

Environmental Monitoring Report

Bi-annual Environmental Monitoring Report
January 2014

PAK: Flood Emergency Reconstruction Project

Prepared by National Highways Authority for the Asian Development Bank.

NOTES

- (i) The fiscal year (FY) of the Government of the Islamic Republic of Pakistan and its agencies ends on 30 June.
- (ii) In this report, "\$" refers to US dollars.

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Bi-annual Environmental Monitoring Report

Project Number: 2742/2743 - PAK

PAKISTAN

Flood Emergency Reconstruction Projects (FERP)

Reconstruction and Rehabilitation of Roads

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ISLAMABAD, PAKISTAN

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TABLE OF CONTENTS

Part I

Introduction

1.0 Background	1
1.1 Detailed Activities of the Project	2
1.1.1 Detailed Activities of B category Projects	2
1.1.2 Detailed Activities of C category Projects	3
1.2 Project Organization and Environmental Management Team	5
Figure 1: Environmental and Social Unit (ESU)	6
Figure 2: Organizational Chart for Implementation of Environmental Management Plan	7
1.3 Relationship with the Contractor and the Engineer	8

Part II

Environmental Monitoring

2.1 Environmental Monitoring Summary	8
2.1.1 Noise and Vibration	9
2.1.2 Surface and Ground Water	9
2.1.3 Air Quality	10
2.1.4 Flora and Fauna	10
2.1.5 Top Soil Erosion	10
2.1.6 Cultural Heritage Sites	11
2.1.7 Waste Disposal	11

Part III

Environmental Management

3.1 DDR Review of the REA's	11
3.1.1 Field Visits to the Construction sites	11
3.1.2 Campsite Guidelines	12
3.1.3 Safety Provision	13
3.1.4 EMP Compliance Checklist	13
3.1.5 Conclusion & Recommendations	13

List of Annexure

Annexure I

Environmental Audit Report For N-15

Annexure II

Environmental Audit Report For S-2

Annexure III

EMP Compliance Checklis

Annexure IV

Grievance Redress Mechanism.

Annexure V

EIA/IEE Mitigations and Suggestions.

ABBREVIATIONS

ADB	Asian Development Bank
DNA	Damage and Need Assessment
dB	Decibel
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMMP	Environmental Management Monitoring Plan
ES	Environment Specialist
FERP	Flood Emergency Reconstruction Project
GoP	Government of the Pakistan
HSE	Health Safety and Environment
NEQS	National Environmental Quality Standards
PMC	Project Management Consultants
PMU	Project Management Unit
NHA	National Highway Authority
REA	Rapid Environmental Assessment
SPS	Safe guard Policy Statement
SSEMP	Site Specific Environmental Management Plan
IEE	Initial Environmental Examination
EARF	Environmental Assessment and Review Frame work

PART –I
INTRODUCTION

1.0 Background

1. Pakistan faced unprecedented flooding in 2010 affecting an estimated 22 Million people along with severe damage to infrastructure across the whole country. The incident caused extensive human suffering due to displacement, food shortage, interruption to economic livelihoods, and disease outbreaks. The Asian Development Bank (ADB) is supporting the efforts of the Government of Pakistan (GoP) in various sectors. Assistance is being provided through the Flood Emergency Reconstruction Project (FERP). FERP has three components; Irrigation component in Sindh (Sindh Irrigation Department), Roads network in Sindh (Sindh Works and Services Department) and National Highway Component (NHA: National Highway Authority). This report is for National Highway Component.

2. The Flood Emergency Reconstruction Project (FERP) was funded and administered under an emergency assistance from Asian Development Bank (ADB). Rapid Environmental Assessment (REA) Checklists given in the ADB's Environmental Assessment and Review Framework (EARF) was completed for each subproject to classify the categorization of each road.

3. REA Checklists were filled for all the sub projects and the projects were categorized as B and C (none of the project was categorized as A). All the projects are disclosed on NHA's website.

4. The Flood Emergency Reconstruction project is based upon the reconstruction and rehabilitation of the destruction caused by the devastating flood of 2010 in Monsoon. The activities were carried out for the following sectors of the roads and bridges.

5. So far, eight road projects (besides retroactive financing) were undertaken. REA checklists were completed for each project and projects were categorized. EMP for each specific project was prepared and included in relevant bidding documents. Environmental approvals were obtained from ADB as well as from the relevant EPA (Category B projects; N-45 and N-95). Site Specific Environmental Management Plan (SSEMP) was prepared for category "B" project (N-45: Chakdara Bridge). Environmental Audit was carried out for category "B" project (N-45); non-compliances were rectified and onsite training was provided to the staff/workers. The Supervision Consultants (SC) and NHA are responsible for the environmental monitoring of the

sub projects. Environmental monitoring checklists based upon the EMP have been developed and SC's Environment Specialist conducts monthly monitoring of all sub projects. All the projects were disclosed on NHA's website.

