



# Environmental Monitoring Report

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Summary Initial Environmental Examination  
Project Numbers: MPW/872/ADB/ICB  
June 2009

## The Islamic Republic of Afghanistan: Rehabilitation of Jabul Saraj to Nijrab Road Section

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**Asian Development Bank**

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## ABBREVIATIONS

ADB	-	Asian Development Bank
CD	-	Cross Drainage
COC	-	Certificate of Compliance
COI	-	Corridor of Impact
CPR	-	Common Property Resources
EA	-	Environmental Assessment
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
ESO	-	Environmental and Safety Officer
IEE	-	Initial Environmental Examination
IRA	-	Islamic Republic of Afghanistan
MPW	-	Ministry of Public Works
NEAC	-	National Environmental Advisory Council
NEPA	-	National Environmental Protection Agency
PIA	-	Project Influence Area
PIU	-	Project Implementation Unit
PPE	-	Personal Protective Equipment
REA	-	Rapid Environmental Appraisal
RH	-	Regional Highway
ROW	-	Right of Way
SC	-	Supervision Consultant
SNEAC	-	Sub-National Environmental Advisory Council
UXO	-	Unexploded Ordnance
WHO	-	World Health Organization

## SUMMARY OF INITIAL ENVIRONMENTAL EXAMINATION

### I. INTRODUCTION

1. The purpose of this Initial Environmental Examination (IEE) is to document a screening of the environmental consequences of this project. This IEE is structured in accordance with the requirements of the ADB.
2. The IEE considered environmental impacts on physical, environmental, ecological, social, and cultural resources within the Project influence area during construction and operation phases of the Project.
3. The IEE has been conducted to identify and to minimize the adverse environmental impacts, if any. Environmental issues considered in this IEE are mainly macro-level issues, which can have adverse or beneficial impacts, as a result of the proposed road works.
4. The methodology used for this study is based on the procedures described in ADB Environmental Assessment Guidelines of 2003, ADB Environmental Policy 2002 and IRA's EIA Policy and Environmental Law.

The Initial Environmental Examination has been carried out using current ADB and IRA guidelines, specifically:

- ADB Environmental Policy 2002 ;
- ADB Environmental Assessment Guidelines 2003;
- Project Terms of Reference (TOR);
- EIA Policy of IRA
- Draft Interim EIA Regulation of IRA
- Environmental Law of IRA

### II. DESCRIPTION OF THE PROJECT

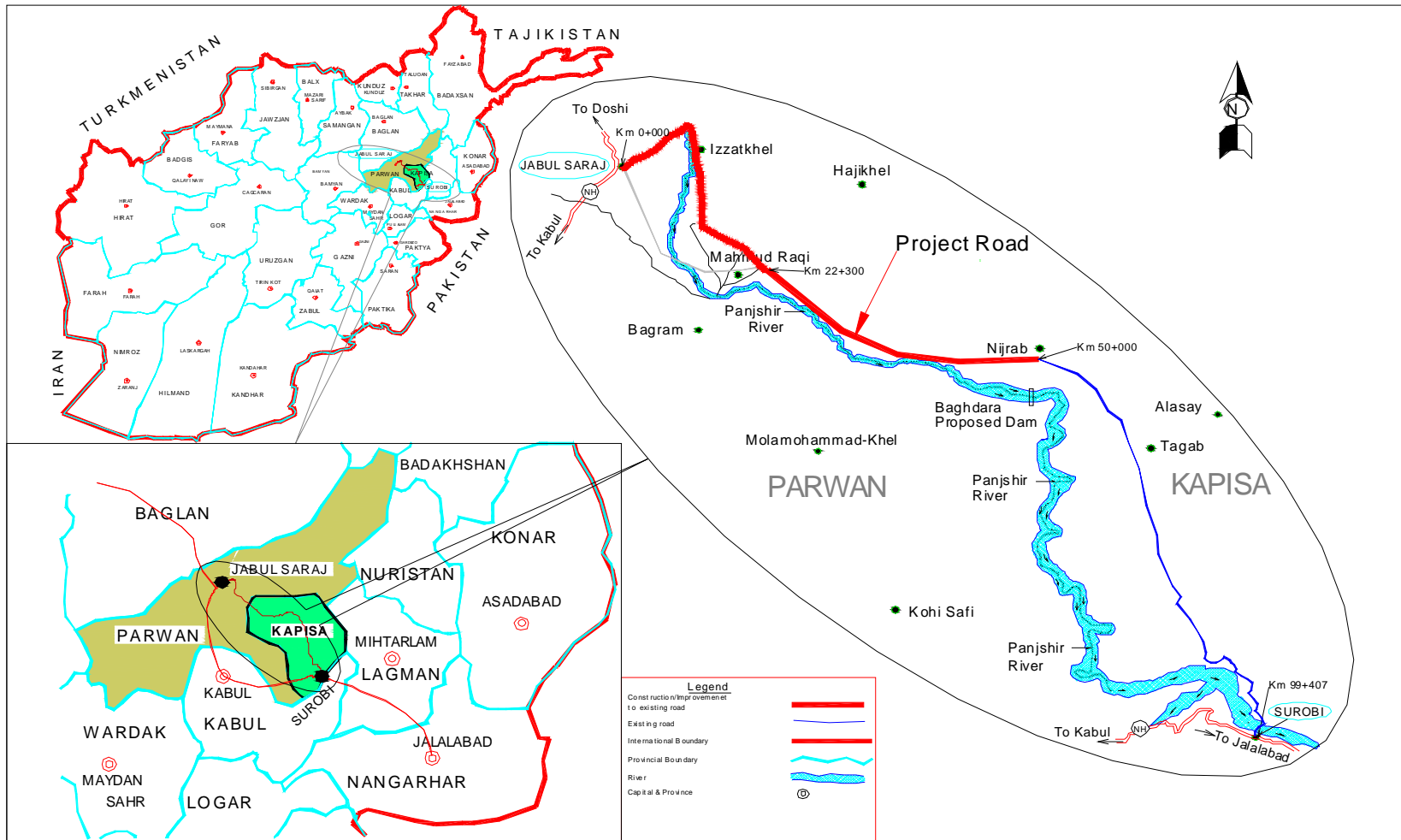
5. The Ministry of Public Works (MPW), Islamic Republic of Afghanistan, intends to provide better accessibility between Jabul Saraj to Nijrab by rehabilitating / reconstruction and maintenance of about 50km of existing National Highway No. 4. The planned improvement includes rehabilitation of existing paved road between Sabul Saraj to Mahmud Raqi (about 22.3 km) to two lane carriageways (7m width) with paved and soft / granular shoulders and maintenance of section between Mahmud Raqi to Nijrab (about 27.7km). The project road starts on Kabul - Doshi (RH-4) road and traverses south-east direction and ends at Nijrab. The project road would facilitate connecting two important primary highways (with NH3 at Surabi) and serves as a bypass to Kabul for through traffic. The project road is planned to be rehabilitated / reconstructed with the assistance of Asian Development Bank. Presently, the traffic plying between Northern part of Afghanistan and Jalalabad adopt the Kabul - Doshi road (RH-4) via Kabul. This makes the Kabul city more congested and high vehicle operating cost. After development of this road, north bound through traffic from Jalalabad or vice-versa is expected to divert to this road which will decongest Kabul city.

