and sorghum, millet, maize, corn are cultivated in Ibb governorate and are considered the major food items for most people outside and inside Ibb city. Sophisticated water management and storage systems of from the seasonal rains allow extra crops to be grown during the dry season. This sophisticated agriculture allows Ibb to support an extremely dense rural population, with densities of up to 500 people/km² in the wettest areas.

The land use of the province also includes some minerals mining, such as clay mineral used for making cement and refractory bricks, zeolite used for making detergents and basalt stones used in construction and as decorative stones.

Furthermore, the Banna, Annah, Maitam, and Al-Door valleys produce many kinds of crops. They are also popular Yemeni tourism destinations as well as cultural and historical areas such as Thafar City, Jeblah area, Ba'adan and Habb Castles.

3.1.4. Climate
Ibb Governorate is characterized by moderate climate throughout the year and this climate covers all areas in the province. It is located on an altitude of 6,725 feet (2,050 meters) on average on a spur of Mount Shamālī. It has a cool continental climate, and is one of the wettest areas of Yemen. Owing to the way in which it captures the upper-level southwestern monsoonal flow during the months from April to October, Ibb governorate is the wettest place in Arabia. Though meteorological data are exceedingly poor and even of questionable accuracy, the annual precipitation is probably more than 1,000 mm (40 inches) and some estimate suggest it could be as high as 1,500mm (60 inches). There is little rain from November to February, but for the rest of the year there is probably at least 100mm (4 inches) of rain per month. Temperatures are warm, averaging about 30 °C (86 °F) in the day but nights are quite cool.
3.1.5. Water Resources
Water is a scarce commodity that is traditionally harvested by Yemenis using intricate systems. Yemenis for centuries have been constructing terraces to utilize highlands for cultivation, which are also useful in controlling soil erosion. In most areas in Yemen the rainfall is insufficient for rain fed agriculture. However, Ibb Governorate is considered rich in water. Approximately, the rain falls during the year months. There is little rain from November to February, but for the rest of the year there is probably at least 100mm (4 inches) of rain per month. There are few permanent springs along the road no. 1 (Al Oudain – Al-Garahi), road no. 6 (Al-Door Wadi crossing) and road no. 22 (As Saddah-Al Meskah). The spring in the road no. 1 is located 20 m from the road whereas the road no. 22 crosses the stream by a bridge.

The significance of water harvesting for the economy of Yemen and to virtually all rural communities is such that they must be a primary consideration in road design programs. Based on the field visits to Ibb project alignments region, several systems were found for water harvesting. They include:

Direct Discharge to Terraces from Mountain Tops
Most of the roads in Ibb governorate are located largely in mountain slopes and would accumulate rainwater runoff. Like other areas in Yemen, it is an established practice that farmers in Ibb governorate construct simple water harvesting structures with locally available materials on the existing track to drain rainwater runoff to terraces.

Irrigation System
Diversion channels to divert water from catchments areas are used. Farmers use local materials to build those channels, which are used during rainfall when water is in abundance. This system is inefficient and is of limited use. Using these channels in irrigation lead to water wastage, as much of the collected water is lost through drainage. The local communities use stones and soils to build drainage channels. This system is overall deemed old and ineffective. In addition, due to the provision of water in Ibb governorate in some areas, locals use pipes to transport water from valleys, rivers, and wells to their agricultural lands as irrigation system.

Water Wells
There are many wells especially dug wells and tube wells in Ibb. The local population use water from ponds and pools, dug wells, and tube wells scattered at many areas in the governorate. They also use water obtained from some points along the road alignments to meet their demand of water for agriculture, drinking and other household purposes. It is notable that there is a large number of wells (tube or dug) along most of the road alignments. The 11 nearest wells are adjacent to the roads and located at a distance of about 100m. There are two along road no. 2, one along road no. 3, one along road no. 4, one along road no. 5, two along road no. 10, one along road no. 6, one along road no. 12, two along road no. 18, and one along road no. 20. The water of those wells mostly is used for agriculture except the two wells in the road no. 2, which are used by local households.
3.1.6. Air Quality and Noise
Data and information on the air quality in Yemen in general and the project area in particular are absent. No air quality monitoring data for the project area was found. The air quality in Ibb governorate is considered unique due to its density vegetation and the highest mountains especially in rural areas. Based on field visit, it was noticed that the air quality along the road is good. No significant pollution sources were identified. The main source of air pollution is caused by traffic. The traffic pollution is minor because of the limited traffic volume in most roads of the sub-project area. However, the air pollution and noise are at raised levels around markets, especially in Nagd Al-Jomae Market, Al-Lail Market, and Al-Hamam Market where there are Automobile oils changing sites adjacent to the road (Ibb - As Sabrah - Qa'atabah. In Maitam Cross (Arrawdah - Sohban - Maitam), Al-Sadda Market (Ketab - Al sadah- Al-Nadirah), there are raised pollution and noise levels where many trucks and vehicles stop, and where traffic congestions are reported. However, even in these sensitive locations the noise levels are below 50dB during peak hours. Furthermore, the air quality is destroyed due to sewage treatment station of Ibb city at the beginning of road no. 2 (Ibb - As Sabrah - Qa'atabah) and in the Al-Qaeda city where raw sewage overflows the road surface. There is foul odor emitted from the areas.

Overall, because of the limited volume of traffic, the low population density through which the roads are passing, the current air quality is found to be of no concern.

3.1.7 Waste disposal
There are no sanitary landfills in the Ibb governorate. The main unsanitary waste disposal site is located near Ibb. Most of the local rural population is not provided with the waste collection services. The governorate has large number of illegal dumpsites usually located near villages or small town. There are intensive informal reuse and recovery of useful component from the waste stream as well as waste burning. Hence, overall the volume of generated solid waste is slow.

The site visits revealed many locations with illegal dumping of solid waste along the road alignments. The most significant cases are:

- Road no. 2: illegal disposal and littering in a road section of 10km length starting at the exit from the Ibb city.
- Road no. 5: domestic waste disposal in many locations along the road alignment.
- Road no. 9: accumulation of waste from markets and construction, especially near markets.
- Road no. 10: dumpling of domestic and market waste in As Saddah center.
- Road no. 22: domestic and market waste accumulation in the Wadi Banna stream under the road bridge.

3.1.8 Flora
The geographical position of Yemen and the diverse topographical features, which resulted in different ecosystem types, has given the country a great diversity of natural environments and a high level of biodiversity. Yemen is very rich in its flora and has a wide range of natural vegetation types. The vegetation of Yemen is a mixture of the East African Highlands, Sahara-Arabian regions, the Mediterranean regions and its own endemic flora.
The most significant feature in Ibb governorate is the rich vegetation cover (see plate 26). There are different kinds of flora in the governorate in most parts of the project area. The vegetation is used by the residents for their daily uses, for firewood and as rangeland for livestock. Most cultivable land in the roads is found along the valleys, which are covering most areas of the governorate. There are different kinds of fruits that grow in the project area such as, mango, sugarcane, pear, apple, watermelon, muskmelon, guava, lemon, orange, honeydew, apricot, peach, peanut, and banana.

There are many kinds of wild plants in the governorate. During the field visit, it was noticed that different kinds of wild plans such as, Acacia Asak which is grown in Al Qaeda Area and As Sayyani district, Acacia ehrenbergiana grown especially in Al Odain, Acacia mellifera grown in Al Odain and Al Qafer areas, Acacia Nilotica grown in areas as Al Odain, Acacia origena grown in As Saddah, Acalypha fruticosa grown in Al Qafer, Al Odain, and Al Qaeda areas, Acanthus Arboreus grown in most area along the road. the most common flora which also found in sub-project area Is Adenia Venenata Forsk, Adiantum Capillus-Veneris L., Aloe Sabaea Schweinf, Ammi Majus L., Boerhavia Diffusa L., Cadia Purpurea, Caesalpinia Bonduc, Capparis Cartilaginea Decne, Carissa Spinorum L., Chenopodium Murale L., Commiphora Myrrha, Cordia Africana Lam, Crassula Alba Forsk, Datura Innoxia Mill, Dianthus Uniflorus Forsk, Doodonaeas Viscosa L., Echium Rauwalfii Del., Ehretia Cymosa Thonn, Euphorbia Ammak Forsk, Euryops Arabica Burm. F., Ferula Communis L., Ficus Cordata L. Subsp, Ficus Sur Forsk, Ficus Sycomorus L., Ficus Vasta Forsk, Foeniculum Vulgare Mell, Hibiscus Deflersii Schweinf, Indigofera Oblongifolia Forsk, Jatropha Cursus L., Kleinia Odor, Leucas Glabrata, Malva Parviflora L., Micromeria Imbricate, Myrica Humilis Cham, Nuxia Congesta, Opuntia,Ficus-Indica, Pennisetum Setaceum, Phoenix Dactylifera L., Picris Scabra Forsk, etc. There are many other different kinds of flora in the area. There are proposed natural reserves in the project area such as Al-Door valley and Annah Valley. Endangered plant species are not reported in the project area.

The site visits revealed several locations where trees were overgrowing the road edges (roads no. 10, 11, 12, 19 and 22).

3.1.9 Fauna

Yemen has a rich and diverse terrestrial fauna due to the wide range of habitats in the country (high mountains, plains, dry sand-deserts, marshes, coastal habitats), and the country’s position at the junction of three major biogeographic regions, the Palearctic, Afro-tropical and Oriental regions.

There are different kinds of animals' species in the sub-project area. Wild animals are found in different areas. They include monkeys, hares, dogs, rabbits, foxes, hedgehog, reptiles (lizard, salamander, snake), predators such as, lions, tigers, hyenas, foxes, and hyena. The wild birds in the area are roadrunner, eagle, flacon, etc. The presence of wild animals is found in sparsely populated areas of valleys, mountains, and plains where there is rich vegetation as found in As-Saddah, Al-Shi‘r, Al-Odain, An-Nadera, Athareb. However, there are proposed protected areas in the vicinity of the road alignment in Al-Door and Annah Valleys. The most common livestock in the area are goats and sheep, cows, camels and donkeys. Endangered animal species are not reported in the project area.
3.1.10 Proposed Protected Areas

Annah and Al-Door Valleys are two wadis in Ibb Governorate, which are considered for natural protection designation. Annah and Al-Door valleys are located within Al Oudain area. Annah valley is about 3 km south of Al Oudian center. It is considered one of the largest valleys in Yemen. The road alignment, which passes this area is the Al-Oudain – Mothaikhrah Road which is about 200m away from the valley whose tributaries and water resources comes from Wadi Al-Door and then feeds Wadi Zabeed.

Al-Door Valley is also located within Al Oudain area neighboring Wadi Annah. The two wadis form a wadi system. The wadis have rich vegetation. The nearest road alignment for this area is Ibb - Al Oudain. The road runs beside the wadi by about 150 m. There is a spring located at a distance of 70 m from the road. Biodiversity of the two valleys is very similar because of identical climate and elevation.

There are different kinds of plants, fruits, and vegetables grown in Annah and Al-Door valleys. The wildest plants that are grown are Oxalis Corniculata, Ocimum Forskolei, Oncopa Spinosa, Opuntia Ficus-Indica, Ormocarpum Yemenense, Pancratium Maximum, Pavetta Longiflora, Acacia, etc. These valleys produce various kinds of fruits, such as mango, sugarcane, pear, apple, watermelon, muskmelon, guava, lemon, orang, honeydew, apricot, peach, peanut, and Banana. The vegetables are onion, hot paper, okra, zucchini, sweet paper, cucumber, eggplant, cauliflower, garlic, tomato, sweet potato, potato, carrot, radish, pea, corn, maize, millet, wheat, barley, sesame and sorghum.

There are different animal species in the project area. They include monkeys, hares, dogs, rabbits, foxes, reptiles (lizard, salamander, snake) - predators such as, lions, tigers, hyenas, foxes, hedgehog, and hyena. The wild birds in the area are owl, crow, sparrow, eagle, falcon, etc. Insects in the project area include scorpion, spider, ant, centipede, butterfly, etc.
Figure 5: Al-Door Valley

Plate 26. Vegetation in the Annah and Al-Door valleys.
3.1.11 Cultural and Historic Resources
There are many historical and cultural sites close to the project area. The most interesting is Dhafar historic City, which is about 500 meters from Dhafar crossing at road no. 20 (Dhafar-Al Shakhab-Gabal Ammar) and road no. 7 (Al Rebat - Thafar-Bait Alashwal). It is an ancient Himyarite site situated in Yemen, some 130 km south-south-east of today's capital, Sana'a. Dhafar was the capital of the Himyarite kingdom (110 BC - 525 AD), which, at its peak, ruled most of the Arabia.

In Al Rebat - Thafar-Bait Alashwal Road, the closest historic sites are Bait Al-Kala'a, about 100m from the road, graves adjacent to the road, and Dhafar historic City. Along the Thafar-Al Shakhab-Gabal Ammar Road, there is Himyari historic cemetery adjacent the road, at a distance of approximately 300 meters. Close to the end of the road, there is an historic area and Kahool castle that are situated at about 300 m away from the road. In Al Meskah – Al Halkleen+ Bait Halbob Road, there is a historic pool near Al Meskah area and there is a cemetery in Hajarah at about 150m away from the road. Along road no. 2 (Ibb -As Sabrah -Qa'atabah), there are some historic spots along the road such as; mosque in Nagd Al-Gomae adjacent the road called Qubat Abdullah Al-Sorory. It was built over 400 years ago. In the same area, there is also the ancient pool called Qubat Al-Kinow, which is about 300m away from the road.