6. Under the FERP (NHA Component) retroactive financing was also required, as government had already spent money on rehabilitation of dilapidated infrastructure. All the sub projects under retroactive financing were categorized as "C" as per the sample environmental assessment. All the projects were carried out along the existing alignment ADB agreed to provide retroactive financing under the condition that no subproject would cause any significant environmental impact. Further to the above all the projects were visited and verified for compliance of ADB SPS 2009 and EARF (REA Checklist were filled for each subproject and a report on retroactive project was submitted to ADB).

1.1 Detailed Activities of the Project:

1.1.1. Detailed Activities for Category B Projects

Chakdara – Kalam N-95

7. The ADB SPS 2009 required REA Checklist, IEE, EMP, and SSEMP for this project. The project lied in category B according to the REA Checklist. ADB SPS 2009 required an IEE for the same. An IEE was prepared and approved by ADB. As per PEPA 1997, the project required an EIA to be submitted to EPA Khyber Pakhtunkhuwan (KP). An EIA was submitted upon which, the approval was granted by EPA KP. EMP has been made the part of the contract. Site Specific Environmental Management Program (SSEMP) was prepared. As the work was divided in three packages, the construction has already started and the regular environmental monitoring is being carried out to ensure the compliance with the ADB safe guard policy statement. The issues discovered in the environmental monitoring of N-95 were brought in the knowledge of the contractor and the contractor himself agreed to meet all the safety requirements on immediate basis. No major or fatal non-conformity was found in the audit. The workers were equipped with necessary protection equipment and were seemed to be committed for work place safety.

Chakdara Bridge (Old & New) including protection works N-45

8. The ADB SPS 2009 required, REA Checklist, IEE, EMP, SSEMP for this project. The project lies in category B according to the REA Checklist. ADB SPS 2009 required an IEE for the same.

An IEE was prepared and approved by ADB. EPA KP has accorded an environmental clearance. EMP has been made the part of the contract. Site Specific Environmental Management Program (SSEMP) has been prepared. The civil work has started on the project. Whereas, regular environmental audits are being carried out, the audit indicated the areas of project that are in compliance with or not with the ADB SPS 2009. The audit identified many issues regarding safety of the workers, native people and the surrounding environment. The contractor agreed to resolve all the issues, on immediate basis. The workers were fully aware of the safe work place policy, and safeguard policy statement of ADB. They were provided with necessary personal protective equipments, so that the work place injuries and accidents can be avoided at their best.

1.1.2 Detailed Activities for Category C Projects

Multan – Muzaffar Ghar - D. G. Khan - Bewata (Vedor Nullah), excluding new bridge N-70

9. REA checklist has placed this project as category “C”. An EMP has been prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction of causeway on the existing alignment. The civil work is in progress. Whereas, continual environmental monitoring is being carried out to ensure the compliance with the ADB safe guard policy statement. Almost every environmental issue is being monitored and supervised by the contractor himself. The safe work place policy is also employed, to ensure that the workers, natives and the surrounding environment is kept clean and safe environment. Some problems regarding the hindrances of the traffic due to the heavy machinery and the construction debris, was posing obstruction to manage tasks, but the contractor maintained a good communication system between the workers and the people on road to avoid the traffic congestions. The safety signs and signage were displayed all over the area. In certain cases the missing safety signs were arranged immediately by the contractors.

Kohala- Muzaffarabad (Excluding new Bridges) S-2

10. REA checklist has categorized this project as “C”. An EMP has been prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction/rehabilitation of road has been completed in August 2013 whereas, the construction of the two bridges will be completed in May 2014. Environmental Audit was carried out during construction (after every six months). Environment Audit indicated the areas required improvement. Onsite training was provided and compliance was ensured to ADB SPS 2009. The environmental issues were identified by the environment specialist, and were noticed by the

contractor. He agreed to resolve all the issues on immediate basis. The safety signs and signage were missing at some places at the construction site. The contractor also arranged proper safety signs and personal protective equipment on immediate basis. The workers were generally responsible and were equipped with the basic knowledge of work place safety.