5. The rehabilitation and reconstruction of the project road will be carried out under civil works contracts by contractors selected through International Competitive Bidding (ICB) procedures.
6. In order to prepare a Detailed Project Report (DPR), MPW has appointed the Messrs Louis Berger Group, Inc., USA as Consultants to carry out the preparation of Detailed Project Report.
7. As per ADB Environmental Assessment Guidelines 2003, the project road falls under Category B project, but not deemed environmentally sensitive. As such, an Initial Environmental Examination (IEE) is required, as no significant adverse impact has been envisaged.
8. Project implementation duration is considered as two years tentatively starting current year. This excludes project preparation and other pre-construction stage activities. The project is expected to start operation early in 2011.

### **III. DESCRIPTION OF THE ENVIRONMENT**

9. The project road is located in mountainous and rolling terrain. Almost the entire alignment of the project road is beset with poor to very poor horizontal and vertical geometric condition which needs major geometric improvements.
10. The landuse of the project area is mainly barren and necked mountain. Over 80% of the corridor passes through barren land. About 10% of the project corridor passes through agriculture land with scattered and isolated farmstead. The rest of the corridor passes through built-up / semi-built-up area having low density urban conglomeration and roadside ribbon development. There is no forest or ecologically sensitive area
11. Afghanistan has a continental climate, the summers are warm and winters cold, due to the great mountainous extension. The temperatures vary daily according to the season and depending on the altitude.

Fig:1.1: Index Map



12. Afghanistan has not yet established its ambient air quality standard. There were no data available on ambient air quality of this area. However, air pollution does not constitute a major problem in the study area but its reliance on inexpensive energy has created some issues. Most vehicles run on diesel fuel, and household energy often relies on burning wood and other materials. As a result, air pollution in urban areas is visible and may pose health issues.
13. The major factors affecting the air quality in the Project area are dust emissions from domestic fuel combustion (heating and cooking). Dust from the unpaved roads is the major source of air pollution in rural areas.
14. Presently, unleaded petrol is sold in Afghanistan. There is hardly movement of 1 or 2 vehicle in a day on this project road because it is cart road and this is situated in rural area, so that possibility of lead pollution along the road is negligible.
15. The oldest rocks are Archean and they are succeeded by rocks from the Proterozoic and every Phanerozoic system up to the present day. The soil of the area is alluvial in nature. The region in Afghanistan also experiences earthquakes and also prone for the landslide.
16. The Project road runs parallel to Pansher River. The Pansher River flows close to project road between km 24 to km 42, for 18km length. Availability of water is not a problem in this area unlike rest of the Afghanistan. But availability of potable water is still a cause of concern due to unhygienic, unhealthy disposal of solid and liquid wastes.
17. No noise monitoring data is available in the project area and it is expected that noise quality will conform to international noise standards with low background noise level. The field visit also reveals that vehicular traffic, which is low in volume, is the main source of noise level. The ambient noise level seems to be within the humanly acceptable limits and is not an issue of concerned.
18. The vegetation in Afghanistan is directly related to the amount of precipitation. Trees are only found in a few areas as a consequence of massive deforestation which has taken place in recent decades. The project road passes through the barren area with very few stretches having roadside tree plantation. As such there is no forest area within the Project Influence Area (PIA).
19. As mentioned earlier, there is no forest area within the Project Influence Area (PIA), no effective protected area system so that there is no wild life crossing point along the project corridor.
20. There are no listed heritage sites or cultural property<sup>1</sup> of significant value located within project influence area. About more than 80 % length along the project road is barren land and it would not have any major adverse social effect due to improvement in geometrics. Nomads or Kuchis are prevalent in all the Project area. Kuchi families reside in tents. They mainly move from one place to the other to graze their animals and to seek agricultural jobs. Agriculture has been the mainstay of the Afghanistan economy, and irrigation traditionally provides 85% of all crop production.