In brief, there are many other historic and cultural sites in the governorate such as, Arwa Queen Mosque and some cultural sites in Jebla district, Ba'adan Castle, Al-Taqar Castle. They are on mountain peak and about 1km – 2 km away from the nearest target road.

3.1.12 Population
The estimated population of Ibb Governorate is about 2,699,051 inhabitants in 2013 and constitutes 10.8% of the total population of Yemen. They are distributed administratively into 20 districts, and Ibb city is the capital of the province. The project serves most of the governorate’s population. Table 4 shows the total estimated population in 2004 and 2013 in addition to the number of households and density P/km².

Table 4: Population and Settlements of Ibb Governorate (2013 estimated).

<table>
<thead>
<tr>
<th>No.</th>
<th>District</th>
<th>Number Of HH (Family) 2004</th>
<th>Total Population 2004</th>
<th>Total Population 2013</th>
<th>Area Km²</th>
<th>Density P/Km² 2004</th>
<th>Density P/Km² 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ibb</td>
<td>19855</td>
<td>143614</td>
<td>174783</td>
<td>74.33</td>
<td>1932.48</td>
<td>2351.46</td>
</tr>
<tr>
<td>2</td>
<td>Alradamah</td>
<td>10076</td>
<td>76503</td>
<td>94502</td>
<td>326</td>
<td>234.90</td>
<td>289.89</td>
</tr>
<tr>
<td>3</td>
<td>As Sabrah</td>
<td>9844</td>
<td>69855</td>
<td>85952</td>
<td>346</td>
<td>201.94</td>
<td>248.42</td>
</tr>
<tr>
<td>4</td>
<td>As Saddah</td>
<td>11658</td>
<td>82426</td>
<td>101906</td>
<td>270</td>
<td>305.56</td>
<td>377.43</td>
</tr>
<tr>
<td>5</td>
<td>As Sayyani</td>
<td>15450</td>
<td>110471</td>
<td>135148</td>
<td>238</td>
<td>464.35</td>
<td>567.85</td>
</tr>
<tr>
<td>6</td>
<td>Ash Sha'ir</td>
<td>4907</td>
<td>39722</td>
<td>48934</td>
<td>145</td>
<td>274.52</td>
<td>337.48</td>
</tr>
<tr>
<td>7</td>
<td>Al Dhihar</td>
<td>21006</td>
<td>152240</td>
<td>224614</td>
<td>74.33</td>
<td>2077.21</td>
<td>3021.85</td>
</tr>
<tr>
<td>8</td>
<td>Al Oudain</td>
<td>22025</td>
<td>143373</td>
<td>176891</td>
<td>362</td>
<td>396.62</td>
<td>488.65</td>
</tr>
<tr>
<td>9</td>
<td>Al Qafr</td>
<td>16021</td>
<td>102670</td>
<td>126544</td>
<td>676</td>
<td>152.77</td>
<td>187.20</td>
</tr>
</tbody>
</table>
### 3.1.13 Poverty Status

Ibb governorate is a poor governorate with relatively high poverty indicators, especially in the rural areas. Approximately 27.70% of the population lives below the poverty line, according to the latest national statistics in 2004. It is expected that the poverty percentage might increase to 50% in 2013. The RMF should employ local people in the construction and maintenance works as part of a poverty reduction strategy.

#### Table 5: Poverty Status of Ibb Governorate

<table>
<thead>
<tr>
<th>No.</th>
<th>District</th>
<th>Number of poor by rural district</th>
<th>Number of poor by urban district</th>
<th>Number of poor by district</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ibb</td>
<td>50130.7</td>
<td>0.0</td>
<td>50130.7</td>
</tr>
<tr>
<td>2</td>
<td>Alradamah</td>
<td>21484.6</td>
<td>649.6</td>
<td>22134.2</td>
</tr>
<tr>
<td>3</td>
<td>As Sabrah</td>
<td>20935.9</td>
<td>850.4</td>
<td>21786.4</td>
</tr>
<tr>
<td>4</td>
<td>As Saddah</td>
<td>21053.3</td>
<td>1371.9</td>
<td>22425.2</td>
</tr>
<tr>
<td>5</td>
<td>As Sayyani</td>
<td>32367.6</td>
<td>561.0</td>
<td>32928.6</td>
</tr>
<tr>
<td>6</td>
<td>Ash Sha'ir</td>
<td>3597.3</td>
<td>294.7</td>
<td>3892.0</td>
</tr>
<tr>
<td>7</td>
<td>Al Dhihar</td>
<td>7927.5</td>
<td>9635.1</td>
<td>17562.6</td>
</tr>
<tr>
<td>8</td>
<td>Al Oudain</td>
<td>52848.4</td>
<td>223.9</td>
<td>53072.3</td>
</tr>
<tr>
<td>9</td>
<td>Al Qafr</td>
<td>36432.6</td>
<td>2824.5</td>
<td>39257.1</td>
</tr>
<tr>
<td>10</td>
<td>Al Makhadir</td>
<td>37103.2</td>
<td>538.7</td>
<td>37641.9</td>
</tr>
<tr>
<td>11</td>
<td>Al Mashannah</td>
<td>3973.0</td>
<td>8278.3</td>
<td>12251.2</td>
</tr>
<tr>
<td>12</td>
<td>An Nadirah</td>
<td>12311.7</td>
<td>1949.9</td>
<td>14261.6</td>
</tr>
<tr>
<td>13</td>
<td>Ba'dan</td>
<td>21549.7</td>
<td>399.7</td>
<td>21949.4</td>
</tr>
<tr>
<td>14</td>
<td>Jiblah</td>
<td>26177.2</td>
<td>3917.6</td>
<td>30094.7</td>
</tr>
<tr>
<td>15</td>
<td>Hubaysh</td>
<td>33752.0</td>
<td>1142.0</td>
<td>34894.0</td>
</tr>
</tbody>
</table>

Total: 304,841

Source: Annual Statistics Book 2003 and 2012
3.1.14 Services and Facilities in the Project Area

Local people have difficulty getting access to basic public services, such as education, water supply and sewage in many districts (Table 6).

Table 6: Access to Basic Public Services in Ibb Governorate (Statistic year book 2012)

<table>
<thead>
<tr>
<th>No.</th>
<th>District Name</th>
<th>% of HH Using Wood &amp; Coal</th>
<th>% of HH with Health Facilities</th>
<th>% of HH with Electricity</th>
<th>% of HH with sewage</th>
<th>% of HH with water sources</th>
<th>Illiteracy Ratio Adult Both Sexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ibb</td>
<td>13.7</td>
<td>29.3</td>
<td>45.5</td>
<td>27.2</td>
<td>25.1</td>
<td>58.9</td>
</tr>
<tr>
<td>2</td>
<td>Alradamah</td>
<td>11.1</td>
<td>51.5</td>
<td>50.6</td>
<td>23.1</td>
<td>27.4</td>
<td>58.1</td>
</tr>
<tr>
<td>3</td>
<td>As Sabrah</td>
<td>22.0</td>
<td>56.8</td>
<td>42.6</td>
<td>20.3</td>
<td>21.8</td>
<td>59.2</td>
</tr>
<tr>
<td>4</td>
<td>As Saddah</td>
<td>8.9</td>
<td>39.9</td>
<td>67.6</td>
<td>32.4</td>
<td>62.1</td>
<td>56.8</td>
</tr>
<tr>
<td>5</td>
<td>As Sayyani</td>
<td>21.4</td>
<td>55.9</td>
<td>35.1</td>
<td>21.8</td>
<td>26.3</td>
<td>57.3</td>
</tr>
<tr>
<td>6</td>
<td>Ash Sha'ir</td>
<td>3.3</td>
<td>37.9</td>
<td>86.9</td>
<td>30.1</td>
<td>46.6</td>
<td>53.3</td>
</tr>
<tr>
<td>7</td>
<td>Al Dhihar</td>
<td>8.4</td>
<td>48.3</td>
<td>52.5</td>
<td>42.8</td>
<td>22.9</td>
<td>54.0</td>
</tr>
<tr>
<td>8</td>
<td>Al Oudain</td>
<td>37.2</td>
<td>65.0</td>
<td>12.1</td>
<td>20.0</td>
<td>23.0</td>
<td>65.8</td>
</tr>
<tr>
<td>9</td>
<td>Al Qafr</td>
<td>48.0</td>
<td>62.9</td>
<td>32.4</td>
<td>14.8</td>
<td>26.6</td>
<td>61.7</td>
</tr>
<tr>
<td>10</td>
<td>Al Makhadir</td>
<td>18.2</td>
<td>53.0</td>
<td>52.2</td>
<td>29.0</td>
<td>23.1</td>
<td>61.1</td>
</tr>
<tr>
<td>11</td>
<td>Al Mashannah</td>
<td>4.0</td>
<td>39.3</td>
<td>87.4</td>
<td>30.7</td>
<td>38.7</td>
<td>47.8</td>
</tr>
<tr>
<td>12</td>
<td>An Nadirah</td>
<td>6.8</td>
<td>40.9</td>
<td>74.4</td>
<td>41.6</td>
<td>25.6</td>
<td>52.4</td>
</tr>
<tr>
<td>13</td>
<td>Ba'dan</td>
<td>7.3</td>
<td>38.3</td>
<td>93.1</td>
<td>34.1</td>
<td>34.9</td>
<td>52.2</td>
</tr>
<tr>
<td>14</td>
<td>Jiblah</td>
<td>9.1</td>
<td>38.6</td>
<td>85.6</td>
<td>30.1</td>
<td>40.7</td>
<td>52.0</td>
</tr>
<tr>
<td>15</td>
<td>Hobish</td>
<td>21.2</td>
<td>62.5</td>
<td>11.8</td>
<td>19.0</td>
<td>24.4</td>
<td>67.3</td>
</tr>
<tr>
<td>16</td>
<td>Hazm Al Odayn</td>
<td>43.0</td>
<td>60.9</td>
<td>40.0</td>
<td>17.6</td>
<td>26.3</td>
<td>67.2</td>
</tr>
<tr>
<td>17</td>
<td>Dhi As Sufal</td>
<td>19.8</td>
<td>50.9</td>
<td>34.7</td>
<td>19.9</td>
<td>50.8</td>
<td>54.7</td>
</tr>
<tr>
<td>18</td>
<td>Far Al Udayn</td>
<td>68.0</td>
<td>73.2</td>
<td>5.0</td>
<td>19.2</td>
<td>6.5</td>
<td>69.0</td>
</tr>
<tr>
<td>19</td>
<td>Mothaikhrah</td>
<td>31.6</td>
<td>49.9</td>
<td>45.0</td>
<td>21.0</td>
<td>53.0</td>
<td>57.1</td>
</tr>
<tr>
<td>20</td>
<td>Yarim</td>
<td>30.3</td>
<td>63.6</td>
<td>29.6</td>
<td>19.5</td>
<td>19.1</td>
<td>65.9</td>
</tr>
</tbody>
</table>

4. ENVIRONMENTAL AND SOCIAL IMPACTS

4.1. Impact Scoping

During the field work, scoping was used to identify the key issues that should be given more attention. Scoping was primarily conducted as an expert exercise, however input from the public and various authorities consulted during this process were also considered and incorporated.

Table 7 below provides a matrix of potential impacts associated with the implementation of the sub-project and likely occurrence. The key activities during backlog repairs and maintenance activities are listed against natural resources, environmental media and biodiversity, and social aspects. The estimated magnitudes of impacts are also presented.

The scoping exercise indicated that the likely environmental and social impacts include:

- Waste generation of debris at some locations;
- Increased noise levels during construction and base materials extraction activities;
- Agricultural lands may be affected by bad waste management and extraction of base materials;
- Air pollution;
- Landscape in mountainous locations may be destroyed due to need to debris from falling rocks, bad waste management, quarrying and borrow pits activities;
- Temporary disruption of traffic circulation; and
- Temporary disruption of social and economic activities.

The most sensitive issues in relation to the project activities were found to be noise/vibration levels, air quality, and agricultural lands which might be affected by waste generation. The project activities that are most likely to cause deterioration of environmental quality and social integrity are generation, storage and disposal of debris and construction waste, trucking of construction materials, and resurfacing of roads.

The construction activities are predicted to have minor negative impacts on the siltation, soil erosion, slope stability, surface runoff, noise, agricultural land damage, air quality pollution, habitats changes, vegetation deterioration, wild life movement and landscape.

Trucking and construction materials are predicted to cause increase of noise levels and vibration, and deterioration of air quality. Road resurfacing is predicted to lead to increase noise levels, deterioration of air quality and reduced safety during the repairs works.

Diesel and oil storage, and refueling of vehicles is expected to cause contamination risk to agricultural land, surface and groundwater, and safety of project workers. The setting up and operation of labor camps may create minor increase in noise levels and deterioration of vegetation and landscape.

Since this project does not involve the construction of new roads, the negative impacts associated with resettlement and land acquisition are not expected.
The impact scoping exercise indicated that overall, beneficial impacts of the project on (physical resources, safety, job creation and local economic development) are expected to outweigh negative impacts.