Pano Aqil – Dherki N-5

11. REA checklist has categorized this project as “C”. An EMP was prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction of road on the existing alignment. The road construction/rehabilitation was divided into 3 sections (Sarhad Bypass-Dherki: 1 Package, Hala-Moro: 3 packages, Ranipur-Rohri: 2 Packages). The construction has started on Sarhad Bypass-Dherki (The contract commenced on 30-05-12. The construction progress is around 35%). As the construction is near to completion on the fore said packages, the civil work on the third package has been started. The environmental audit is being carried out for all the fore said projects. The environmental issues were identified by the environment specialist and the contractor himself. The contractor was seen vigilant in resolving all the environmental problems on immediate basis. The proper safety signs were displayed all over the places. The missing safety signs were being arranged by the contractor. Proper place for the solid waste management was also arranged for the construction debris. Workplace safety was ensured and properly implemented by the contractor.

Ratodero-Qubo Saeed Khan M-8

12. REA checklist has categorized this project as “C”. An EMP was prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction of road on the existing alignment. The construction was started in April 2013 and will be completed in April 2014. The environmental audit was carried out for the project. It specified the areas of variable environmental impacts on certain points. The contractor agreed to resolve almost all the issues on immediate basis. The work place safety was also ensured by the contractor. The safety equipments and safety signs were in proper form. The contractor also agreed to remove all the pointed out work place hazards immediately. The surrounding environment affected by the project would be restored in its original form after the completion of work.

Mansehra - Naran - Jalkhad - Chilas including bridges N-15

13. REA checklist has categorized this project as “C”. An EMP has been prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction/rehabilitation of retaining walls and road on the existing alignment. The construction has started. The civil work is on its way of completion and will be completed in April 2014. The environmental audit has been carried out to ensure the compliance with the ADB safeguard policy statement. The regular visits were made by the TA environment consultant. The issues regarding the environment were identified by the consultant and were notified by the contractor. The contractor was advised to resolve all the environmental issues on priority basis. The specialist also arranged the regular visits to the construction site in order to assess the workplace area and the surrounding environment. Any adverse impacts observed during the site visits would be identified and the contractor was advised to take immediate notice, and also to take necessary actions to reduce the environmental impacts.

Jacobabad–Dera Allah Yar N-65

14. REA checklist has categorized this project as “C”. An EMP has been prepared to fulfill ADB SPS 2009 requirement. The EMP is included in the bidding/contract document. The sub project is the construction/rehabilitation of road on the existing alignment. The construction has been started from May 2013 and will be completed on April 2014. Regular environmental monitoring is being carried out for the project. The environmental issues identified in the audits were resolved by the contractor on immediate basis.

1.2 Project Organization and Environmental Management Team

15. The National High Way Authority (NHA) is the implementation agency (IA) for roads and bridges rehabilitation component of FERP, the IA is responsible to ensure the implementation of the environmental management and monitoring requirements and procedures for FERP under the overall guidance of Environmental Assessment and Review Framework (EARF). The objective of the EARF is to establish systems and functions that will ensure that conditionality are built into each initiative at its design stage such that through reconstruction, improved and environmentally sustainable structures are built that have better resistance to natural calamities such as floods. EARF also requires ensuring that all the environmental mitigation measures proposed for the design phase are incorporated in the design and included in the contract document.

16. NHA has established an Environmental and Social Unit (ESU). The ESU is responsible for environmental and social review based on the selection criteria, preparation, submission, implementation and environmental management & monitoring and evaluation of all the sub projects. ADB has provided technical support to ESU through providing environment specialist. TA Environment Specialist is responsible for explaining policy requirements to ESU, helping them to meet those requirements, building capacity, and monitoring implementation of agreed safeguards.

17. Moreover, IA has engaged a Project Management Consultants (PMC) team to strengthen their procurement capacity, support and help monitor design and construction supervision services, and support the preparation, implementation, monitoring and compliance of environmental safeguard action plans including consultation and social and gender analysis as well as implementation and monitoring of gender action plans.

18. The Project Management Consultants has established their offices on each construction site (where the contractor has mobilized). The Resident Engineers at the site of PMC has hired one Environment Specialist on intermittent basis who worked with the help of support staff.