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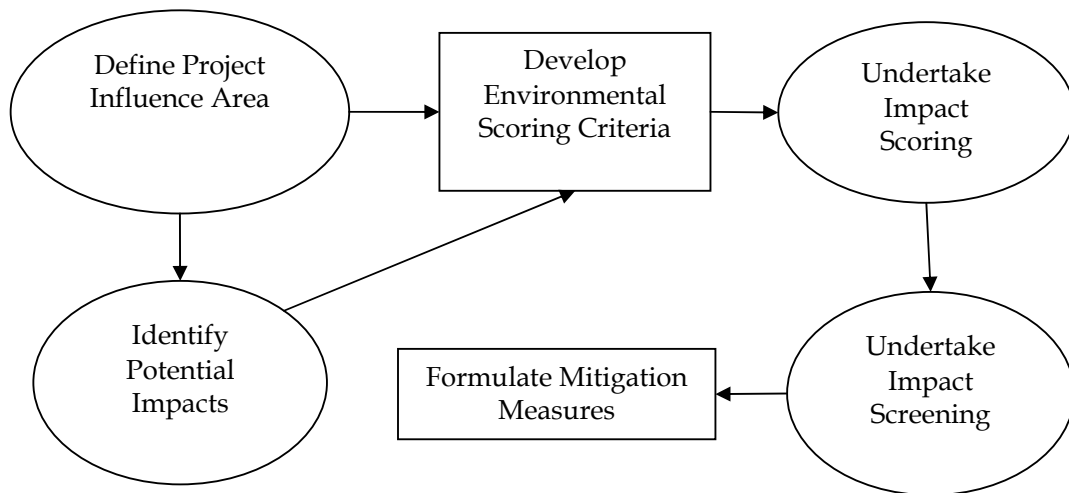
<sup>1</sup> Cultural Property defined as “movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.”

#### IV. FORECASTING ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

21. After studying the existing baseline environmental scenario, identifying environmental hotspots, the actual and potential adverse impacts due to the project design, construction and operation phases have been identified, evaluated and assessed. The likely positive impacts and scope for environmental enhancement are also specified. By adopting suitable safeguard measures in the design and during construction and operation, potential adverse impacts on various environmental components would be avoided and mitigated. The potential impacts and their suitable mitigation measures are identified and are presented at the end in a Tabular form (Table 2).

##### Methodology Adopted

22. The methodology adopted for environmental impact screening and formulating mitigation measures is outlined through flow chart given below:



##### Potential Impacts and Mitigation

23. Major Highways shall have a standard lane width of 3.50m. The carriageway width of 7.0m wide is adopted for the project road. Extra widening of carriageway for the hilly and mountainous roads will be provided based on the design speed and the curvature at that location. The rehabilitation of the project road will follow the existing road location and alignment. The pavement is generally 7 m wide, and rehabilitation work will involve widening of the existing road, only at few locations.
24. It is expected that construction materials for the road rehabilitation work will be mined from the approved quarries. The following criteria will be used for locating project borrow areas.
- Borrow areas will not be established in ecological sensitive areas,
  - Villagers will be consulted regarding the design and location of all borrow areas to ensure safety of local communities and to incorporate beneficial post construction issues for villages,
  - Borrow areas will be located away from the road and hill slopes or settlements facing the road, so as to minimize visual impacts,

25. Afghanistan in general is prone to a number of natural disasters: earthquakes, flooding, drought, landslides and avalanches. Floods are dominant in the spring, when the snow begins to melt and rainfall is heavy, so that considering all these factors, care has been taken during designing of all structures like bridges, culverts and pavements. In 2006 the Federal Highway Administration (FHWA) published a major revision to the 'Seismic Retrofitting Manual for Highway Bridges, it will be followed during design and construction.
26. While the ROW for project road is 30 m in open area and 19 m in built up area, only houses and other structures within 5 - 6 m from the centre line of the road will need to be relocated. There are few shops / structures which are likely to be affected during construction of this road section.
27. Field surveys indicate that all affected households support the implementation of the project and expressed willingness to relocate, if necessary.
28. Rehabilitation of the road will greatly reduce the vehicular emissions impacts on the flora and fauna and help in the improvement of macro-level environment, which is now affected by the multiple parallel tracking systems adopted by the vehicles travelling along the road section. Along the road, vegetation is predominated by grasses, shrubs and forest areas that have been degraded by heavy exploitation for fuel wood. There are no pristine forests close to the project road. The road will not traverse any existing and proposed sensitive areas.
29. There is no precious ecology located near the project road nor any endangered species are report within corridor on impact and thus there will be no encroachment on such resources.
30. The rehabilitation of project road will have no significant adverse impact on Flora and Fauna because there are no ecologically sensitive areas along the road.
31. There are no protected national parks in the project area. Earthwork associated with quarrying or borrow pits could reveal sites or artifacts of cultural significance. In the event of such a discovery, the proper authority will be informed. This will be incorporated in contract documents. The project will not have any adverse impact on historical places / monuments.
32. Impact on surface water hydrology would be limited mainly at bridge (new construction) locations and due to sourcing of borrow and quarry material from river bed. Unplanned siting of construction camp, plants and debris disposal sites i.e. near water bodies will have potential of causing erosion and sedimentation and thus altering hydrology of such water bodies albeit minimal. The magnitude of impact is expected to be very low but importance of such impact would be moderate, as water is a scarce resource in the country. To mitigate this, slope stability measures will be undertaken throughout the construction period. The construction work at the bridges will be avoided during the rainy seasons to minimize erosion and sedimentation of the rivers.
38. During construction air quality is likely to be degraded at micro level and short term, due to exhaust emission form the operation of construction machinery; fugitive emission from brick, concrete, and asphalt plants; and dust generated from haul roads, exposed soils and material stockpiles.