Therefore, the project activities will generate also positive environmental and social impacts. The positive environmental impacts include: reduced soil erosion and siltation of surface water, and improved slope stability and surface runoff.
<table>
<thead>
<tr>
<th>Impact Category</th>
<th>Natural Resources</th>
<th>Environmental Media and Biodiversity</th>
<th>Social and Cultural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion</td>
<td>L L L L L L L</td>
<td>L L L L L</td>
<td>L L L</td>
</tr>
<tr>
<td>Excavation works, borrow pits, quarries</td>
<td>Storage and disposal of debris and construction waste</td>
<td>0 0 0 0 0</td>
<td>0 L L L L L</td>
</tr>
<tr>
<td>Construction and repairs of retaining walls</td>
<td>Slope stabilization, building of gabions</td>
<td>L B B B 0 0</td>
<td>L 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Trucking materials</td>
<td>Restorations of shoulders</td>
<td>0 0 0 0 0 0</td>
<td>L 0 0 0 0 0</td>
</tr>
<tr>
<td>Storage of diesel/oils</td>
<td>Operation of labor camps</td>
<td>0 0 0 0 0 0</td>
<td>L L L L L</td>
</tr>
<tr>
<td>Road resurfacing</td>
<td>Drainage restoration, repairs of culverts and side ditches</td>
<td>B 0 B B 0 L 0 B 0 L B 0 0 0 0 0</td>
<td>· B B 0 B B</td>
</tr>
</tbody>
</table>
| Legend: 0 = no adverse impact; L = Low adverse impact; M = Medium adverse impact; H = High adverse impact; B= Beneficial impact *(bold –high)*
4.2. Specific Impacts During the Backlog Road Repairs and Maintenance

This section describes in more detail the environmental and social impacts of the project during the backlog road repairs and maintenance phase following the scoping exercise and results of the consultation with the local communities presented in chapter 8. Illustration of the identified impacts are presented in plates 27 through 51 (pages 79-103).

4.2.1 Impact of Construction-related Waste Generation, Storage and Disposal

No doubt that the project activities will generate construction waste during the repairs/maintenance works as a result of excavation, reconstruction and building retaining walls, removing the damaged asphalt. Also, the waste generation is expected from trimming and stabilizing the side slopes, and from improper waste disposal. If these wastes and surplus fill are left to pile up around road shoulders, they can damage agricultural land and vegetation, induce further erosion and create slope stability problems. Construction waste generation is also expected where segments of the road require reconstruction (scraped tarmac and shoulders fixing). During maintenance works, excess fill material will be generated.

Another important waste generation is expected from cleaning up the blocked drainage system. The generated waste should be stored temporarily in locations agreed with the local communities, reused in road construction and ultimately disposed of in designated areas.

The temporary storage of debris and fill materials may lead to soil erosion, siltation of watercourses, and damage to soil and agricultural land (especially to terraces).

Waste generation may arise at the contactor’s base camp and work site as a result of inadequate provision and use of sanitary and waste facilities and spillage or leakage of polluting substances. Organic waste from labor camps may lead to local contamination of groundwater. Furthermore, equipment maintenance and fuelling may cause contamination of soil and watercourses, in case of improper or careless handling of petroleum products (lubricants, fuels, or solvents).

During the field visits, it was noticed that a few areas in Ibb governorate are susceptible to the impacts associated with the storage and disposal of debris and solid construction wastes because of the existence of agricultural lands and terraces along the roads. The areas adjacent to the beginning of roads no 2, 10, 14 and 22 at As-Saddah district center in Banna valley stream, and road no 11 in Anna valley are sensitive to the impacts associated with the storage and disposal of debris, solid, and liquid construction wastes due to their location in river valleys. The area adjacent to roads no. 6, 7, 11, 14, 18, 24, 25 are sensitive to the impacts associated with the storage and disposal of debris and other solid construction wastes. This is due to the existence of agricultural terraces or properties along both sides of the roads.

The waste generation, storage and disposal caused by maintenance works can cause negative impacts on agricultural lands, valleys, watercourses, vegetation, and settlements along the alignments. The nature of impact is minor, localized and reversible.
4.2.2 Impact of Landslides, Soil Erosion, and Visual Intrusion

Generally, Ibb governorate terrain is mountainous and has many deep valleys. Nearly all the roads the project are characterized by landslides and soil erosion which occur continuously especially during the rainy season at unstable slopes. The soil erosion and the lack of slope stabilization measures cause damage to the road itself, farmlands and vegetation below the road and is a threat to people and property. These landslides and soil erosion must be fixed urgently to prevent further deterioration.

During the repairs activities, excavation and earth removal activities render slopes and topsoil more vulnerable to landslides and erosion, especially during the rainy season. In addition to soil erosion, excavation and mountain cutting activities can result in depletion of the riparian vegetative cover and an evident visual impact on the landscape. Landslides and soil erosion can cause negative impacts in several spots in all roads except roads no. 5, 7, and 25 where there are no soil erosion and landslides. The most dangerous road subject to landslides and soil erosion is road no. 8 in the Somar slope, and road no. 21 Ariab - Bani Al Hareth (First phase) because it runs through the edge of mountains. Maintenance works on roads no. 20 (Dhafar-Al Shakhab-Gabal Ammar (First phase)) at the end and road no. 21 (Ariab - Bani Al Hareth (First phase)) can cause soil erosions and landslides due to the presence of dangerous cliffs and slopes where many rocks and parts of mountains are ready to fall down. They must be removed.

*Landslides and soil erosion caused by repair works can cause negative impacts on agricultural land, soil and vegetation especially, especially during the rainy season. The nature of landslides and soil erosion impact is major, localized and reversible.*

4.2.3 Deterioration of the Ambient Air Quality

During the construction phase, air quality can be affected negatively by dust generated by excavation works, transport and storage of fill materials and construction waste, removing unstable slopes as well as gaseous emissions from operation of equipment such as bulldozers, excavators, and trucks. However, most of the repair/construction works will be carried out using hand held equipment and manual labor. The dust and emissions to air will be limited to less than a 150m wide corridor along the road and very adverse impact is expected on the neighboring habitats of road no. 20. This impact is more significant in sensitive areas with slightly elevated baseline concentrations of dust; areas such as Nagd Al-Gomae Market road no. 2, Maitam cross road no. 3, Hobish cross road no. 16, As Saddah center road no. 10, and Al Lail Market and road no. 2 where traffic congestion was reported.

During the field visits, it was noticed that construction/repair works on the road can cause local minor impacts associated with dust and air pollutants emissions from construction equipment and works.
The adverse expected impact of ambient air quality is potentially of concern near populated areas, especially in markets, and agricultural areas. The nature of impacts on air quality impact is temporary, localized, limited, minor and reversible.

4.2.4 Impact of Increased Noise Levels and Vibration

Using the construction and repairs vehicles and equipment and heavy machines during the construction phase will lead to increase of noise levels in the target areas. The local residents and the workers as well as students and shopkeepers near the road may be affected. Noise emissions will be much lower during the maintenance phase due to smaller scope of works that will involve heavy machinery.

The field visits indicate that the significance of these impacts will be higher in some locations along the following roads no. 2, 3, 5, 17, 6, 13, 8, 10, 12, and 20. There will likely be higher levels of noise and vibration generated from operation of construction machines than other roads because these roads are characterized by narrow corridors with intensive human activities.

In both phases, the area that may be potentially impacted would typically be limited to a corridor less than 100m wide along the road and the associated increase in noise level is expected to be less than 15dBA.

Noise and vibration are important issues near settlements, farmlands, and wildlife sites. The nature of this impact is temporary, localized, minor and reversible.

4.2.5 Disruption of Water Supply

According to the field visits findings, there will be adverse impacts on the water supply system caused by the road works. The water supply system may require either displacement or temporary shutdown as they cross many points along the different roads. The project activities are likely to affect the water supply system as the field surveys revealed water pipes underneath or crossing the roads. It was noticed that water supply by pipes can be affected in roads no. 3, 7, 10, 16, and 18 because pipe crossing the roads in some locations. The local population uses dug wells, tube wells, and water tanks in several locations along the roads for water supply. During the field visits, it was noticed that repairs and maintenance works on nearly all roads can affect water supply system adjacent to the road alignments. The impacts on ground water quality are associated with soil erosion and siltation nearby water wells as well as drainage and soak away sinks. Contamination of groundwater may be caused also by hazardous wastes and spill as explained in 4.2.7.

Disruption of water supply system can affect local population and lead to social conflicts. The nature of this impact is temporary, localized, major and reversible.

4.2.6 Disruption of Runoff Water and Drainage Systems

Runoff Water: Generally, the roads are designed to concentrate runoff water on the surface and adjacent channels and ditches along the roads. According to the field visits’ findings, there is no expected impact to occur as a result of runoff water on the asphalt surface as the asphalt surface is
somewhat well designed with good slope cambers on both sides of the road. However, the expected negative impact could occur on side ditches along roads due to erosion at different locations. The potential impact is water harvesting along, and even on, the roads surfaces during the road works.

Blockage of Cross Drainage/Culverts: According to the field visit, nearly all drainage culverts are filled with accumulated, plants, soil and other debris. Three drainages along road no. 24 (Yarim-Aras) in Thee Saref village were blocked by the landowners below the road and the rainwater runs on the asphalt bringing soil and waste on the surface of the road. The locals said that the landowners closed these drainages because much rainwater destroys their lands. Cleaning these drainages may cause social tensions with landowners. Along road no. 20 near Kuhal castle, much rainwater runs down and runs over the asphalt layer because the culvert is narrow. When the water runs down, the locals complained that it destroys the road to the mountain where there are agricultural terraces.

Thus, it was noticed that repairs and maintenance works on all roads could affect runoff water, drainage and water harvesting systems. The potential impacts are highest in road sections characterized by higher precipitation. Cleaning of drainage culverts will require unskilled workers, and thus it will create job opportunity for the local population. The periodic cleaning of culverts should be conducted.

The nature of this impact is temporary, localized, major and reversible.

4.2.7 Deterioration of Groundwater Quality

There are many wells along the roads alignments in the project areas. They vary from dug wells, tube wells, and water fount in valleys. The impacts on ground water quality are associated with soil erosion and siltation nearby water wells as well as drainage and soak away sinks. Contamination of ground water may be caused also by hazardous wastes and spill, and dangerous liquid materials. During field visits, it was noticed that the higher risks of groundwater contamination are along roads no 1 and 6 where water springs are located in a distance of less than 100m from the road alignment, and roads no. 11, and 22 where the water flows from the Bana, Annah, and Al-Door valleys. The contamination of wastes in the channels of these valleys might cause groundwater contamination because these valleys feed many wells. Furthermore, there are many wells adjacent to the roads and located at a distance of less than 50m. The impacts for these wells are minor due to limited maintenance activities.

The nature of this impact is temporary, localized, minor and reversible.

4.2.8 Damage to Fauna and Flora, and Deterioration of Local Ecosystem

During the field visits, it was noticed that the project runs near biodiversity hotspots. There are three areas in Ibb which contain rich biodiversity. These areas are: Annah valley, Al-Door valley, and Bana valley. However, they will not be affected negatively by the maintenance activities due to the very limited maintenance works in these areas.

Flora Vegetation should not be affected by the project activities due to the limited scope of works. Limited tree cutting may be necessary in few locations of the roads no. 10, 11, 12, 19 and 22 where
trees overgrow the road edges. The trees have no ecological value. The vegetation cover may be affected by waste such as fuel and diesel discharges from the maintenance equipment that might cause problem for vegetation cover. Therefore, the maintenance works will not lead to major vegetation deterioration.

**Fauna:** The impact of maintenance activities will be minor on fauna. There are different kinds of fauna in the project areas. Reptiles, mammals, or birds might be affected. Due the road alignments adjacent the two valleys, the impacts on fauna will be indirect. They will be affected by increasing noise/vibration of maintenance equipment and workers. The maintenance waste, fuel and diesel disposal on the valleys water stream may cause pollution of water and grass that feed animals and birds.

The roads which run in the valleys mentioned above are roads no 6 (Ibb - Al Oudain) in Al-Door valley, 10 (Ketab - Al Sadah- Al Nadirah) and 22 (As Saddah-Al Meskah) in Bana valley, and 11 (Al Oudain – Mothaikhrah) in Annah valley. These roads are associated with a diversity of negative effects on the biotic integrity of sensitive ecosystems. However, road construction and repairs lead to very short-term fragmentation of local ecosystem. The maintenance activities, such as noise and vibration which affect fauna and flora will be minor and temporary.

Another concern due to road repairs and maintenance is the fate of the sparse existing trees on the edge of all roads which might be affected by site clearance of off-road movement of vehicles unless protected appropriately. Earth works may cause local land erosion and siltation especially during rain periods.

Proper maintenance of constructor vehicles and avoiding refueling, decreasing noise, and avoiding dust raise must be applied.

The nature of this impact is very temporary, localized, minor and reversible.

### 4.2.9 Disruption of Traffic

During the backlog works phase, traffic flow along the road undergoing the maintenance activities will be disturbed. During the field visits, it was noticed that minor impacts are expected to affect traffic flow and movement in some locations because the roads might need to be closed temporarily for roads no. 2, 5, 6, 10, 11, 13, 16, 17, and 18. These roads have segments with markets places adjacent the road. This may lead to short-term traffic delays and impact on local economic life. This is a short-term impact that can be alleviated by placing signs and proper traffic management.

This impact is very temporary, localized, manageable and minor.

### 4.2.10 Health and Safety Conditions

The maintenance activities pose potential risks to the safety of workers as well as the general public through traffic disturbance or negligent-careless use of heavy equipment. Moreover, Ibb governorate is characterized by high mountainous terrains. Nearly all road alignments run through mountains, which characterized by high slopes and cliffs and sharp curves. Disturbance of slopes during road works and deposition of debris on mountainous sections of the road may increase risk
of accidents. The disturbance of slopes might happen in case of landslides from the mountains above roads especially in the rainy season.