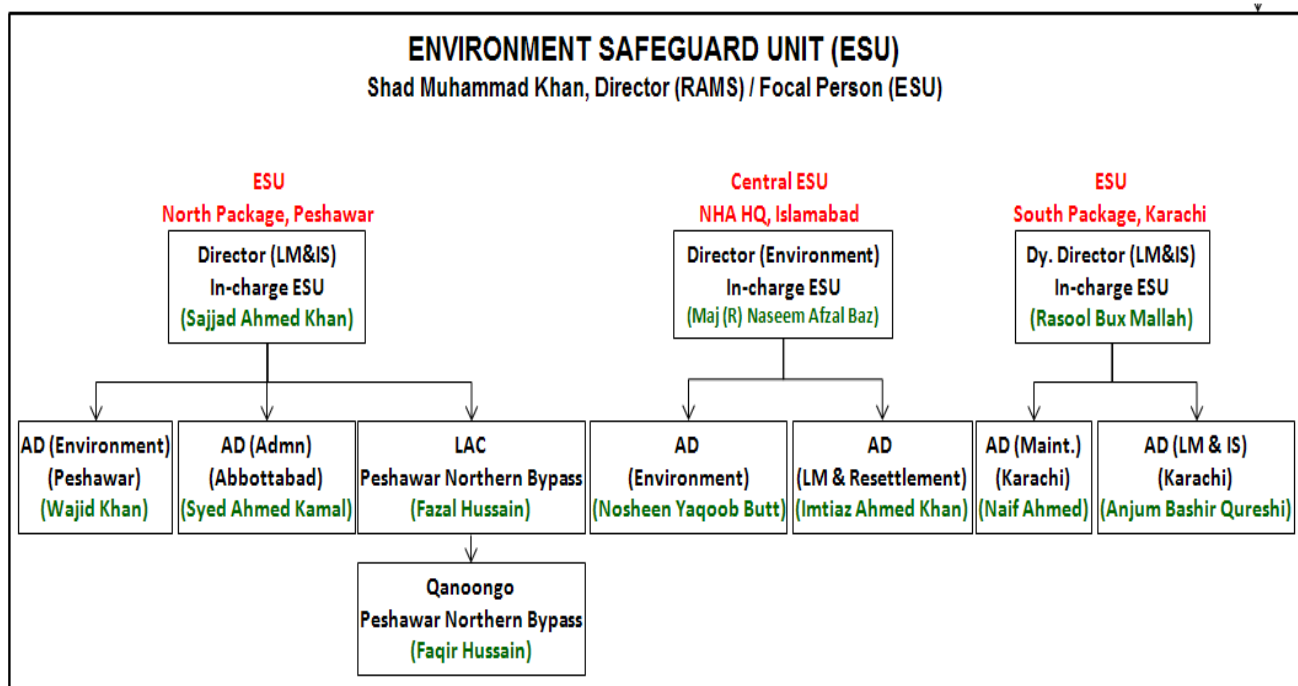


Fig 1: Environment Safeguard Unit (ESU)