Following actions will be implemented in order to minimize the likely impacts-

- Dust control and suppression measures at construction site will be implemented by regular sprinkling of water on unpaved surface used for flying of construction

vehicles, and during / after laying of embankment and subgrade layers. Regular water sprinkling will be carried out on embankment and subgrade layers until first granular sub-base layer is laid, to avoid fugitive dust emission, as may be required. Plying of traffic on unpaved surface will be avoided.

- Stone crushers and hot mix plants will be located away from water bodies and settlements. The construction plants management guidelines will be adopted to control air pollution from construction plants

39. Noise generation is expected due to operation of heavy machinery. Piling will also cause vibration problems. Noise and vibration from piling will be unavoidable but temporary impacts will principally affect the population near the locations of piling. Stringent control measures to follow a limit of 75 dB(A) at construction site boundary will be engaged. At construction sites within 500 m of settlement, noisy operation will be stopped between 2200 to 0600 hrs. Regular maintenance of the construction vehicle and machinery will be done to reduce additional noise due to poor maintenance.

40. The likely effects on various environmental features due to construction, operation activities along with their mitigation measures are summaries in a tabular form at the end (Table 2).

## **V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN**

41. The MPW, through its Project Implementing Unit (PIU), is the Executive Agency of the Project. PIU is already established and headed by a Project Director. There is no separate Environmental Officer within PIU. The Project Director is overall responsible for EMP implementation. The following key players are involved in EMP implementation during construction stage:

- MPW/PIU and its environmental unit
- Construction Supervision Consultant (SC) i.e. Engineer and his representatives
- Contractor

42. There is a need for establishing an Environmental Management Unit (EMSU) within the PIU. It is recommended that one of the senior officers of PIU could be designated as Environmental Officer for monitoring implementation of proposed safeguard measures, as IEE does not envisage any significant impact and thus additional senior staff requirements is not envisaged. EMU will be headed by the Project Director but coordinating and supervising implementation of safeguard measures will be undertaken by the designated Environmental Officer. The capacity of MPW on project management and implementation including safeguard measures has been developed which is limited to day-to-day implementation of funded projects. The large projects implemented / being implemented by aids are mainly managed and implemented by PMU consultants attached with MPW. The MPW staff skill being upgraded by on-the-training and secondment to contractors and consultants. The capacity of MPW is now being developed for facilitating it to carry out its core function of sustainably planning, designing, managing and implementing road rehabilitation. However, there is a need for upgrading / enhancing skill of MPW in monitoring and supervising implementation of environmental safeguard measures.

43. The Project Director of PIU with the assistance of designated Environmental Officer will be overall responsible for ensuring compliance of safeguard measures and will be reporting to the regulatory bodies and ADB certifying that relevant environmental

safeguard measures have been complied with during project implementation. At the provincial level, the senior engineer of MPW's local office with the assistance of construction supervision consultant will supervise implementation of safeguard measures and submit monthly reports to PIU. The Supervision Consultant (SC) will liaise with PIU environment unit to ensure that Contractor complies with the requirements of various environmental safeguard measures through supervision, monitoring and reporting on the same.

44. This section identifies and assesses the potential adverse impacts on different environmental components due to planning and design, construction and operation of the proposed project. After studying the existing baseline environmental scenario, identifying environmental hotspots, the actual and potential adverse impacts due to the project design, construction and operation phases have been identified, evaluated and assessed. The likely positive impacts and scope for environmental enhancement are also specified. By adopting suitable safeguard measures in the design and during construction and operation, potential adverse impacts on various environmental components would be avoided and mitigated. The potential impacts and their suitable mitigation measures are described here.
45. Environmental monitoring is an essential tool for environmental management as it provides the basic information for rational management decisions. To ensure the effective implementation of mitigation measures and environmental management plan during construction and operation phase of the upgradation of project road, it is essential that an effective Environmental Monitoring Plan has been designed and followed. The effects monitoring will be undertaken to track and report the defined performance indicators / parameters as given in end of the report as tabular form.

## **VI. POTENTIAL ENVIRONMENTAL ENHANCEMENT**

46. One of the most effective, economical and useful remedies for control of environmental pollution is tree plantation. Trees have innumerable direct and indirect benefits of supplying timber and fuel at maturity. During their life time, they supply fodder, fruits, seeds, help in soil and water conservation, offer shade and are oxygen producing noise and dust pollution. Due to water scarcity and problems of protecting the saplings against grazing, tree plantation along the road is not feasible at all the locations; however, plantation of 3300 no. of sapling are recommended only along the urban areas, like Sabul Saraj and Mahmud Raqi to improve the aesthetic beauty of the areas.

## **VII. PUBLIC CONSULTATION AND DISCLOSURE**

47. Public participation and community consultation has been taken up as an integral part of social and environmental assessment process of the Project. Public participation has been viewed as a continuous two way process, involving promotion of public understanding of the processes and mechanisms through which developmental problems and needs are investigated and solved. Consultation was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. It assisted in identification of the problems associated with the project as well as the needs of the population likely to be impacted. This participatory process enabled the participation of the local people in the decision making process. The involvement of the various stakeholders ensured that the affected population and other stakeholders are informed, consulted and allowed to participate at various stages of project preparation

48. Public consultation has been carried out in this Project with the objectives of minimising probable adverse impacts of the project through alternate design solutions (alignment and cross-sectional) and to achieve speedy implementation of the project through bringing awareness amongst the community on the benefits of the project. The public consultation has been taken up as an integral part of social and environmental assessment process for this project.

The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to road improvement
- To encourage and provide for people's participation in project design and development
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities

The public consultation results are briefly described in a tabular form under Structured Consultation and are presented at the end of this section:

#### Information Disclosure

49. Environmental assessment reports for ADB funded projects are intended to be accessible to the interested parties and the public. As per the requirements for Category B Project (deemed to be not environmentally sensitive), the environmental analysis is to be posted on ADB website as part of RRP. The full IEE report is also to be made available to the interested parties upon request.