Landslides and rocks fall is considered a significant impact on human safety and public. The roads that have many dangerous landslides locations are roads no. 1, 8, 11, 13, 14, 17, 18, 19, and 21. The road no. 21 (Ariab - Bani Al Hareth (First phase) might be the most dangerous for the safety both maintenance workers and the public due to the continued landslides along the road especially in the rainy season.

The nature of this impact is temporary, localized, major and reversible.

4.2.11 Cultural and Historical Resources

There are many historical and cultural sites around the project areas. The most significant features of cultural and historical heritage are Dhafar historical City located at about 500 meters from the Thafar crossing. This is an ancient Himyarite site situated in Yemen, some 130 km south-south-east of today's capital, Sana'a. Thafar was the capital of the Himyarites (110 BC - 525 AD), which at its peak ruled most of the Arabia. Furthermore, in Al Rebat - Thafar-Bait Alashwal Road, the closest historic sites are Bait Al-Kala'a away from the road by about 100 m, grave adjacent the road, and Thafar historic City away by about 500 meters from Thafar cross, the nearest road. In Thafar-Al Shakhab-Gabal Ammar Road, there is Himyari historic cemetery adjacent the road away from the road start by approximately 300 meters. Near the end of the road, historical area and Kahool castle are situated away from the road by about 300 m. In Al Meskah – Al Halkeen+ Bait Halbob Road, there is a historical pool near Al Meskah area and there is cemetery in Hajarah away from the road by about 150 m. In Ibb -As Sabrah - Qa'atabah Road, there are some historic spots along the road such as; mosque in Nagd Al-Gomae adjacent the road called Qubat Abdullah Al-Sorory. It was built about 400 years ago. In the same area, there is also the ancient pool called Qubat Al-Kinow which is away by about 300m from the road.

In brief, there are many other historic and cultural sites in the governorate such as, Arwa Queen Mosque and some historical spots in Jela district, Ba'adan Castle, Al-Taqar Castle. They are on peak of mountains far away from the nearest target road by about 1km – 2 km.

Thus, there will not be adverse impacts on the cultural and historical sites which are far from the road alignments. The distances of those sites and the roads vary from 150 m to 300m, 500 m, and 2 km. Due to the proposed maintenance works, there is no fear on those sites because there will be very limited maintenance activities near those historical and cultural sites. There will no need to use heavy machines and dangerous materials. Because the project does not involve any construction of new roads and the realignment of existing roads and road widening would not be considered. The nature of maintenance activities will be very limited to existing track of roads near those areas. The road maintenance will involve cleaning ditches and culverts, removing illegal bumps, and installing traffic signs. The maintenance works will not involve any involuntary taking of land and major works. Thus, there is no adverse impact may occur on any historical and cultural sites. The maintenance activities will affect those sites positively due to road improvement. The adverse impacts on the cultural and historical sites are negligible because the maintenance works near these areas are very limited.
The nature of the impact on cultural and historical resources is negligible, localized, and reversible.

4.2.12 Social Impacts

Since the sub-project does not involve any construction of new roads and the realignment of existing roads and road widening would not be considered. All the maintenance activities will be limited to existing track of roads. The road maintenance will not involve any involuntary taking of land, involuntary resettlement of local people or involuntary restriction of access to economic assets for livelihood.

Thus, maintenance activities will create two kinds of impacts: positive impact and negative impact.

*Positive Impacts*

When the roads were established, they improved the local lives socially and economically. The roads improved the social relationships among families and community members. They resulted in easy movement by linking villages and areas with cities. This link led to mixing people with each other. It facilitated tourist arrivals, whether Yemenis or foreigners, for those are interested in scenic sights in the countryside. This overlap among the region’s people created changes in customs, traditions, and life style.

Likewise, social and economic impacts will be improved by maintaining the road. The maintenance project will need a market to provide construction materials. It will lead to job creation either for workers or companies. The maintenance works will improve access to markets and public services, historic and cultural sites. Furthermore, it will result in smooth road surfaces, which may lead to fewer vehicle repairs thereby resulting in longer vehicle life and lower maintenance expenditures. Moreover, the road works will rebuild the confidence between locals and the state especially after the problems that have taken place in Yemen in the last few years.

*Negative Impacts*

On the other hand, during the maintenance work phase, there will be some minor adverse impacts. Road users and passengers might get affected negatively during maintenance activities especially at market places such due to traffic jam which translates into economic loss and delay. However, the owners of the market places (small shops) adjacent to roads might benefit positively from sales to travelers and workers which translate into economic increase. The public may hear some noise.

There are other low adverse impacts that might occur such as, conflicts with people by burying a water resource adjacent the road in the road no. 3 where there is a water fount adjacent the road. Other expected conflicts are related with contractor's camps. There might be two camps set up which require about 2,500m² for each one. They may generate small volume of sewage and waste. Also, they may create social tension with locals nearby. Thus, the contractor's camp has to be located away from local villages and wild life locations, and agricultural land.
No encroachment was identified within the right of way. The maintenance activities are relatively small scale (such as shoulder repairs, cleaning blocked culverts, repairs of riprap, road resurfacing, crack sealing, installation of road sign, installation of safety barriers and handrails) and within the right of way of existing road.

However, some other social impacts were revealed through consultations with both men and women groups. The main social impacts are related to interruption of carrying water from water tanks located along road no. 2 (Ibb -As Sabrah -Qa’atabah). The maximum time period of the maintenance works is about two days. The people who might be affected are few represented by the owners of water trucks. However, the impact on this is limited because there are many alternatives to be used instead of these water tanks. There are other social impacts such as road safety issues near by the school and villages, crossing road for grazing, collecting firewood, and potential conflicts between local communities and construction workers camp.

*These impacts are minor and manageable.*
Plate 27: General Impact Views of Road No. 1 Al Oudain – Al-Garahi with branches

- Bee feeding
- Animals crossing & grazing near the road
- Culvert blocked by debris accumulation
- Market place
- Market place of handicrafts
- A hospital
Plate 28: General Impact Views of Road No. 2 Ibb - As Sabrah - Qa'atabah

Water flooding road from tube well used by water tankers caused damage for asphalt

Plants block Culvert outlet

A historic Mosque in NagdALGumae

Leakages from water tanks, near market, caused by people drinking

Sites of changing Automobile oils causing pollution

Broken asphalt in the market
Plate 29: General Impact Views of Road No. 3 Arrawdah-Maitam –Sohban

- Soil erosions blocked ditches
- Blocked Ditch By residents
- Broken walls by people use mountain rocks
- Removing the Cracked asphalt, maintenance work
- Blocked ditches by landslides
- Spring of water used for harvesting below the roads using pipes
Plate 30: General Impact Views of Road No. 4 Nagd Al Soqa-Al Athreb

- Landslides and eroded soil blocked ditches
- Dangerous curve without barriers or signs
- Water dam, would this dam be affected by maintenance works?
- Block Factory below the road at the end
- Blocked Ditch by rich wild plants and landslides
- Illegal bump
Plate 31: General Impact Views of Road No. 5 Ibb -Jeblah

- Blocked ditches by stone accumulation
- Soil accumulation and rocks of pavements removed
- Rocks start to remove non-paved road
- Sewage spill into the road
Plate 32: General Impact Views of Road No. 6 Ibb - Al Oudain

- Cracked Pavement
- Debris accumulated on the pavement
- Stones and soil accumulation on the asphalt surface
- Stagnant water beside the road comes from Valley
- Blocked Culverts
- Cracked Pavement & sand accumulation
Plate 33: General Impact Views of Road No. 7 Al Rebat - Thafar-Bait Alashwal

- Historical site in Al Rebate Village
- Grave yard
- Tube Well
- Sand on the road
- Damaged asphalt
Plate 34: General Impact Views of Road No. 8 Kitab-Ibb

- Local market - Traffic Jam
- School near the road
- Cracked Pavement
- Blocked ditches by non-asphalt branch
- Water supply pipes across the road surface
- Dangerous slope in Sumara mountain
Plate 35: General Impact Views of Road No. 9 Ibb-Alganad

- Much debris accumulation on the road surface
- Sewage pool in the road
- Landslides blocked ditches
- Damaged Guard Rail
- Bee feeding
- Cracked Pavement
Plate 36: General Impact Views of Road No. 10 Ketab - Al sadah- Al Nadirah

- Damaged asphalt – soil
- Water supply

- Non-asphalted pavement for about 150
- Donkeys used for water supply

- Waste accumulation creeping on the surface
- Water flow from Bana valley-road bridge
Plate 37: General Impact Views of Road No. 11 Al Oudain – Mothaikrah

Rich Vegetation

Spots of water pools in Annah

Blocked ditches by land slides

Waste accumulated on shoulders

Cracked Pavement on culvert

Water supply
Plate 38: General Impact Views of Road No. 12 An Naderah – Damt (first phase) + Khwal Alshaer

- Water pool created by tube well
- Landslides in a sharp curve led to blocked ditch
- Sand accumulation
- Blocked culverts by waste
- Dangerous curves
Plate 39: General Impact Views of Road No. 13 Akmat Al Amgoood - Mothaikhrah

- Rocks fall
- Soil and stones cover the asphalt
- Landslides blocked ditch
- Eroded shoulder
- Cracked Pavement
- Landslides narrow the road
Plate 40: General Impact Views of Road No. 14 As Saddah – Al Radhaee

- Non-asphalted curve
- Sharp curve
- Landslides blocked ditches
- Health center
- Eroded Shoulder
Plate 41: General Impact Views of Road No. 15 Al Meskah – Al Halkeen+ Bait Halbob
Plate 42: General Impact Views of Road No. 16 MafraqHobish + branches

- Blocked Culvert & water pipes
- Waste accumulation
- Market place
- Debris accumulation on block pavement
- Animals crossing to pasture
- Water supply & pool of stagnant water
Plate 43: General Impact Views of Road No. 17 Ibb – Hobesh

- Blocked Culvert
- Landslides blocked ditches
- Water supply pipes on the asphalt layer
- Sharp curve
- Cracked Pavement
Plate 44: General Impact Views of Road No. 18 Yarim-Erian-Rehab (First phase)

- Tube well
- Water harvesting pipes
- Cracked Pavement
- Inlet blocked Culvert
- Blocked ditches
Plate 45: General Impact Views of Road No. 19 Nagd Al amqa- Al Daleel

- Water supply crossing the asphalt layer
- Inlet blocked Culvert
- Outlet blocked
- Unfinished asphalt
- A school beside the road
- Damaged Guard Rail – A sight on Ibb City
Plate 46: General Impact Views of Road No. 20 Dhafar-Al Shakhb-GabalAmmar (First phase)
Plate 47: General Impact Views of Road No. 21 Ariab - Bani Al Hareth (First phase)

- Building rocks sites on the lift side of the road
- Illegal bump
- Landslides blocked ditches
- Water pipes come from the mountains used to wash cars
Plate 48: General Impact Views of Road No. 22 As Saddah-Al Meskah

- Soil erosion & wild plants in ditches
- Landslides blocked ditches
- Clean Culvert
- Protected barrier is broken on the bridge
- Waste accumulation
- General look of the road
Plate 49: General Impact Views of Road No. 23 Ring Road of Ad dalil

- Debris accumulation created by landslides
- Stones and soil blocked ditches
- Water Leakage caused asphalt
- The road used by trucks
- Rocks falls blocked ditches
Plate 50: General Impact Views of Road No. 24 Yarim-Aras

- Soil accumulated and creeping by rain flood
- Blocked culvert
- Culvert blocked by locals
- Water supply pipes
- Blocked culvert
- A school & populated area
Plate 51: General Impact Views of Road No. 25 Yarim-BaniMuslem

- Blocked culvert by soil and grass
- Stand accumulated
- A historical mosque
- Cracked Pavement
5. ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES (ESMM)

5.1. General
This section contains the Environmental and Social Mitigation Measures (ESMM) for the proposed works. These mitigation measures aim to address the expected potential negative impacts of the project and should be ensured and approved under the terms of contract for construction and supervision, and as necessary by agreement with communities that will be referred to in the SFA. The mitigation measures are meant to reduce and mitigate the potential adverse impacts and strengthen the positives ones. They are highly dependent on the significance of the predicted impact, the nature of the impact (permanent vs. temporary, direct vs. indirect), or the phase of the project (works vs. maintenance). The summary of mitigation measures during the backlog works and repairs phase are presented in table 10 with the total estimated cost of 94,000 USD. Summary of mitigation measures during the maintenance phase is presented in table 11.

There are specific measures required from the contractor to reduce the potential impacts of physical works and also the proposals for monitoring contractor compliance/performance during construction. These measures are attached in the contract documents (volume 2 General Specification and Regulations).

The General Specifications and Regulations contain specific Environmental, Health and Safety Requirements for:

- Proper management of construction waste;
- Control measures for waste fuel, oil and lubricants;
- Reduction of noise and dust levels;
- Rehabilitation of areas used for construction detours and sites used for temporarily storage of construction materials;
- Use and proper maintenance of equipment with appropriate noise and smoke; etc.

The following table summarizes the Relevant Clauses in Standard Construction Contracts (see Annex 2 for Environmental and Social Procedures to be included in the construction contracts).

<table>
<thead>
<tr>
<th>Clause #</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 to 4.10</td>
<td>General Requirements</td>
</tr>
<tr>
<td>5.1 to 5.16</td>
<td>Safety Requirements</td>
</tr>
<tr>
<td>6.1 to 6.5</td>
<td>Environmental and Health Requirements</td>
</tr>
<tr>
<td>7.1 to 7.5</td>
<td>Additional Requirements for Work in Public Areas</td>
</tr>
<tr>
<td>8</td>
<td>Contractor’s Site Check List</td>
</tr>
</tbody>
</table>
5.2. Mitigation Measures for Project Activities During Both the Backlog Repairs and Regular Maintenance Phases

The specific mitigation measures during the repairs and maintenance phase address the potential impacts described in the previous section.