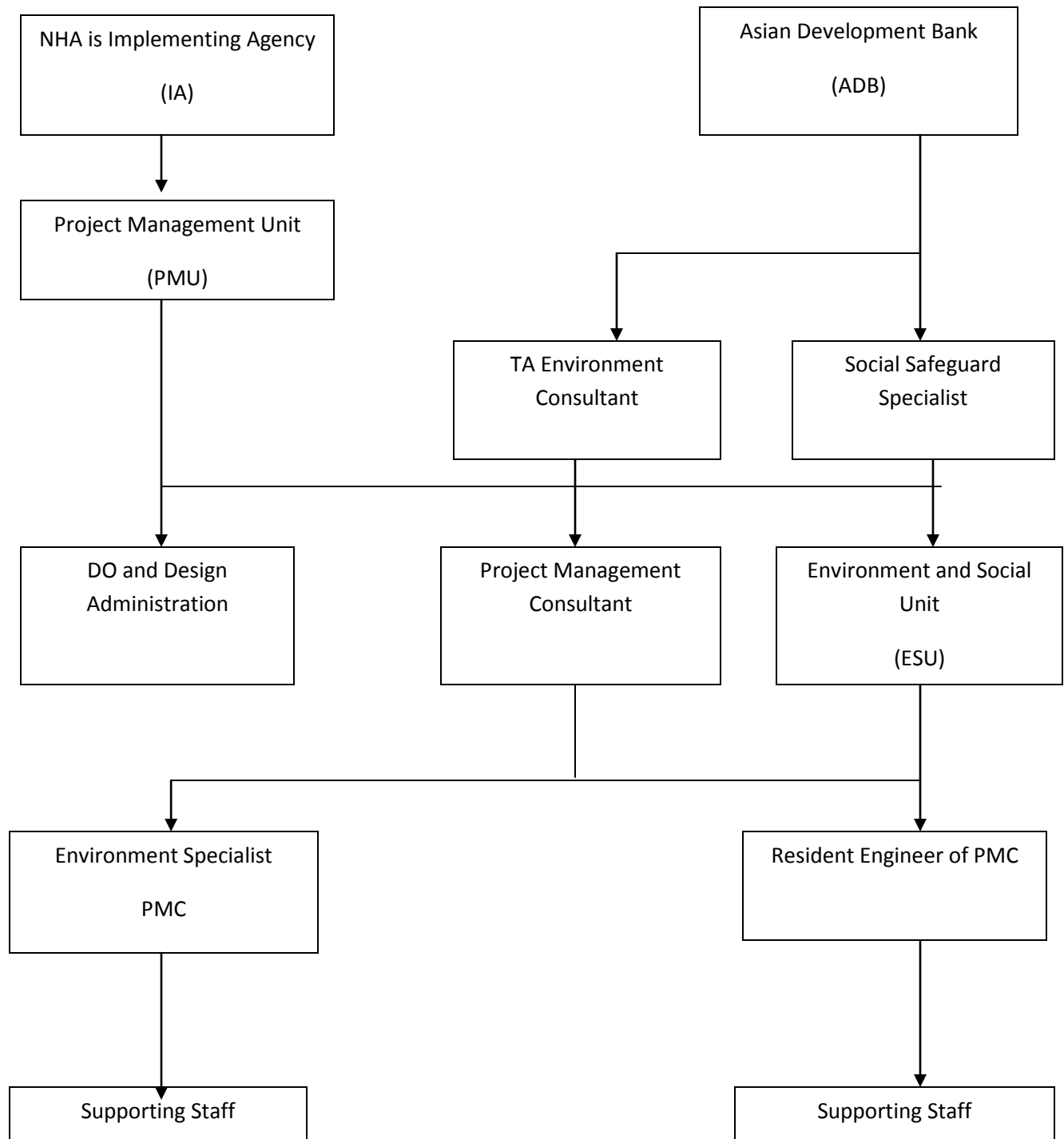


Fig 2: Organizational Chart for Implementation of Environmental Management Plan

1.3 Relationship with the Contractor and the Engineer

19. The Resident Engineer (RE) of the project has a role of the Project Manager under the construction contracts. Environment Assistant is on board for all the sub projects under PMC. A good working relationship was maintained among the contractor and the Engineer during the execution of the project. Contractor's representatives were informed about the Environmental Management and Monitoring activities. During camp site inspection areas of improvement were mutually discussed with Contractor's representatives. EMP compliance checklist and status of compliance in monthly progress were developed by environment assistant and shared with contractors. The environmental checklist was also shared with the TA environment specialist who reviewed and endorsed the results and provided necessary guidance and training to the contractors. Whereas, over all environmental monitoring is being carried out by the TA environment consultant and his team.

Part II Environmental Monitoring

2.1 Environmental Monitoring Summary

20. The environmental monitoring was carried out by using monthly EMP compliance checklists as well as through visual observations to get information on the actual nature and extent of key impacts and the effectiveness on mitigation and enhancement measures outlined in the Environmental Management Plans (EMP's) and agreed by the Contractors under the contracts. The EMP compliance checklists have covered all the aspects mentioned in the project specific EMPs for each project. The monitoring of noise and vibration, surface and groundwater, air quality, flora and fauna, camp sites, top soil erosion, cultural heritage and safety provisions are discussed in this section. There are two category B projects; Chakdara Bridge (N-45) and Chakdara – Kalam Road (N-95). Environmental approval was obtained for both the projects and monthly monitoring was carried out. Construction has started on all the sub projects. Environmental monitoring is also being carried out for the said project. All the environmental issues are being addressed by the contractors, and they have mutually agreed to overcome all possible impacts. Therefore the impact on environment is very low. However, monthly monitoring was regularly carried out for both category B projects to ensure compliance to the local laws and ADB SPS 2009. Following are the aspects covered in the environmental monitoring of all the sub projects with more focus on the category B projects.

2.1.1 Noise and Vibration

21. Implementation of the mitigation measures recommended in EMP to reduce the impact of Noise and Vibration were observed. Construction activities situated close to populated areas were limited to daylight hours only to minimize the impact of noise. Prayer timings and school timings were observed specially in the areas close to the mosques and schools along the carriageway during the construction activities. Camp sites were established away from the residential areas. Contractors were advised to keep their earth moving equipment in good condition and to provide personal protective equipment like ear-plugs to the working staff at noise generating sites. No noise and vibration related complaints from public or workers were registered during the reporting period. For category B projects, in addition to the above measures, compliance to the SSEMP was ensured as per ADB SPS 2009. Third party monitoring of noise values near the sensitive receptors (public property, mosque and school etc.) is being carried out. Where the noise pollution was not possible to control, the contractor agreed to supply the workers with ear plugs and ear muffs, to avoid any NIHL during the working hours. Whereas, the contractor has also agreed to change the schedule of the working hours of the workers to avoid their regular exposure to the noise pollution.

2.1.2 Surface and Ground Water

22. Preventive measures recommended in EMP were observed to monitor any Surface and Ground Water contamination that may result due to construction activities or storage of material at site. It was advised to keep fuel and oil storage areas away from water courses. Asphalt treatment practice was not allowed during rain to avoid it being washed into water courses.