**Table-1: Structured Consultation**

<b>Date: 05 June 2007</b>	<b>Venue : Taqab Village</b> <b>Attendance: Total 30 participants comprising farmers and shopkeepers attended this consultation</b>
<b>Issue Emerged</b>	<ul style="list-style-type: none"> <li>• Realignment may be considered for existing alignment of about 300m length (between KM 70 to 71) to avoid affecting some houses</li> <li>• Migrant labourer may be housed in proper labour camp to minimize interaction with local people</li> <li>• Dust control measures may be implemented during construction</li> </ul>
<b>Remarks</b>	<ul style="list-style-type: none"> <li>• This section is now excluded from implementation scope.</li> <li>• Other suggestions are incorporated in EMP</li> </ul>

<b>Date: 01 June 2007</b>	<b>Venue : Kapisa MPW Office</b> <b>Attendance: Total 12 participants from local farmers and shopkeepers and MPW Engineers attended this consultation</b>
<b>Issue Emerged</b>	<ul style="list-style-type: none"> <li>• Realignment may be considered at Gulbahar market area</li> <li>• Migrant labourer may be housed in proper labour camp to minimize interaction with local people</li> <li>• Roadside trees are to preserved wherever possible and tree plantation should be part of the project</li> <li>• Dust control measures may be implemented during construction</li> </ul>
<b>Remarks</b>	<ul style="list-style-type: none"> <li>• The design has incorporated necessary modification in alignment at Gulbahar.</li> <li>• Other suggestions are incorporated in EMP</li> </ul>

<b>Date: 07 June 2007</b>	<b>Venue : Durmana Village</b> <b>Attendance: Total 18 participants comprising farmers and shopkeepers attended this consultation</b>
<b>Issue Emerged</b>	<ul style="list-style-type: none"> <li>• Acquisition of grape cultivated land should be kept minimum</li> <li>• Local people may be engaged for unskilled works during construction</li> <li>• Sourcing borrow material from fertile land may be avoided</li> <li>• Dust control measures may be implemented during construction</li> </ul>
<b>Remarks</b>	<ul style="list-style-type: none"> <li>• This section is now excluded from implementation scope.</li> <li>• Other suggestions are incorporated in EMP</li> </ul>

## VIII. FINDINGS AND RECOMMENDATIONS

50. The findings of IEE are summarized herewith.

- The project road (National Highway 4) starts from Kabul - Doshi (RH-4) road and traverses south-east direction and ends at Nijrab having length of about 50km of which 6km and 44km are in the province of Parwan and Kapisa, respectively. The project road facilitate in connecting two important primary highways and serves as a bypass to Kabul for through traffic;
- The project road follows existing paved road;
- The planned improvement includes two lane carriageways (7m width) with paved shoulder (1m) and soft / granular shoulders (1m) for section between Jabul Saraj to Mahmud Raqi (22.3km) and maintenance (overlying) in the section between Mahmud Raqi to Nijrab (27.7km);
- The project interventions were examined on the background of existing environmental conditions, impacts were identified and screened in consultation with local communities, and an appropriate level of impact assessment undertaken (IEE) along with necessary environmental monitoring and management plan;
- Existing traffic volume is quite low. The projected traffic is expected to increase substantially as the project will drastically reduce travel time from about 7 hours at present to about 2 to 3 hours;
- The project road (national highway) will facilitate in connecting the undeveloped hinterland with regional road and important towns /cities;
- The existing road is passing through rolling to mountainous terrain. The landuse is mainly barren land with patches of agriculture and semi built-up areas;
- The project does not involve encroachment on any precious ecology or environmentally critical areas;
- There is no major water bodies except Pansher River, but project does not envisage any alteration of surface water hydrology;
- About 1110 trees of girth size 600 to 1000mm are to be cut, which will be compensated by planting trees 3 times of the same;
- The project does not envisage any impact on wild animal and ecosystem;
- The project road lies on high seismic zone and landslide prone areas and will have potential landslides due to construction activities;
- No impact on cultural properties is envisaged;

- The proposed rehabilitation /reconstruction will entails minimum additional land requirements;
- The project involves involuntary resettlement as some shops and residential structures will be affected which are of mostly temporary type;
- No significant adverse environmental impact envisaged. Anticipated potential adverse impacts are localized, short-term (during construction), reversible, and could be easily mitigated. Moderate adverse impact anticipated on land use, air quality, water quality, noise environment and landslides, which are all limited to construction stage. Impact on other environmental attributes will be minor or negligible;
- Local people welcomed the project and suggestions made during public consultation has been incorporated in the project;
- The project is found to be technically, economically, environmentally and socially feasible;
- The project falls under Category B, as per ADB's EA Guidelines of 2003;
- IEE will be adequate and no follow-up EIA is required;
- The project falls under Category B as per EIA Policy / Regulations of NEPA / IRA. The project is deemed not to require Certificate of Compliance by NEPA but a confirmation on the same by NEPA is advisable; and
- There is a need for capacity building of Project Implementation Unit (PIU) through appropriate trainings to ensure adequate supervision, monitoring and reporting of requisite environmental safeguard measures during implementation and post-implementation.

51. The findings recommendations are made based on findings of IEE:

- The project falls under Category B and no significant adverse impact is anticipated. The IEE would be considered as completed environmental assessment, and no follow-on EIA would be required;
- Proposed Environmental Monitoring and Management Plan needs to be implemented to avoid, minimise, and mitigate adverse impacts and enhance positive impacts;
- Proposed capacity building plan of PIU on environmental management needs to be carried out to help ensure implementing safeguard measures;
- Estimated environmental budget needs to be allocated as part of project cost;
- Ensure compliance of statutory requirements as mentioned in Subsection B.5 of this report.