5.2.1 Generation, Storage and Disposal of Construction-related Waste

To mitigate environmental impacts caused by construction-related waste generation, storage and disposal, generation of solid waste should be minimized as much as possible. The debris and waste in side ditches and on the road surface should be cleaned, transported and disposed at suitable sites in agreement with the local beneficiaries to avoid damages to terraces and agricultural lands and properties along the roads. It is very important to avoid disposal in the environmentally sensitive areas such as the streams of Annah, Al-Door, and Banna Valleys.

The mitigation measure for the construction and resurfacing waste (including shoulders) is to remove the excess material and dispose it in designated areas. In addition, the mitigation for waste generation during cleaning of the blocked drainage is to dispose the waste at vacant land agreed with the local populations.

All contractors must define and commit to a clear plan for solid and liquid waste management for the RMFIU approval prior to initiating repair and maintenance activities. To avoid damage to the natural environment there is a need to ensure proper handling of fuels, lubricants and other chemicals in sealed containers while maintaining construction equipment and prevent possible leakage of lubricants and fuel during periodic inspection and maintenance of equipment. Moreover, during maintenance phase, there should be an educational campaign to local population and vehicle drivers about the importance of keeping surrounding areas clean with respect to health and environmental quality.

Very high volumes of debris could be generated in case of landslides and soil erosion along roads 14, 15, 20, and 21. Rehabilitation of damaged pavement sections will generate additional construction waste along all roads. Coarse and fine waste materials can be used as filling, construction and stabilization material.

5.2.2 Landslides, Soil Erosion, and Visual Intrusion

The project areas are mountainous with deep valleys. There are many areas characterized by high slopes in the sub-project area. The risk of landslides and soil erosions may affect the road repairs and maintenance activities especially during the rainy seasons. The soil erosion and landslides may cause damage to farmlands and properties below the road. They also can harm human life and animals.

To mitigate landslides and soil erosion and visual intrusion, there is a need for land but, which is not agricultural land nor is it in use by people or owned by people. It is adjacent to and part of road. Hence, there is no expected adverse impact due to the use this land for temporarily accommodate fallen debris. The mitigation measures also include: (i) rehabilitation of existing retaining walls (ii)
provision of an open ~1m wide piece of land behind cut side channels, to temporarily accommodate fallen debris; (iii) construction of retaining walls and gabions; (iv) increase the mass thickness of the rock fill to provide additional resistance to instability; (v) Riprapping the damaged drainage system after compacting lose material; (vi) planting of trees and vegetative cover in sensitive zones; (vii) planting of grass and trees along the slopes to prevent landslides.

According to The field visits revealed that rehabilitation and building retaining walls is required along most roads except road no. 5, 7, and 25 as well as rehabilitation of protection works to side slopes, inlet and outlets of drainage works for all roads. Hence, during operation phase all retaining walls and protection works should receive continuous maintenance.

5.2.3 Deterioration of Air Quality

The impact of maintenance activities of road works on air quality can be effectively mitigated. The mitigation measures include:

- Maintaining equipment and project vehicles in good conditions.
- Using good quality fuel to reduce exhaust emissions.
- Cleaning of vehicle tires.
- Spraying of water during dry periods to reduce dust generation.
- Covering trucks carrying construction materials and fill to avoid dust generation.
- Avoiding earthworks near schools during the school hours.

The gaseous impact will be limited to less than a 100m wide corridor along the road and no long-term impacts are expected on the neighboring habitat. During the operational stage, gaseous emissions can be reduced by using good quality fuel and keeping equipment in good conditions. Mitigation measures must be strictly enforced in near markets, schools, and health center due to elevated level of baseline.

5.2.4 Increased Level of Noise

The impact of road works on noise levels can be mitigated and reduced by using well maintained equipment, limiting noisy activities to normal daylight working hours, introducing speed limits in critical sections of the roads near human and animal habitats. The contractor should also inform the public about the location and timing of noisy activities. There is a need to use dynamite to remove a rock on road no. 20 near Kuhal castle, so the contractor should inform public about that, including the authorities in charge of the castle. Mitigation measures must be strictly enforced in all roads especially in the following roads: 2, 3, 5, 17, 6, 13, 8, 10, and 12 due to elevated level of noise.

High noise levels generated by borrow pits and quarrying operations should be reduced by obtaining the base course material for the road works from local already eroded material or from existing quarries. Establishing new quarries next to the sites should be minimized to prevent noise and visual disruptions. In case new borrow pits or local quarry needs to be used, the contractor has to obtain permits from the governorate authorities for site selection and operation, address land ownership issue and comply with environmental regulations of the Law 26/1995.
The increase of noise levels during the maintenance phase will be very minor due to limited scope of works. The key mitigation measure that should also be applied is limiting road works to daytime hours.

5.2.5 Disruption of Water Supply

The impact of disruption of water supply can be mitigated and avoided by scheduling maintenance and relocation activities with the locals. It is important to inform beneficiaries to use alternative sources of water supply during the road works. The highest risks of damage of the water supply system are found along roads no 2, 3, 5, 7, 6, 13, 18, 10, 12. The road works should not disturb water harvesting and irrigation systems especially in the following roads: 2 and 3 in the agricultural land. Siltation of surface water should be mitigated by fixing the damaged riprap after compacting the topsoil along the eroded side ditches. This type of work, which is labor intensive, will create job opportunities for the poor people in the project area.

Mitigation measures for protecting wells and groundwater from hydrocarbon pollution is to store fuel, lubricants and solvents in sealed containers, and conducting refueling and small repairs on paved surfaces.

The contractor should avoid any damages to water supply sources and facilities during the maintenance phase of the project.

5.2.6 Disruption of Runoff Water and Drainage Systems

The mitigation measures of disruption of the runoff water and drainages system are making adequate drainage structures, removing all the wastes and siltation away from the drainages and making proper side sloping of the road surface to prevent accumulation of water on the road surfaces, making the retaining walls and erosion control measures by planting trees to protect disturbed soils to prevent erosion and landslides to drainage ditches and culverts. The mitigation measures against the blockage of cross culverts during road works are to control sediment runoff into culverts, cleaning of clogged culverts and side sloping. The mitigation for the adverse negative impacts of the drainage ditches in Thee Saref village is to make ditches beside the agricultural lands adjacent the road to avoid drifting the farmlands.

The mitigation measure for the impact near Kuhal castle is to re-direct the water channels from the mountains to make the rainwater go down slowly.

Overall, there should be regular maintenance for the drainage ditches and culverts to prevent accumulated of waste, uncontrolled runoff of water and clogging of the drainage system.

5.2.7 Deterioration of Groundwater Quality

Mitigation measure for protecting wells and groundwater and water from hydrocarbon pollution is to store fuel, lubricants and solvents in sealed containers, and conducting refueling and small repairs on paved surfaces. In addition, the wastes generated from the road maintenance must be taken away from wells adjacent to the roads and water springs along roads no. 1 and 6. The open groundwater
wells near the road must be covered during the maintenance activities. The liquid waste management plans should be developed and implemented by the contractor. The water quality in nearby wells should be periodically analyzed.

5.2.7 Stress on Fauna and Flora

The impact on maintenance works on fauna and flora can be mitigated. The maintenance wastes and spoil either liquid or solid must not be thrown on the edge of the environmental sensitive places such as channels or near the channels of Annah, Al-Door, and Bana valleys as well as agricultural lands. The contractor should use well maintained equipment, provide waste disposal containers to transport wastes away from sensitive areas and limit noisy activities. To avoid dust raised near these areas, there should be spraying of water to reduce dust generation. Furthermore, planting trees and placing speed limit signs can alleviate potential negative impacts of noise from the road. The existing sparse trees along the road alignment should be preserved by the contractor.

The damage to the valley areas along roads no. 6, 10, 11, and 22 must be prevented by avoiding any spillages of fuel or lubricants from the road sections located adjacent to these sites. All constructor vehicles must be properly maintained to prevent any fuel leakages. Refueling, vehicles and machines repairs must be banned in these road sections. Further, worker camps cannot be located near the areas of valleys to avoid any sewage discharge and littering.

The site survey showed that the effective mitigation for amphibians is to maintain clean culverts and rehabilitating them to provide open crossings and avoid fragmentation of habitats. The contractor should restore the land adjacent to the road alignments to at least its pre-construction status.

There are other extra mitigation measures to protect the proposed protected areas such as:

- Restrict work near the proposed protected areas to periods outside animals and birds spawning and rainy seasons.
- Ensure that concrete works (material) are isolated from the watercourse and plants. The contractor will be responsible for implementation of all environmental related activities under the sub-project. Each contractor is obliged to respect Environmental Management Framework Document (EFD) and Environmental Management Plan (EMP) provisions during the sub-project implementation,
- Contractor should develop and submit an environmental protection proposal, for approval, especially for these proposed protected areas.
- Impose speed limits on all vehicle movements at the work site to reduce dust emissions.
- Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations.
- Follow up the contractor continuously especially in these areas to ensure there in no adverse impact and to ensure whether the contractor is in compliance with all the standards and criteria for protecting environment.
Minimal loss or damage of vegetation and loss and damage or disruption to fauna can occur during works. There will be no negative impacts on the areas considered for protection due to limited scope of works.

5.2.8 Disruption of Traffic

Objective of maintenance activities is to improve the existing alignments that help vehicles to flow well. The impact of the road works activities on traffic can be mitigated. The mitigation measures include:

- Informing the public and placing signs about the location and length of time expected for temporary traffic disruption.
- The provision of alternative access roads during road works.
- On the spot traffic management.

5.2.9 Deterioration of Health and Safety Conditions

Road workers need to receive safety instructions and personal protective equipment. Construction signs should be used to avoid accidents. Implementation of traffic management plan and by passes in the working areas should be organized to establish a safe working environment. Regarding the risk of landslides in the mountainous sections of the road, it is important to build retaining walls and gabions to prevent landslides. In addition, the entire roads do not have traffic signs. It is significant to install traffic signs in all dangerous locations especially curves, landslides, slopes, livestock locations. All the roads need barriers in the dangerous curves and slopes because many accidents are happening.

Accidents that happen near the populated locations and livestock, schools, health center can be mitigated by placing speed limit bumps.

5.2.10. Cultural and Historical Resources

Due to the limited maintenance activities near the historical and cultural/ religious sites, there will be no negative impacts for these sites due to the nature of work. However, there are some issues should be taken into consideration to avoid any adverse impact on this sites such as, contractor should communicate to the public through community committees regarding the scope and schedule of road rehabilitation, as well as certain road rehabilitation activities causing disruptions or access restriction, do not block access to cultural and religious sites, wherever possible, and take special care and use appropriate equipment when working next to a cultural/religious and historical sites. Road maintenance must be managed in such way to avoid any impact or access restriction to scenic, graveyards and architectural sites.

For the graves close to the roads, ensure that they are protected during construction activities and notify site workers of their locations. Preferably, provide sign posts to clearly mark them out. The graves located very near the road 20 Dhafar-Al Shakhab-Gabar Ammar should be protected using temporary separation walls during the road works.
5.2.11 Social Mitigation Measures

The socio-economic impacts of the project on residents can be minimized by shortening the maintenance period, providing alternative access routes to residences and roadside businesses and by adopting traffic management plans to ensure a safe and efficient movement of traffic during maintenance as well as by informing the public about the schedule of road works activities.

Contractors are responsible for adhering to these mitigation measures and implementing them throughout the duration of their contracts in coordination with the Supervising Consultant and the RMF. For the contractor labor camps, the contractor should coordinate with local communities for the selection of the sites for the workers’ camps. The latter will ensure adequate monitoring as outlined below.

The labor camps must be located away from local villages, valleys, and agricultural lands to avoid social tensions with the local populations and wildlife harassment. They must be equipped with sealed septic tanks and waste containers (both must be regularly emptied in permitted locations).

The road maintenance projects will generate positive social impacts during the backlog repairs and maintenance phase such as local employment, additional revenue in the local economy, and increased demand for local products. The positive social effects of the sub-project should be enhanced by encouraging the contractor to hire local workers and thus generate temporary jobs in rural areas of the governorate.
6 ENVIRONMENTAL AND SOCIAL MONITORING ACTIVITIES

6.1 Monitoring Arrangements

The monitoring activities for both environmental and social measures of these road subprojects will be the responsibility of the environmental and social specialists of the Supervision consultant supported by the Project’s Implementation Unit. The monitoring will determine contractors compliance, or otherwise, with the ESMP. Monitoring activities will rely primarily on field observations, feedback from stakeholders and other affected people, and documentation of their reactions to the project works and their perception of the adequacy of the mitigation measures. Photographic documentation will be required in the continuous and regular monitoring.

The environmental and social (E&S) specialists of the Road Asset Management Project (RAMP) are responsible for overall monitoring coordination of all the roads evaluated in this ESIA. Their responsibility is to collect and review monitoring information provided by the Supervision consultant, review and comments on the monthly reports on contractor’s compliance.

After completion of the sub-project (during the maintenance phase) and thereafter, periodic routine inspections/monitoring will continue by the dedicated environmental and social specialist at the Implementation Unit, according to the monitoring framework. Social impact would be managed through the Social Framework Agreement between RAMP through (RMF) and Beneficiaries.