23. Arrangements for proper storage and disposal of solid waste were devised. Camp areas were selected where adequate natural drainage was available. Septic Tank and Soak Pits were provided at camp site for treatment of effluents. No surface water or ground water contamination was reported due to oil spillages, solid waste dumping or asphalt lying during the reporting period. Potable water was supplied to the workers working at the sites. For category B projects in addition to the above, compliance to the SSEMP was ensured as per ADB SPS 2009. Third party monitoring of potable water for drinking purpose was being carried out. Whereas the contractor has also agreed to arrange the guard rails around the water tanks, to avoid any accident of spillage during the work course.

2.1.3 Air Quality

24. The potential sources of air pollution during construction are the kick-off dust, asphalt plant, crusher, and vehicles. It was recommended to take asphalt material from existing approved asphalt plants. Visual observations were noted to monitor regular water sprinkling at dust prone areas during the construction activities. However, some violations were observed and the concerned contractors were advised to take care to control the dust emissions. Visual observations were also made for fitness of the vehicles to minimize the smoke emissions. For category B projects in addition to the above, compliance to the SSEMP was ensured as per ADB SPS 2009. Third party monitoring of air quality near the sensitive receptors (public property, mosque and school etc.) is being carried out. Whereas, regular monitoring for measuring the air quality is being carried out through the regular visits to the site. The TA environment has ensured that the dust level should be reduced to maximum possible level so that it may not affect the workers and the surrounding environment including the native people.

2.1.4 Flora and Fauna

25. During the reported period no flora and fauna was disturbed by the construction activity by Contractors. No mortality of wild animal was reported. All the category C projects were on the same alignment. The new Chakdara Bridge (category) is also adjacent to the old alignment, therefore no major harm to flora and fauna has occurred. All the possible adverse impacts to fish and other fauna have been addressed in the SSEMP. TA environment specialist ensures the compliance of SSEMP through site visits. There is limited construction activity on N-95 (category project). However the EMP compliance checklist are duly filled and reported. Regular biodiversity study is also being carried out to ensure the compliance with ADB SPS. The flora and fauna of the said project is duly recorded. Any change to the biodiversity would be reported immediately to the contractor. The contractor would have to take such steps in order to reduce the impacts and to restore the biodiversity of the area immediately.

2.1.5 Top Soil Erosion

26. For category B projects contractors were made responsible for regulating the procurement of burrow material and protecting topsoil from erosion by complying with the recommendation of EMP. Monthly EMP compliance reports indicate that either burrow pits are available in the RoW or natural areas with high elevation are available as burrow areas.

27. All burrow areas were required to be approved by the consultant to assess their suitability. After completion of the project the burrow areas are required to be restored to the natural land profile. If burrow areas are leased the land owner should be compensated as per lease agreement. No damage to the agricultural land due to burrow pits on agriculture land or top soil erosion is reported. The approved land for digging purpose would be filled by the left over construction waste. In this way the waste produced during the construction would be used at the same time. This would help to improve the traffic flow in the areas where extensive digging is being carried out.

2.1.6 Cultural Heritage Sites

28. Project sites were visited by TA Environment Specialist. No cultural heritage sites/ wetland/ protected area/ mangrove/ estuarine lies in RoW of project alignment. Almost all sub projects are being executed on existing alignment. Only N-95 has new alignment, which also does not pass through or breach any site of cultural heritage or sensitive nature. The cultural heritage would be preserved in its original form.

2.1.7 Waste Disposal

29. Waste from construction and camp site are being disposed away from the populated areas as per the EMP. For category B projects the waste disposal is done at designated sites. The sites are away from water courses and populated areas and are fenced to stop scavengers. The waste disposal sites have now been properly marked by the contractors. The construction waste would be managed on the site immediately to fill all the gaps created by the digging process.

Part III Environmental Management

3.1 DDR Review of the REA's

30. Due diligence Review (DDR) of the Rapid Environmental Assessment (REA) screening checklist along with suitability of mitigation measures recommended in EMP were reviewed by TA Environment Specialist of for the project.

31. Documents including Project Administration Manual (PAM); Environmental Assessment and Review Framework (EARF), Sectoral Initial IEE reports, IEE, EIAs, Generic Environmental Management and Monitoring Plans and project specific Rapid Environmental Assessment reports were reviewed and field visits were conducted.