## **IX. CONCLUSIONS**

52. Rehabilitation / reconstruction of the project road is required to connect important towns / cities with regional road i.e. with rest of the country, and for stimulating economic development in the region. There is no environmentally sensitive area adjacent to the project road and it will not cause encroachment onto any precious ecology, and cultural area. This IEE concludes that the adverse environmental impacts arising from the project will be minimised to acceptable levels through the implementation of clearly identified mitigation measures. Therefore IEE is considered to be an adequate environmental assessment for the project. A monitoring program for the

environment impacts and corresponding mitigation measures will be undertaken to ensure proper implementation of the project.

53. Considering the environmental setting and anticipated impacts due to the proposed improvement works on the project road, the project is categorised as Category "B" as per ADB's EA Guidelines of 2003. As per environmental screening and IEE, no significant adverse impact has been envisaged due to proposed road improvement. Anticipated potential impacts are localized and most of them would be limited during construction stage, and reversible. The project would be anticipated to have some moderate adverse impact anticipated on land use, air quality, water quality, noise environment and landslides, which will be limited to construction stage. The project will result in involuntary resettlement of some temporary shops and residential properties which will be resettled as per ADB's requirement as stated in RP. Impact on other environmental attributes will be minor or negligible. Suggested mitigation measures along with the proposed institutional arrangement would ensure that all the adverse impacts are adequately mitigated and the results reported to various stakeholders.
54. The IEE would be considered as completed environmental assessment, and no follow-on EIA would be required.