The estimated costs of the monitoring activities during the backlog repairs and maintenance phase is 96,000 USD and the bulk of it the cost of hiring environmental and social monitoring specialist (see table 1), camera and use of vehicle. The environmental and social specialist shall conduct site visits to inspect and determine contractors compliance or otherwise with the ESMP.

Upon completion of the sub-project or at the conclusion of the overall project, it is expected that the specialists who gained experience under the RMF will remain with the Implementation Unit and develop and implement a routine plan of periodic joint environmental and social inspections/monitoring.

The World Bank will provide implementation support to the implementation of road specific ESIs/ESMPs and other safeguards related documents (SFAs, Resettlement Plans etc.). In particular the Bank must ensure that proper monitoring takes place and that the reports are filed regularly. Should these reports indicate incomplete monitoring of specifically identified social issues; these will be reported to the responsible staff in the RMFIU.

6.2. Reporting

The Supervision Consultant shall provide monthly monitoring report that is location and activity specific. This shall identify areas of contractor’s non-compliance with the ESMP and provide guiding remarks on actions to be taken. The significance of the non-compliance shall also be described. The E&S specialist shall prepare these reports and follow-up with the contractor to comply with all ESMP items or otherwise corrective actions would be taken. In addition, the RAMPIU shall prepare a monitoring report twice a year, and brief supervision memo before every WB mission on each sub-project to be reviewed by the Environmental and Social Safeguards team. In addition, an annual report of all the environmental and social monitoring activities will be compiled by the RAMPIU and submitted to the Bank as part of the overall project implementation.
7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN - ESMP

7.1. General

The Purpose of the Environmental and Social Management Plan (ESMP) is to summarize findings of the study and establish a mechanism for implementation of mitigation measures addressing the expected negative impacts and monitor their efficiency.

The report includes a specific management plan based on the findings of consultations with local stakeholders. The ESMP for this sub-project will be reviewed in accordance with the World Bank guidelines and disclosed prior to the launching of the works contract. Tables 10 and 11 present the comprehensive ESMP framework during the backlog works and repairs phase, and the maintenance phase respectively.

Due to the limited and minor nature of potential negatives impacts of subproject identified in this ESMP report, it is considered that the Environmental and Social Management Plan (ESMP) prepared for the Ibb Province will satisfy the OP 4.01 Safeguard Policy of the World Bank.

The total estimated costs of the ESMP during the backlog repairs and maintenance phase, including implementation of mitigation measures and one full time social and environmental monitoring specialists, travels costs, and camera is estimated to reach 190,000 USD. The costs represent activities specifically related to environmental and social mitigation and monitoring measures. The bulk of mitigation measures will be addressed by the standard environmental and social procedures included in the technical specifications of works contracts (see Annex 2).

7.2. Responsibilities and Procedures

The overall implementation of the ESMP is the responsibility of the RAMP, through the RMFIU, which includes qualified environmental and social specialists. The procedures of the RMFIU are designed to incorporate, or “mainstream” environmental and social considerations into the overall process for road planning and implementation. These procedures are summarized in table 9.
**Table 9: Summary of Environmental and Social Management Plan procedures**

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Cycle</th>
<th>Phase</th>
<th>Activities</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>Screening and Scoping</td>
<td>✓ Initial site visit &amp; consultations. ✓ Identification of issues and applicable safeguards policies ✓ Categorization ✓ Action plan</td>
<td>RMFIU</td>
</tr>
<tr>
<td>2</td>
<td>Design</td>
<td>Preparation of ESMP, SFA and consultations</td>
<td>✓ Draft ESMP ✓ Draft SFA ✓ Women consultations</td>
<td>Consultant/RMFIU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disclosure and agreement signing</td>
<td>✓ Disclosure of draft ESMP &amp; SFA to communities ✓ Signing of final SFA ✓ Abbreviated RAP ✓ Landowners participation</td>
<td>RMFIU/Districts, landowners and communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Finalization and Incorporation</td>
<td>✓ Final version of ESMP ✓ Incorporation of EMP into contract documents</td>
<td>Consultant/RMFIU</td>
</tr>
<tr>
<td>3</td>
<td>Execution</td>
<td>Implementation and monitoring</td>
<td>✓ Implementation ✓ Monitoring &amp; reporting on environmental and social mitigation measures</td>
<td>Contractors RMFIU, RE &amp; local community</td>
</tr>
<tr>
<td>4</td>
<td>Operations</td>
<td>Operations and maintenance</td>
<td>✓ Implementation ✓ Monitoring &amp; reporting on environmental and social mitigation measures</td>
<td>Contractors RMFIU RE &amp; local community</td>
</tr>
</tbody>
</table>

ESMP = Environmental and Social Management Plan  
SFA = Social Framework Agreement
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generation, storage, disposal of construction and domestic waste</td>
<td>• Waste minimization&lt;br&gt;• Storage of construction waste in locations pre-agreed with the local communities&lt;br&gt;• Waste disposal in designated locations&lt;br&gt;• Avoid disposal in environmentally sensitive areas e.g. the streams of Annah, Al-Door, and Banna Valleys&lt;br&gt;• Waste from cleaning of blocked drainage should be disposed at vacant land agreed with the local populations&lt;br&gt;• Coarse and fine waste materials should be used as filling, construction and stabilization material&lt;br&gt;• Handling of liquid waste in sealed containers&lt;br&gt;• Solid and liquid waste management plan</td>
<td>• Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation&lt;br&gt;• Site inspections&lt;br&gt;• Frequency: Twice a month for each road under repairs</td>
<td>Contractor, Supervision Consultant</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Expected additional USD 10,000 costs</td>
</tr>
<tr>
<td>2</td>
<td>Landslides, soil erosion, and Visual intrusion</td>
<td>• Construction and repairs of retaining walls&lt;br&gt;• Restoration of riprap and stone pitching&lt;br&gt;• Provision of open area ~1m wide, behind cut side channels, to store temporarily fallen debris&lt;br&gt;• Increase the mass thickness of rock fill for additional stability&lt;br&gt;• Restoration of drainage systems&lt;br&gt;• Planting trees in sensitive zones&lt;br&gt;• Restoration of vegetative cover</td>
<td>• Site inspection and photographic documentation of excavation and maintenance activities&lt;br&gt;• Photographic documentation of planting and re-vegetation activities&lt;br&gt;• Frequency: Once a week for each road under repairs</td>
<td>Contractor, Supervision Consultant</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.</td>
</tr>
<tr>
<td>No.</td>
<td>Potential Impacts</td>
<td>Mitigation Measures</td>
<td>Monitoring</td>
<td>Responsibility</td>
<td>Additional Cost in USD</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Deterioration of air quality</td>
<td>- Usage of well-maintained equipment&lt;br&gt;- Using good quality fuel to reduce exhaust emissions. &lt;br&gt;- Water spraying for dust control &lt;br&gt;- Cleaning of vehicle tires &lt;br&gt;- Covering of trucks carrying fine grade construction materials &lt;br&gt;- Avoiding earthworks near schools during the school hours.</td>
<td>- Visual observation and photographic documentation of equipment induced emissions and dust clouds from works and trucks&lt;br&gt;<strong>Frequency:</strong> Once a week for each road under repairs</td>
<td>Contractor</td>
<td>Will be part of the works contract. Expected additional costs: 10,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supervision Consultant</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Increased level of noise</td>
<td>- Usage of quiet/well-maintained equipment&lt;br&gt;- Limiting noisy activities to normal daylight hours &lt;br&gt;- Provision of speed limit signs at critical locations &lt;br&gt;- Informing local population about noisy road works &lt;br&gt;- Obtain permits for siting and operation of any new quarrying or borrow pit areas &lt;br&gt;- Planting trees in sensitive zones</td>
<td>- Site supervision, inspection and documentation to ensure the implementation of mitigation measures&lt;br&gt;<strong>Frequency:</strong> Once a week for each road under repairs</td>
<td>Contractor</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Expected additional cost: 5,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supervision Consultant in coordination with the Contractor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Disruption of water supply</td>
<td>- Protecting water supply systems during works&lt;br&gt;- Fixing the damaged riprap after compacting the top soil along the eroded side ditches &lt;br&gt;- Coordination with land owners on scheduling maintenance activities &lt;br&gt;- Ensuring no interruption of water supply during works.</td>
<td>- Close supervision and documentation of pipe relocation activities &lt;br&gt;- Monitoring any interruptions of water supplies to local communities caused by project works&lt;br&gt;<strong>Frequency:</strong> Once a week for each road under repairs</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Expected cost 20,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supervision Consultant in coordination with the Contractor</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Potential Impacts</td>
<td>Mitigation Measures</td>
<td>Monitoring</td>
<td>Responsibility</td>
<td>Additional Cost in USD</td>
</tr>
<tr>
<td>-----</td>
<td>------------------</td>
<td>---------------------</td>
<td>------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| 6   | Disruption of the runoff water and drainage systems | • Proper side sloping of the road to prevent the accumulation of water on the road surface  
• Re-vegetation of disturbed soils  
• Keeping the drainage ditches and culverts unblocked | • Site inspection and photo documentation of water harvesting activities and re-vegetation activities  
• Checking on culverts particularly following rainfall events  
• *Frequency: Twice a month during the rainy season for each road* | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the contract. Bidders will be able to cost this item in their bids. Additional cost (revegetation): 7,000 USD | Cost of full time environmental and social monitoring specialists, camera and vehicle. |
| 7   | Deterioration of groundwater quality | • Storage of liquid materials (especially hydrocarbons) in sealed containers.  
• Application of liquid fuels and oils in sealed and paved areas with sump.  
• Refueling in sealed locations  
• Development and implementation of Waste management plan. | • Monitoring water quality of the groundwater wells  
• Monitoring of fuel and oil handling and storage.  
• *Frequency: Once every month for each road under repairs* | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract. Bidders will be able to cost this item in their bids. Expected additional costs: 20,000 USD (incl. water sampling and analysis) | Cost of full time environmental monitoring specialist, camera and vehicle. |
| 8   | Damage to fauna, flora and the proposed protected areas | • Placing speed limit signs and planting trees at critical locations and known animal crossing pathways  
• Road works to be conducted outside of the birds spawning and nesting season  
• Waste and spoil cannot be dumped near sensitive areas (Al-Door and Bana valleys)  
• Keeping culverts unblocked to facilitate amphibians crossing  
• Spraying of water to reduce dust emissions during road works  
• Restoring affected land along the road alignment to the preconstruction status  
• Preventing leakages of fuel | • Site inspection and photographic documentation of the condition of culverts  
• Monitoring of re-planting activities  
• Checking records of spillages and animal killings  
• *Frequency: Once every two weeks for each road under repairs* | Contractor in coordination with Supervision Engineer  
Supervision Consultant | Will be part of the works contract. Expected additional costs: 10,000 USD | Cost of full time environmental monitoring specialist, camera and vehicle. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Disruption of traffic</td>
<td>• Informing the public about schedule of repair and maintenance works</td>
<td>• Site inspection and photo documentation</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Additional costs: 2,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provision of temporary alternative access roads/by-passes</td>
<td>• Frequency: Weekly (including photo evidence) for each road under repairs</td>
<td>Supervision Consultant</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• On the spot traffic management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Deterioration of health &amp; safety conditions</td>
<td>• Provision and use of personal protective equipment to workers</td>
<td>• Inspection and photo evidence</td>
<td>Contractor</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Installing construction and warning signs</td>
<td>• Maintaining records of injuries and accidents with cause and location</td>
<td>Supervision Consultant</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Retaining walls and gabions to prevent landslides</td>
<td>• Frequency: Weekly for each road under repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Speed limit bumps in settlements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Installing barriers in sharp curves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Damage to cultural and historical sites</td>
<td>• Do not block access to cultural and religious sites, wherever possible</td>
<td>• Site inspection/supervision and photographic documentation of cultural and</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Part of the contract. Bidders will be able to cost this item in their bids.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of manual equipment when working next to cultural, religious or historical sites</td>
<td>historical sites.</td>
<td>Supervision Consultant</td>
<td>Cost of full time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mark graves by sign posts and notify workers about them</td>
<td>• Frequency: Monthly for each road under repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Social Impacts</td>
<td>• Coordinating with the public schedule of maintenance activities in residential areas</td>
<td>• Site inspection and documentation of community activities along roads.</td>
<td>Contractor in coordination with Supervision Engineer</td>
<td>Will be part of the contract. Bidders will be able to cost this item in their bids. Expected additional cost: 5,000 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Employing local workers</td>
<td>• Inspections of worker camps</td>
<td>Supervision Consultant</td>
<td>Cost of full time social monitoring specialist, camera and vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide alternative access roads/by-passes</td>
<td>• Frequency: Bi-weekly for each road under repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Traffic management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Workers’ camps have to be located away from settlements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Camps must be equipped with sealed septic tanks and waste containers.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Expected additional mitigation costs:** USD 94,000  
**Expected monitoring costs:** USD 96,000  
**Total expected costs of ESMP:** USD 190,000
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generation, storage, disposal of construction and domestic waste</td>
<td>• Waste minimization • Storage of construction waste in locations pre-agreed with the local communities • Avoid disposal in environmentally sensitive areas e.g. the streams of Annah, Al-Door, and Banna Valleys • Waste from cleaning of blocked drainage should be disposed at vacant land agreed with the local populations • Waste disposal in designated locations • Handling of liquid waste in sealed containers</td>
<td>• Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation • Site inspections • Frequency: Once a month for each road under maintenance</td>
<td>Contractor, Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>2</td>
<td>Landslides, soil erosion, and Visual intrusion</td>
<td>• Repairs of retaining walls • Restoration of riprap and stone pitching • Cleaning and repairs of drainage systems • Restoration of vegetative cover</td>
<td>• Site inspection and photographic documentation of maintenance activities • Photographic documentation of planting and re-vegetation activities • Frequency: Once a month for roads under maintenance</td>
<td>Contractor, Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>3</td>
<td>Deterioration of air quality</td>
<td>• Usage of well-maintained equipment • Water spraying for dust control • Using good quality fuel to reduce exhaust emissions. • Clearing vehicle tires • Covering of trucks carrying fine grade construction materials</td>
<td>• Visual observation and photographic documentation of equipment induced emissions and dust clouds from works and trucks • Frequency: Once a month for roads under maintenance</td>
<td>Contractor, Supervision Consultant</td>
<td>Cost of part time environmental and social monitoring specialists, camera and vehicle.</td>
</tr>
<tr>
<td>No.</td>
<td>Potential Impacts</td>
<td>Mitigation Measures</td>
<td>Monitoring</td>
<td>Responsibility</td>
<td>Additional Cost in USD</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 4   | Increased level of noise                      | • Usage of quiet/well-maintained equipment  
    • Informing local population about noisy road works  
    • Limiting noisy activities to normal daylight hours  
    • Provision of speed limit signs at critical locations | • Site and documents inspections  
    • Frequency: Once a month for each road under maintenance | Contractor  
    (Supervision Consultant in coordination with the Contractor) | Will be part of the contract.  
    (Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 5   | Disruption of water supply                    | • Protecting water supply systems during works  
    • Coordination with land owners on scheduling maintenance activities  
    • Ensuring no interruption of water supply during works. | • Monitoring any interruptions of water supplies to locals caused by project works  
    • Frequency: Once a month for each road under maintenance | Contractor (in coordination with Supervision Engineer)  
    (Supervision Consultant in coordination with the Contractor) | None  
    (Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 6   | Disruption of the runoff water and drainage systems | • Keeping the drainage ditches and culverts unblocked  
    • Checking on culverts following rainfall events  
    • Frequency: Once a month during the rainy season for each road under maintenance | Contractor in coordination with Supervision Engineer  
    (Supervision Consultant in coordination with the Contractor) | Will be part of the contract.  
    (Cost of part time environmental and social monitoring specialists, camera and vehicle. |
| 7   | Deterioration of groundwater quality           | • Storage of liquid materials (especially hydrocarbons) in sealed containers.  
    • Application of liquid fuels and oils in sealed areas with sump.  
    • Refueling in sealed locations  
    • Monitoring of fuel and oil handling and storage.  
    • Frequency: Once a month for each road under maintenance | Contractor in coordination with Supervision Engineer  
    (Supervision Consultant in coordination with the Contractor) | Will be part of the works contract.  
    (Cost of part time environmental monitoring specialist, camera and vehicle. |
| 8   | Damage to fauna, flora and the proposed protected areas | • Keeping culverts unblocked to facilitate amphibians crossing  
    • Preventing leakages of fuel  
    • Road works should be conducted outside of the birds nesting season  
    • Waste and spoil cannot be dumped near sensitive areas (Al-Door and Bana valleys)  
    • Site inspection and photographic documentation of the condition of culverts  
    • Checking records of spillages and animal killings  
    • Frequency: Once a month for each road under maintenance | Contractor in coordination with Supervision Engineer  
    (Supervision Consultant in coordination with the Contractor) | Will be part of the works contract.  
    (Cost of part time environmental monitoring specialist, camera and vehicle. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Additional Cost in USD</th>
</tr>
</thead>
</table>
| 9   | Disruption of traffic                          | • Informing the public about schedule of maintenance works       
     |                                               | • On the spot traffic management                                                  | Site supervision-inspection and photo documentation             | Contractor in coordination with Supervision  | Cost of part time environmental and social monitoring specialists, camera and vehicle. |
|     |                                               |                                                                     | • Frequency: Monthly for each road under maintenance             | Engineer                                                        |                                             |
| 10  | Deterioration of health & safety conditions     | • Provision and use of personal protective equipment to workers       
     |                                               | • Installing construction and warning signs near markets, schools, health centres, pastures, firewood sites  
     |                                               | • Removal of random speed bumps                                                  | Inspection and photo evidence                              | Contractor                                     | Will be part of the contract. |
|     |                                               | • Maintaining barriers in sharp curves and along steep slopes        | • Frequency: Once every month for each road under maintenance   | Supervision Consultant                                       |                                             |
| 11  | Damage to cultural and historical sites         | • Do not block access to cultural and religious sites, wherever possible       | Site inspection and photographic documentation.                 | Contractor in coordination with Supervision Engineer           | Part of the contract.                       |
|     |                                               | • Use of manual equipment when working next to a cultural or religious and historical sites. | • Frequency: Monthly for each road under maintenance            | Supervision Consultant                                       |                                             |
| 12  | Social Impacts                                 | • Coordinating with the public the schedule of maintenance activities in residential areas 
     |                                               | • Awareness workshop on road maintenance                                     | Site inspection and documentation of community activities along roads. | Contractor in coordination with Supervision Engineer | Will be part of the contract. |
|     |                                               | • Traffic management                                                    | • Frequency: Once a month for each road under maintenance       | Supervision Consultant                                       |                                             |
|     |                                               | • Camps must be equipped with sealed septic tanks and waste containers. |                                                                 |                                                    |                                             |
8 SOCIAL CONSULTATIONS