3.1.1 Field Visits to the Construction sites.

32. The field visits to the sites of N-45 (4 visits), N-95 (3 visits), S-2 (2 visits), M-8 (1 visit), N-15 (2 visits), N-65 (1 visit), N-70 (2 visits) and N-5 (2 visits) were made along with the ESU and PMC officials. Consultation meetings were held with the contractor's representatives. Visual observations, actual sampling and photographs were taken during the field visits. Key findings were discussed with the concerned engineering staff and the contractors. DDR had been generated on the basis of observations, and the monitoring reports submitted to PMU to meet the constraints. Recommendations had been made against all the environmental issues or problematic entities of the area. In general, it is concluded that so far project execution have no significant and irreversible environmental impacts. As the construction on all the sub projects has been started, regular monitoring is being carried out, to ensure the compliance with ADB SPS. Whenever, environmental issues were observed during the visits, those were brought into the notice of the contractors. The contractors were seemed vigilant to cure all the impacts of the projects. Where, there is no option available, they agreed to arrange personal protective equipment for the workers. The proper safety signs were also being displayed at the sites. The areas where signs were absent, contractors agreed to arrange them immediately.

3.1.2 Camp site Guidelines

33. Guidelines to establish camp site were prepared by TA Environment Specialist in the light of EMP recommendations. Camp sites of all the project areas were visited to assess environmental compliance. These guidelines are mainly recommendation, mitigation measures given in the EMP for the management of camp sites at the Siting, Design & Preconstruction and Construction Stages. Camp site guidelines are organized to detail the camp locations, camp site management, workers training requirement, plans and procedures and waste management.

34. In initial visits it was observed that copy of the EMP was not available at camp sites (of all sub projects). Copy of the EMP was shared with the contractors at each camp site. EMP compliance checklist to monitor monthly environmental compliance of the project was also discussed with contractor's site staff. Informal training was provided during each camp site visit regarding implementation of EMP, camp site guidelines and monthly EMP compliance checklists.

35. Contractors have mainly hired local labor. No child labor and forced labor were employed. TA environment specialist indicated the need to fence the camp sites to avoid any trespassing.

36. In the EMPs, use of LPG cylinders was recommended, whereas use of wood as fuel was discouraged. Use of wood was observed at different camp site due to non-availability of LPG cylinders. Contractors were advised to avoid any wood burning. No complaints regarding transmission of Communicable diseases (such as STI's and HIV/AIDS) were reported during the reporting period.

3.1.3 Safety Provisions

37. During project sites visits, TA environment specialist monitored the safety requirements during road construction. Road site safety is considered to be a serious concern along the roads especially broken culverts, road cuts, depressions and eroded road shoulders etc, which may lead to any serious accident. Many safety lapses were observed and communicated to the contractors. Contractors were advised to take road safety a priority and place safety signs (Safety cautions, Safety cones, Safety tapes etc).

38 Implementation of EMP recommendations regarding the use of PPE by contractor site staff was also poor. Contractors were asked to provide PPE's to workforce and train / motivate them about their use. However, no accident at any project has been reported during the reporting period.

39. During environment audit of N-45, and S-2 it was observed that the PPEs were not appropriately used. Contractors were advised to provide adequate number of PPEs to workers. First Aid Kits were available at camp sites and work sites. A follow up visit was also carried out to ensure compliance to the findings of previous audit. All non compliance matters and observations were addressed. Another audit was carried out on the above said projects; the contractors had arranged the PPEs for the workers to avoid any harm to the workers. The issues identified in the first audit were now being completely addressed in another audit. The workers were equipped with proper protective equipments, and the safety signs were displayed all over the area.

3.1.4 EMP Compliance Checklist

40. Simple checklist has been developed to monitor monthly environmental compliance of all priority road and bridge projects. The checklist is mainly based on the recommended mitigation measures given in the EMP for environmental safeguard at different stages of the project (including the category B projects). Contractor identifies any impact on any environmental concern categorized in the form of YES and NO during the reporting month. Monthly progress

report will be supported with the objectively verifiable indicators (OVI's) like video logs, photographs, letters, copy or grievances registers, test reports etc. In case, if an impact has happened, corrective action taken is provided in the remarks column supported with OVI's.

3.1.5 Conclusions and Recommendations

- i. The work is in progress at most of the sites without any significant adverse environmental impact.
- ii. Copy of the EMP, Camp site Guidelines, Grievance register and monthly EMP Compliance Checklists must be available at camp sites. One person from contractor side should be designated to coordinate implementation of EMP recommendations and any first aid related issues.
- iii. No noise and vibration related complaints from public or workers were registered. Construction activities situated close to populated areas must be limited to daylight hours only to minimize the impact of noise. Prayer timings and school timings must be observed close to the mosques and schools along the roads during construction activities.
- iv. No surface water or ground water contamination was reported due to oil spillages, solid waste dumping or asphalt lying during the reporting period.
- v. No flora and fauna was disturbed by the construction activity. No mortality of wild animal was reported.
- vi. No cultural heritage sites/ wetland/ protected area/ mangrove/ estuarine lies in RoW of project alignment.
- vii. No damage to the agricultural land due to burrow pits or top soil erosion is reported.
- viii. Road site safety considered to be a serious concern along the roads especially broken culverts, road cuts, depressions and eroded road shoulders etc which may lead to any serious accident. Contractors were advised to take road safety a priority, place safety signs (Safety cautions, Safety cones, Safety tapes etc).
- ix. Use of PPE by contractor site staff was also poor. Contractors were asked to provide PPE's to workforce and train / motivate them about their use.