**Table 2: Environmental Impacts, Mitigation Measures and Responsibility**

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
<b>PRE-CONSTRUCTION STAGE</b>					
<ul style="list-style-type: none"> <li>Site clearance</li> </ul>	<ul style="list-style-type: none"> <li>Loss of trees and vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Obtain permission from concerned authority before commence of tree cutting</li> <li>Restrict tree cutting to bare minimum</li> <li>Compensatory tree plantation</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> </ul>	<ul style="list-style-type: none"> <li>NEPA / concern authority</li> <li>SC</li> </ul>	<ul style="list-style-type: none"> <li>66,600</li> </ul>
<ul style="list-style-type: none"> <li>Clearance of UXOs</li> </ul>	<ul style="list-style-type: none"> <li>Risk of injury or death as a result of unexploded ordnance (UXO)</li> </ul>	<ul style="list-style-type: none"> <li>Clearance of UXOs is the responsibility of the Government, which must certify that areas have been cleared of UXOs before any construction activities take place</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> </ul>	<ul style="list-style-type: none"> <li>MPW</li> </ul>	<ul style="list-style-type: none"> <li>Under MPW routine Cost</li> </ul>
<ul style="list-style-type: none"> <li>Seismic Hazards</li> </ul>	<ul style="list-style-type: none"> <li>Impact on safety of Structures</li> </ul>	<ul style="list-style-type: none"> <li>Consider seismic hazards in deigning of all major structures like bridges, culverts and pavements</li> <li>Consider 'Seismic Retrofitting Manual for Highway Bridges' published by the Federal Highway Administration (FHWA) In 2006</li> </ul>	<ul style="list-style-type: none"> <li>Design Consultant</li> </ul>	<ul style="list-style-type: none"> <li>MPW</li> </ul>	<ul style="list-style-type: none"> <li>Factored in engineering Cost</li> </ul>
<b>CONSTRUCTION STAGE</b>					
<ul style="list-style-type: none"> <li>Formation cutting, embankment / subgrade / pavement construction</li> </ul>	<ul style="list-style-type: none"> <li>Dust generation due to loading and unloading of earth material; earth work operation i.e. excavation, backfilling etc.</li> <li>Soil erosion from excavated area, stockpile of earthen material</li> <li>Localized flooding / ponding at excavated area</li> <li>Disruption of access</li> </ul>	<ul style="list-style-type: none"> <li>Dust control - delineating construction zone, necessary water sprinkling</li> <li>Covering friable material transported by track, tippers, dumpers etc.</li> <li>Providing temporary drainage, catchpit, sedimentation tank / silt trap etc., wherever possible, for minimizing soil erosion and preventing downstream siltation</li> <li>Providing temporary bypass drain wherever possible, pumping out the water, proper construction planning to avoid prolonged excavation</li> <li>Design to prevent soil erosion and maintain</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> <li>SC</li> </ul>	<ul style="list-style-type: none"> <li>13,380 for dust control</li> <li>Cost of other measures are factored in construction cost</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
	<p>to abutting shops and houses</p> <ul style="list-style-type: none"> <li>• Disruption of traffic</li> <li>• Disruption of services during shifting utilities i.e. water supply pipe, power cable, telephone cable.</li> <li>• Impact on occupational health and safety</li> </ul>	<p>slope stability.</p> <ul style="list-style-type: none"> <li>• Construction in the dry season.</li> <li>• Protection of soil surfaces during construction.</li> <li>• Physical stabilization of erodible surfaces through turfing, planting a wide range of vegetation, and creating slope breaks</li> <li>• Providing / maintaining necessary temporary access</li> <li>• Planning traffic detour, delineating working zones from traffic zones, providing and maintaining necessary signage for warning and guiding traffic etc.</li> <li>• Early identification of presence of utilities and providing advance notice to utility agencies for shifting of the same with minimum disruption of services</li> <li>• Proper construction planning and site operation, delineating construction zones especially deep excavation, keeping local people away from operating construction equipment, conducting pre-construction information dissemination and awareness campaign with the local community about various construction activities and soliciting their cooperation besides introducing site supervisors, engineers to the community</li> <li>• Providing necessary personal protective equipment to all workers and enforcing their use</li> </ul>			
<ul style="list-style-type: none"> <li>• Transportation of</li> </ul>	<ul style="list-style-type: none"> <li>• Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>• Providing necessary water sprinkling on</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
construction material	<ul style="list-style-type: none"> <li>Spill of material on road</li> </ul>	earthen haul road <ul style="list-style-type: none"> <li>All tippers / dumpers carrying earth, sand or stone will be always fitted with tailboards to prevent spilling</li> <li>Materials shall not be loaded to a higher level than the side and tail boards and shall be covered with a clean tarpaulin in good condition. The tarpaulin shall be properly secured and extend atleast 300mm over the edges of the side and tail boards</li> </ul>		PIU <ul style="list-style-type: none"> <li>SC</li> </ul>	construction cost
<ul style="list-style-type: none"> <li>Operating construction vehicle and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Increased noise level due to operation of construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>All construction equipment with adequate silencers, and regular maintenance of plant and machinery, avoid noise generating activities during particular periods (such as times of prayers, school hours, etc. adjacent to such areas), discontinue all operations during night as far as possible, provide ear plugs / ear muff to construction workers working in the vicinity of noisy equipment</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> <li>SC</li> </ul>	<ul style="list-style-type: none"> <li>Factored in construction cost</li> </ul>
<ul style="list-style-type: none"> <li>Construction camp and operation of plants</li> </ul>	<ul style="list-style-type: none"> <li>Air pollution</li> <li>Water pollution</li> <li>Land pollution</li> </ul>	<ul style="list-style-type: none"> <li>Locating hot mix plant, concrete batching plant and crushers away from urban area</li> <li>Providing sedimentation tank for water scrubber of HMP (if used as dust control device)</li> <li>Prefer baghouse filter as pollution control devices for HMP</li> <li>Provide dust control and suppression measures for crusher such as installing water sprinkling system, covering conveyors etc.</li> <li>Carrying out routine maintenance and or</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> <li>SC</li> </ul>	<ul style="list-style-type: none"> <li>Factored in construction cost</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
		<ul style="list-style-type: none"> <li>replacement of dust control devices</li> <li>• Carrying out regular maintenance of plant, equipment and vehicles</li> <li>• Providing impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle maintenance platform</li> <li>• Collection of oil and lubes drips in container during repairing construction equipment vehicles</li> <li>• Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area</li> <li>• Strictly enforcement of not cleaning / washing construction equipment vehicles within any surface water body</li> <li>• Providing sewage collection and disposal system for all toilets and bathrooms</li> <li>• Providing surface water drain all around the camp and facilitating seepage into the ground through intermittent percolation chambers along the drain</li> <li>• Preventing disposal of wastewater into water bodies</li> </ul>			
<ul style="list-style-type: none"> <li>• Workers' camp</li> </ul>	<ul style="list-style-type: none"> <li>• Land pollution</li> <li>• Impact on health of workers</li> </ul>	<ul style="list-style-type: none"> <li>• Providing necessary water supply, sanitation, drainage and medical health facilities at campsite</li> <li>• Using working reverse horn for all construction equipment and construction vehicles such as tippers, dumpers, rollers.</li> <li>• Providing earth link circuit breaker (ELCB)</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-PIU</li> <li>• SC</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in construction cost</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
		<ul style="list-style-type: none"> <li>for all electrical connections</li> <li>• Maintaining first aid at construction sites</li> <li>• Maintaining emergency response system</li> <li>• Conducting induction and periodic training for all workers and supervisors</li> <li>• Conducting periodic mock drilling on critical accident prone activities</li> <li>• Conducting periodic training for all personnel working at plant site</li> <li>• Guidelines given in <b>Annexure-6 and 6.1</b> will be followed</li> </ul>			
<ul style="list-style-type: none"> <li>• Borrow area identification and operation</li> </ul>	<ul style="list-style-type: none"> <li>• Change of landuse</li> <li>• Converting usable land into waste land (land potential)</li> <li>• Air pollution</li> <li>• Change surface water hydrology</li> <li>• Contaminate surface water</li> </ul>	<ul style="list-style-type: none"> <li>• Maximize use of cut material for filling / embankment</li> <li>• Select borrow areas away from human habitation, water bodies, ecologically sensitive locations, sensitive areas (school, hospital)</li> <li>• Avoid use of agriculture land, as far as possible</li> <li>• Prefer river bed material</li> <li>• Prepare operation and redevelopment plan based terrain, existing land use and local needs, as will be agreed by the land owner and approved by the supervising Engineer</li> <li>• Restrict operation as per agreed plan</li> <li>• Rehabilitation of borrow area as per agreed plan</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-PIU</li> <li>• SC</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in construction cost</li> </ul>
<ul style="list-style-type: none"> <li>• Stone and sand quarry operation</li> </ul>	<ul style="list-style-type: none"> <li>• Change of landuse</li> <li>• Creating environmental</li> </ul>	<ul style="list-style-type: none"> <li>• Use licenced quarry only (as permitted by Ministry of Mines)</li> <li>• Prefer river bed material, without affecting</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• PD&amp;C</li> <li>• PST</li> <li>• PMU/TS</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in construction cost</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
	hotspot	water flow <ul style="list-style-type: none"> <li>• Redevelop stone quarry area</li> <li>• Adopt safety measures during blasting</li> </ul>		U	
<ul style="list-style-type: none"> <li>• All onsite and off site operation</li> </ul>	<ul style="list-style-type: none"> <li>• Impact on occupational health and safety</li> </ul>	<ul style="list-style-type: none"> <li>• Providing and enforcing use of necessary PPEs.</li> <li>• Using working reverse horn for all construction equipment and construction vehicles such as tippers, dumpers, roller.</li> <li>• Providing earth link circuit breaker (ELCB) for all electrical connections</li> <li>• Maintaining first aid at construction site, construction camp and workers' camp</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-PIU</li> <li>• SC</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in construction cost</li> </ul>
<ul style="list-style-type: none"> <li>• All construction activity at site</li> </ul>	<ul style="list-style-type: none"> <li>• Impairment of public health and road safety</li> </ul>	<ul style="list-style-type: none"> <li>• Providing and maintaining traffic management comprising diversion; warning, guiding and regulatory signage; channelisers and delineators; lighting, flagmen; dust control system as specified in the contract.</li> <li>• Providing adequate light at construction zone if working during night time is permitted by the Engineer</li> <li>• Consultation with local traffic police and soliciting their assistance in controlling traffic during construction, as will be necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-PIU</li> <li>• SC</li> </ul>	<ul style="list-style-type: none"> <li>• Factored in construction cost</li> </ul>
<b>OPERATION STAGE</b>					
<ul style="list-style-type: none"> <li>• Increased vehicular volume and speed</li> </ul>	<ul style="list-style-type: none"> <li>• Increased chances of accident</li> <li>• Increase noise level</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare and implement plan for minimizing vehicular accident i.e. providing necessary traffic signage, pavement marking, speed breaker etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> <li>• MPW</li> </ul>	<ul style="list-style-type: none"> <li>• MPW-PIU</li> <li>• SC</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of traffic control devices factored in</li> </ul>