8.1 Consultations Program
Consultations were carried out with both men and women. The consultations program has multiple objectives:

- To provide a forum for the initial definition of critical environmental and social issues;
- To establish from regional stakeholders their concerns of key development issues and their linkages to the environment and social development;
- To confirm the suitability of the initial list of beneficiary’s communities selected for consultations; and
- To obtain assistance by contacting leading members of target communities whenever necessary.

8.2 Consultation With Men
Consultation with representatives of male beneficiaries from selected local communities along the road alignments were carried out from January 2014 to February 2014. One hundred and six sites were selected within the twenty five roads. A total of 142 beneficiaries were randomly selected for above mentioned sites and interviews (see table 11). Due to the fact the most of the respondents are illiterate; data was collected by face-to-face interviews. The interview started with general talk and a brief explanation about the nature and objectives of the study to gain the trust and confidence of the respondents and to ensure the most reliable responses.

The consultation took place to ensure (i) that respondents are aware of all the activities to be undertaken, their timetable and possible impacts, and; (ii) that their consent is documented so as to prevent later misunderstandings between the project, contractors, and the general population.
<table>
<thead>
<tr>
<th>No</th>
<th>Road Name</th>
<th>Villages Surveyed</th>
<th>No. of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Al Oudain – Al-Garaih with branches</td>
<td>The Branch - Hiran – Al Shali – Sheber Valley – Al garsi – Al Mazahen - Al Shahari – Derkhal – Al Marate’a – Hour</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Ibb - As Sabrah - Qa’atabah</td>
<td>Nagd Al Gomae’ – Al Qalalah – As Sabrah - Mahmoud Mount – Qareen</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Ar rawdah-Maitam – Sohban</td>
<td>Al Amqi – Al Shukami – Al Mesena’ah – Al Uqair – Al Surih – Al Nagel</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Nagd Al Soqa- Al Athreb</td>
<td>Bani Mansoor</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Ibb - Jeblah</td>
<td>Aqamat Jeblah- Aqamat Issa – Mafraq Jeblah - Zoo</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Ibb - Al Oudain</td>
<td>Al Ma’asouk – Al Hadaba Al Uay - Aia – De’ras – As Sahla - Mashwara – Al-Door Valley</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Al Rebat - Thafar-Bait Alashwal</td>
<td>Thafar - Herabah – Bani Huqba – Qrabah</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Ibb-Alganad</td>
<td>Al Nagd Al Ahmer – As Sayani</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Ketab - Al sadah- Al Nadrah</td>
<td>Al Romaisa – Al Ehdad</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Al Oudain – Mothaikrah</td>
<td>Helbab - Qurba – Anna’a Valley - Agwal – Aredat Ba’aran – Mothaikrh</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>An Naderah – Damt (first phase)+ Khwal Alshaer</td>
<td>Al Qara’a – Al Kashaa’h – Al Hajrah – Aqrah – Demt</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>Akmat Al Agaood - Mothaikrh</td>
<td>Al Majareba – Al Shujie – Al Sharafi – Al Gareen – Mothaikrthr - Akmat Al Angaood</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>As Saddah – Al Radhaee</td>
<td>Al Dha’ – Thee Ad</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Al Meskah – Al Hakeen+ Bait Halbob</td>
<td>Al Habali Mount - Bait Halbob</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>Mafraq Hobish + Branches</td>
<td>Al Fajrah – Sheb b Alnajar – Aqah</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>Yarim-Erian-Rehab (First phase)</td>
<td>Thomran - Hajah - Ailhaqah - Alsadah</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>Nagd Al amqa- Al Daleel</td>
<td>Alsharaf – Bohn</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>Dhafer-AlShahab-Gabal Ammar (First phase)</td>
<td>Dhafer - Herabah – Al Hakleen - Faneg</td>
<td>6</td>
</tr>
<tr>
<td>21</td>
<td>Ariab-Bani Al Hareth (First phase)</td>
<td>Alrajmah – Aldmadl</td>
<td>5</td>
</tr>
<tr>
<td>22</td>
<td>As Saddah-Al Meskah</td>
<td>As Saddah – Al Meskah - Al Habali</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>Ring road Of Ad dall</td>
<td>Bait Anan – As Sabet Market – Al Nozha - Awadi</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>Yarim-Aras</td>
<td>Harris – Thee Saref</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>Yarim-Bani Muslem</td>
<td>Alobab – Mathkarar</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>142</strong></td>
<td></td>
</tr>
</tbody>
</table>
Social Consultations
During the Social Consultations that were carried out with the local people, most of the locals have shown their cooperation and willingness to cooperate with the contractor and showed their interest to work with the contractor as workers.

Findings of the consultations also were concentrated on to speed up the process of road maintenance works. The locals reiterated the need for road maintenance to improve road safety and reduce damage to agricultural lands resulting from floods and limited number of box culverts. Other comments were related to the need to include local workers in the maintenance works, correcting dangerous curves, implementation of works without delays, and removal of random speed bumps. It is worth noting that this round of consultations included representatives from the civil society organizations.

8.3. Consultations with Women
The woman consultations were carried out in June 2013 through field visits and interviews with women in different villages along the road alignments of Ibb governorate to be financed by the project. 72 women were interviewed along the sub-project areas. Most of the respondents were married and illiterate women by about 75%.

During the field visits, it was noticed that women in Ibb play a major role in family life. They take responsibilities and burdens of the family because most heads/ fathers of families are working outside the province or expatriates outside Yemen. They work both inside the house raising children and outside the house in farmlands, fetching water and firewood, etc.

The consultations with women were implemented by female consultant. The consultation process included questionnaires, which were also used to solicit respondents’ views, concerns, and feedback on the road maintenance activities to be supported by the project. The main environmental and social problems factors of roads from the women’s point of view are the following:

- Lack of beneficiaries involvement in the road maintenance activities.
- Lack of local authorities’ cooperation in road maintenance activities.
- Lack of community awareness of the positive impacts for road maintenance works.
- Lack of community awareness of the negative impacts for bad road use as represented by: overloading, throwing waste in both sides of the roads especially in the markets, making illegal bumps.
- Lack of supervisory by authorities overseeing the road safety.

The respondents expressed their dissatisfactions on the current road conditions and said that continuous ignorance of road problems and absence of maintenance will cause the following situations:

- Corrosion of asphalt layer that may lead to road destruction.
- High maintenance costs.
- Material losses which will affect beneficiaries.
- Frequent traffic accidents which will lead to human and material losses.
- High transportation costs.
The key results and findings of the women consultation are the following:

The Main Concerns

- The main concern is that improved road may increase the speed of vehicles in front of pastures, firewood sites, schools, and residential areas. That will have potential impacts on safety of students, children, animals, and local residents. They expressed that road bumps should be built to reduce the vehicles’ speed near the schools, pastures, firewood sites, markets, and villages and to place traffic signs at places where students cross to schools, also where women and animals cross to the fields.
- They showed their concerns on contractor’s camp. Their concerns are from workers harassments. They expressed their preference for the camps to be built outside the populated areas.
- Women are afraid to cross the road during the maintenance for grazing activities, getting water and collecting firewood. They hope the maintenance activities can be shortened as much as possible.
- Women also expressed concerns of the potential conflicts between local communities and construction worker camps. They hope the location of camp should be selected carefully in consultation with local people and construction workers should be educated to have better understanding of the local traditions and customs.
- Lack of beneficiaries involvement in the road maintenance activities.
- Lack of local authorities cooperation in road maintenance activities.
- Lack of community awareness of the positive impacts for road maintenance works.
- Lack of community awareness of the negative impacts for bad road uses which include: overloading, throwing waste in both sides of the roads especially in the markets, making illegal bumps.
- Lack of supervisory by authorities overseeing the road safety.

The respondents expressed their dissatisfactions on the current road conditions and they said that continuous ignorance of road problems and absence of maintenance will cause the following situations:

- Corrosion of asphalt layer that may lead to road destruction.
- High maintenance costs.
- Material losses which will affect beneficiaries.
- Frequent traffic accidents which will lead to human and material losses.
- High transportation costs.