Activity	Potential Impacts	Prevention and Mitigation Measures	Implementing Agency	Supervision/ Monitoring Agency	Cost Estimate (US\$)
		<ul style="list-style-type: none"> <li>Prohibiting use of air horn in populated and sensitive areas</li> </ul>			construction cost
<ul style="list-style-type: none"> <li>Seismic Hazards/ Flood/ Land Slide/ Drain / Culvert</li> </ul>	<ul style="list-style-type: none"> <li>Road Blockage/ Traffic Congestion</li> </ul>	<ul style="list-style-type: none"> <li>Periodic monitoring of PIU/MPW</li> <li>Periodic cleaning of culverts/ drain/ land slide area (if found during operation)</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> </ul>	<ul style="list-style-type: none"> <li>MPW</li> </ul>	MPW routine monitoring Budget
<ul style="list-style-type: none"> <li>Monitoring and Management of Planted Trees</li> </ul>	<ul style="list-style-type: none"> <li>Survival Rate</li> </ul>	<ul style="list-style-type: none"> <li>Water/Weeding/Training/Pruning/ Replanting/</li> </ul>	<ul style="list-style-type: none"> <li>MPW-PIU</li> </ul>	<ul style="list-style-type: none"> <li>MPW</li> </ul>	After 2 years of plantation it will cover under MPW routine monitoring Budget

**Table 3: Environmental Monitoring Plan**

Environmental Features/ Attributes	Aspects to be monitored	Time and Frequency of Monitoring	Location	Responsibility	Cost Estimate (US\$)
Air quality	Dust generation <ul style="list-style-type: none"> <li>Is it impairing visibility?</li> <li>Is it affecting vegetation?</li> <li>Is the dust at construction zone such that vehicle can ply with open window?</li> <li>Is any complaint on dust generation received?</li> </ul>	Daily during construction	All construction sites, plants location, borrow and quarry area	SC/PIU	Factored in MPW routine monitoring budget

Environmental Features / Attributes	Aspects to be monitored	Time and Frequency of Monitoring	Location	Responsibility	Cost Estimate (US\$)
Noise level	Noise level <ul style="list-style-type: none"> <li>▪ Can two people communicate at a distance of 5m with without voice, at construction zone?</li> <li>▪ Is there any complaint from local community on noise?</li> <li>▪ Is construction activity generating high noise restricted near habitation during night time?</li> <li>▪ Are all equipment / vehicle having silencers / acoustic enclosure?</li> </ul>	Daily during construction	All construction sites, plants location, borrow and quarry area	SC/PIU	Factored in MPW routine monitoring budget
Water quality	<ul style="list-style-type: none"> <li>▪ Is run-off from construction sites is allowed to enter water bodies directly without any silt-trap/catch-basin?</li> <li>▪ Is sediment deposit in receiving water bodies visible?</li> <li>▪ Is there any complaint on water contamination due to construction?</li> </ul>	Daily during construction	Water bodies located near to construction sites, plants location, borrow and quarry area	SC/PIU	Factored in MPW routine monitoring budget
Vegetation / Trees	<ul style="list-style-type: none"> <li>▪ No. of trees exist before construction</li> <li>▪ No. of trees cut due to construction</li> <li>▪ Is fuel wood being used for fire?</li> <li>▪ Is the vegetation clearance limited within construction zone only?</li> </ul>	During construction	Roadside, and all ancillary sites	SC/PIU	Factored in MPW routine monitoring budget

Environmental Features / Attributes	Aspects to be monitored	Time and Frequency of Monitoring	Location	Responsibility	Cost Estimate (US\$)
Wild animal	<ul style="list-style-type: none"> <li>▪ Is any wild animal sighted at construction sites and camp sites?</li> <li>▪ Is any poaching of wild animal by workers reported?</li> </ul>	During construction	Roadside, and all ancillary sites	SC/PIU	Factored in MPW routine monitoring budget
Occupation health & safety	<ul style="list-style-type: none"> <li>▪ No. of road accidents taken plan at construction sites</li> <li>▪ No. of accidents / mishap occurred amongst workers</li> <li>▪ Is there any outbreak of disease occurred at construction camp?</li> </ul>	During construction	Construction sites and all ancillary sites	SC/PIU	Factored in MPW routine monitoring budget