Positive Potential Impacts:

At the same time, the women consulted also recognized the positive impacts of the project and expressed their expectations for job opportunities from the road maintenance. The positive impacts are the following:

- Easy access to markets to get goods,
- The maintenance will contribute to decrease the accidents and dangers for the local population.
- Increasing the level of Services in the Centers of those Areas.
- Increasing the numbers of Girls who will be able to go to schools.
- The maintenance will provide traffic safety.
- 100% of respondents showed their interests to cooperate with maintenance works in all areas along the roads.
- 50% of the respondents asserted that there is a need of community-based initiatives for maintenance works. That is, there must be continuous maintenance works by the beneficiaries themselves. They have to work in repairing and telling the stakeholders if there are some problems on the road.
- Women showed their interests to work in maintenance activities such as, cleaning ditches and culverts, removing small landslides and wastes from asphalt. They said that men should not be involved with them in the work. In addition, their works in maintenance activities should be suitable for women nature, customs, and traditions.

8.4. Recommendations
- Involving beneficiaries in planning working in maintenance works,
- Placing traffic signs on the roads, especially at populated areas near markets, schools, health center, pastures, firewood sites, and near villages. In addition, there must be signs along the road especially in slopes and curves.
- Organizing and holding awareness workshops and symposiums for locals both men and women on road maintenance and their role in keeping the roads in a good condition as well as sign roads and setting up penalties against the violators and this will contribute to the sustainability of the project.
- Involving local councils (authorities) especially monitoring activities.
- Hiring qualified contractors and it is preferred if they are from Ibb.
- Building barriers in sharp curves and high slopes
- Building supporting retaining walls, culverts, Irish crossing in areas that so require.
- The consultation participants recommended also setting a group of residents to control traffic movement next to schools during school time, and to build speed bumps near entrance to villages. These ideas can be implemented easily, but about the traffic controllers, these need employees.
### Annex 1: Sample of Screening Report Template

<table>
<thead>
<tr>
<th>A. Project Related Issues</th>
<th>Yes</th>
<th>No</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Will the project involve land expropriation or demolition of existing structures?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>2. Will the project require that populations be resettled or compensation for resettlement provided?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>2. Will the project involve widespread land disturbance or site clearance?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>3. Will the project require large amounts of raw / construction materials?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>4. Will the project generate large amounts of residual wastes and wasted construction materials or eroded soil?</td>
<td>√</td>
<td></td>
<td>At few locations mentioned in comments</td>
</tr>
<tr>
<td>5. Will the project require the setting up of ancillary production facilities?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>6. Will the project affect land use zoning and planning or conflict with prevalent land use patterns?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>7. Will the project land be encroached upon by urbanized or industrialized areas or areas intended for urbanization or industrialization?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>8. Will the project result in potential soil contamination or ground and surface water contamination, e.g., from oil, grease and fuel from equipment yards, from herbicides for vegetation control and from chemical (e.g., calcium chloride) for dust control?</td>
<td>√</td>
<td></td>
<td>May be, however could be mitigated</td>
</tr>
<tr>
<td>9. Will the project lead to an increase in suspended sediments in streams affected by road cut erosion, decline in water quality and increased sedimentation downstream?</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Will the project involve the use of chemicals or solvents?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>11. Will the project require blasting?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>12. Will the project make significant demands on utilities and services, and require significant levels of accommodation or service amenities to support the workforce during construction?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>13. Will the project increase the levels of harmful air emissions?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>14. Will the project increase ambient noise levels?</td>
<td>√</td>
<td></td>
<td>Near populated places such as markets and schools</td>
</tr>
<tr>
<td>15. Will the project involve the disturbance or modification of existing drainage channels (canals) or surface water bodies (lakes, lagoons)?</td>
<td>√</td>
<td></td>
<td>May it happened in road no. 24</td>
</tr>
<tr>
<td>16. Will the project lead to the disruption/destruction or damage of terrestrial wildlife habitats, biological resources or ecosystems through interruption of migratory routes, disturbance of wildlife habitats, and noise related problems?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>17. Will the project induce marred landscape (e.g., scars from road cuts) and lead to landslides, slumps, slips and other mass movements in road cuts?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>18. Will the project lead to long-term or semi-permanent destruction of soils in cleared areas not suited for agriculture?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>19. Will the project lead to the destruction of vegetation and soil in the right-of-way, borrow pits, waste dumps, and equipment yards?</td>
<td>√</td>
<td></td>
<td>Issue of minor importance &amp; can be mitigated</td>
</tr>
<tr>
<td>20. Will the project lead to environmental and social disturbance by construction camps?</td>
<td>√</td>
<td></td>
<td>Issue of minor importance &amp; can be mitigated</td>
</tr>
<tr>
<td>21. Will the project lead to the creation of stagnant waterbodies in borrow pits, quarries, etc., suited for mosquito breeding and other disease vector?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>22. Will the project lead to health hazards and interference of plant growth adjacent to road by dust raised and blown by vehicles?</td>
<td>√</td>
<td></td>
<td>May be but with minimum effect</td>
</tr>
<tr>
<td>23. Will the project lead to erosions of lands below the roadbed receiving concentrated outflow carried by covered or open drains?</td>
<td></td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Will the project lead to unplanned use of the infrastructure being developed?</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Will the project result in health hazards and interference of plant growth adjacent to road by dust raised and blown by vehicles</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Will the project lead to the illegal invasion of homelands and indigenous people by squatters and poachers causing serious social and economic disruption?</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Will the project be equally profitable to all beneficiaries in the region?</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Will the project be equally accessible by all beneficiaries in the region?</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

### B. Site Related Issues

1. Is the project located in an area with designated natural reserves? ×
2. Is the project located in an area with unique natural features? √
3. Is the project located in an area with endangered or conservation-worthy ecosystems, fauna or flora? √
4. Is the project located in an area falling within 500 meters of national forests, protected areas, wilderness areas, wetlands, biodiversity, critical habitats, or sites of historical or cultural importance? √
   - In Bana, Al-Door, and Annah Valleys
5. Is the project located in an area such that it would create a barrier for the movement of conservation-worthy wildlife or livestock? √
6. Is the project located close to subterranean water sources, surface water bodies, water courses or wetlands? √
7. Is the project located in an area with designated historic or cultural resources? √
8. Is the project located in a polluted or contaminated area? √
   - In one location in road no. 2
9. Is the project located in an area of high visual and landscape quality? √
10. Is the project located in an area susceptible to landslides or erosion? √
11. Is the project located in an area of seismic faults? ×
12. Is the project located in a densely populated area? √
13. Is the project located in prime agricultural land? √
14. Is the project located in an area of tourist importance? √

I. General

1. The Contractor and his employees shall adhere to the mitigation measures set down in the ESMP and take all other measures required by the Engineer to prevent harm, and to minimize the impact of his operations on the environment.

2. The Contractor shall not be permitted to unnecessarily strip clear the right of way. The Contractor shall only clear the minimum width for construction and diversion roads should not be constructed alongside the existing road.

3. Remedial actions that cannot be effectively carried out during construction should be carried out on completion of each Section of the road (earthworks, pavement and drainage) and before issuance of the Hand Over Certificate:

   (a) These sections should be landscaped and any necessary remedial works should be undertaken without delay, including grassing and reforestation;

   (b) Water courses should be cleared of debris and drains and culverts checked to clear flow paths; and

   (c) Borrow pits should be dressed as fish ponds, or drained and made safe, as agreed with the landowner.

4. The Contractor shall limit construction works to between 6 am and 7 pm if it is to be carried out in or near residential areas.

5. The Contractor shall avoid the use of heavy or noisy equipment in specified areas at night, or in sensitive areas such as near hospitals.

6. To prevent dust pollution during dry periods, the Contractor shall carry out regular watering of earth and gravel haul roads and shall cover material haulage trucks with tarpaulins to prevent spillage.

II. Transport

7. The Contractor shall use selected routes to the project site, as agreed with the Engineer, and appropriately sized vehicles suitable to the class of road, and shall restrict loads to prevent damage to roads and bridges used for transportation purposes. The Contractor shall be held responsible for any damage caused to the roads and bridges due to the transportation of excessive loads, and shall be required to repair such damage to a quality subject to the approval of the Engineer.
8. The Contractor shall not use any vehicles, either on or off road with grossly excessive, exhaust or noise emissions. In any built up areas, noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the Contractor.

9. Adequate traffic control measures shall be maintained by the Contractor throughout the duration of the Contract and such measures shall be subject to prior approval of the Engineer.

III. Workforce

10. The Contractor should, whenever possible, locally recruit the majority of the workforce and shall provide appropriate training as necessary.

11. The Contractor shall install and maintain a temporary septic tank system for any residential labor camp and without causing pollution of nearby watercourses.

12. The Contractor shall establish a method and system for storing and disposing of all solid wastes generated by the labor camp and/or base camp.

13. The Contractor shall not allow the use of fuel wood for cooking or heating in any labor camp or base camp and provide alternate facilities using other fuels.

14. The Contractor shall ensure that site offices, depots, asphalt plants and workshops are located in appropriate areas as approved by the Engineer and not within 500 meters of existing residential settlements and not within 1,000 meters for asphalt plants.

15. The Contractor shall ensure that site offices, depots and particularly storage areas for diesel fuel and bitumen and asphalt plants are not located within 500 meters of watercourses, and are operated so that no pollutants enter watercourses, either overland or through groundwater seepage, especially during periods of rain. This will require lubricants to be recycled and a ditch to be constructed around the area with an approved settling pond/oil trap at the outlet.

16. The contractor shall not use fuel wood as a means of heating during the processing or preparation of any materials forming part of the Works.

IV. Quarries and Borrow Pits

17. Operation of a new borrow area, on land, in a river, or in an existing area, shall be subject to prior approval of the Engineer, and the operation shall cease if so instructed by the Engineer. Borrow pits shall be prohibited where they might interfere with the natural or designed drainage patterns. River locations shall be prohibited if
they might undermine or damage the river banks, or carry too much fine material downstream.

18. The Contractor shall ensure that all borrow pits used are left in a trim and tidy condition with stable side slopes, and are drained ensuring that no stagnant water bodies are created which could breed mosquitoes.

19. Rock or gravel taken from a river shall be removed far enough to limit the depth of material removed to one-tenth of the width of the river at any one location, and not to disrupt the river flow, or damage or undermine the river banks.

20. The location of crushing plants shall be subject to the approval of the Engineer, and not be close to environmentally sensitive areas or to existing residential settlements, and shall be operated with approved fitted dust control devices.

V. Earthworks

21. Earthworks shall be properly controlled, especially during the rainy season.

22. The Contractor shall maintain stable cut and fill slopes at all times and cause the least possible disturbance to areas outside the prescribed limits of the work.

23. The Contractor shall complete cut and fill operations to final cross-sections at any one location as soon as possible and preferably in one continuous operation to avoid partially completed earthworks, especially during the rainy season.

24. In order to protect any cut or fill slopes from erosion, in accordance with the drawings, cut off drains and toe-drains shall be provided at the top and bottom of slopes and be planted with grass or other plant cover. Cut off drains should be provided above high cuts to minimize water runoff and slope erosion.

25. Any excavated cut or unsuitable material shall be disposed of in designated tipping areas as agreed to by the Engineer.

26. Tips should not be located where they can cause future slides, interfere with agricultural land or any other properties, or cause soil from the dump to be washed into any watercourse. Drains may need to be dug within and around the tips, as directed by the Engineer. The engineering works should hold back rocks (e.g. gabions).

VI. Historical and Archeological Sites

27. If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:
a. Stop the construction activities in the area of the chance find.

b. Delineate the discovered site or area.

c. 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.

d. Notify the supervisory Engineer who in turn will notify the responsible local authorities and the Ministry of Culture immediately (less than 24 hours).

e. Contact the responsible local authorities and the Ministry of Culture who would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. This would require a preliminary evaluation of the findings to be performed by the archeologists of 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, including the aesthetic, historic, scientific or research, social and economic values.

f. Ensure that decisions on how to handle the finding be taken by the responsible authorities and the Ministry of Culture. This could include changes in the layout (such as when the finding is an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage.

g. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the Ministry of Culture; and

h. Construction work will resume only after authorization is given by the responsible local authorities and the Ministry of Culture concerning the safeguard of the heritage.

VII. Disposal of Construction and Vehicle Waste

28. Debris generated due to the dismantling of the existing structures shall be suitably reused, to the extent feasible, in the proposed construction (e.g. as fill materials for embankments). The disposal of remaining debris shall be carried out only at sites identified and approved by the project engineer. The contractor should ensure that these sites (a) are not located within designated forest areas; (b) do not impact natural drainage courses; and (c) do not impact endangered/rare flora. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas.

29. In the event any debris or silt from the sites is deposited on adjacent land, the Contractor shall immediately remove such, debris or silt and restore the affected area to its original state to the satisfaction of the Supervisor/Engineer.
30. Bentonite slurry or similar debris generated from pile driving or other construction activities shall be disposed of to avoid overflow into the surface water bodies or form mud puddles in the area.

31. All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, where necessary, will be considered incidental to the work and should be planned and implemented by the contractor as approved and directed by the Engineer.

32. Vehicle/machinery and equipment operations, maintenance and refueling shall be carried out to avoid spillage of fuels and lubricants and ground contamination. An oil interceptor will be provided for wash down and refueling areas. Fuel storage shall be located in proper bounded areas.

33. All spills and collected petroleum products shall be disposed of in accordance with standard environmental procedures/guidelines. Fuel storage and refilling areas shall be located at least 300m from all cross drainage structures and important water bodies or as directed by the Engineer.