- x. During construction, special attention must be given in the areas where there are encroachments on the roads side, to minimize the impact on the livelihood of the local personals.
- xi. The contractor must execute the project by employing local labor as much as possible. Child labor is strictly prohibited activity on all of the ADB projects. Child labor was not observed on any subproject. Contractors were advised to avoid child labor in future as well.
- xii. No complaints regarding transmission of Communicable diseases (such as STI's and HIV/AIDS) were reported.
- xiii. Overall no major conflict with the community was observed. Cordial liaison has been maintained with local community.

ANNEXURE 1

ENVIRONMENTAL AUDIT FOR N-15

N-15 ENVIRONMENT AUDIT REPORT

Following discrepancies were observed during the visit to the site.

Site: 120 Km away from Naran

Issues:

1. Initially there is no communication for the people who travel on the road about the work in progress and the dangers was observed but the contractor was arranging the communication system during our visit.
2. Proper sign and signage were displayed at the site.
3. The construction material of the retaining wall was scattered on the road, creating hurdles for the passengers, which was being removed from the site by the workers.
4. There is no cordoning of the dangerous area, places where work is in progress and places where heavy machines are kept on the road. Whereas, the contractor agreed to do the cordoning in 2 to 3 days.
5. Blind turns were marked along the blind ends of the road.
6. The people who were made to stand at later stages were in bright colored jacket and flag sand they were wearing hard hats. This was the good practice observed at the site.

Pictorial Profile of N-15





Site: 24 KM away from Naran

1. Similar problems were observed as in 1st one
2. Rustam JV Batching plant site.

Issues:

1. The heavy loads and old machinery was observed to be on the road sides, whereas, the workers were removing them from the site.
2. Safety signs at blind end mirrors were present.
3. No fire extinguishers were available.
4. There was proper arrangement done for the loose electrical wires..
5. The safety measures were adopted for the diesel tanks.

Site: Near Naran

Issues:

1. The building material was scattered all over the road, creating hurdles for the passengers, which was being removed from the site.
2. Proper safety measures were adopted for the heavy machinery placed at the site.
3. Sign & signage were present in all work area.
4. The rain water was seen on the roads creating small ponds, posing great risks of slips and trips on all over the area. The contractor agreed to fill these small ponds with the construction debris so that the traffic flow should not be disturbed.

5. Safety signs were displayed along the road and on the area of quarrying and landslides.
6. There was a proper place assigned for the workers accommodation.
7. The waste construction material was left to slide along the mountain down to the river.
8. The site is on the bank of the river and the site management was ensured that no remains , rubbish or waste is thrown or mixed in the river

Observing the overall condition of the construction site





ANNEXURE 2

ENVIRONMENTAL AUDIT FOR S-2

MUZAFRABAD S-2 HIGHWAY REHABILITATION PROJECT

Following discrepancies Points were observed during our visit to the site on 16th Sep 2013.

Site: 1st KM: Construction of retaining wall

Issues:

1. There is no communication with the people who travel on the road about the work in progress and the dangers. The road has eroded due to land slide and any mishap can result. The contractor agreed to arrange the fore said system in periods of 4 days.
2. Proper sign and signage were placed on all entrance points to warn people about the hazards of the area.
3. The sign & signage was in proper native language, so that the people could easily understand them.
4. There is no person to facilitate or guide the incoming and outgoing traffic. Whereas, the contractor agreed to make arrangement immediately.
5. The people who were made to stand at later stages were in proper shoes, with bright colored jackets and flags and they were also wearing hard hats.
6. In short we could see construction safety standards even to the minimum being followed.

Pictorial Profile of S-2



Site: 2nd KM: Construction of retaining wall

Issues:

Similar problems observed as in 1st Km

Site: 3 – 9 KM: The Contractor's shed

Issues:

1. The diesel tank was recently made, underground; hence any ground water contamination cannot be ascertained.
2. There were proper sign and signage of the safety instructions for this work area.
3. No fire extinguishers were available.
4. The electrical safety was in a very bad shape inviting problems in diesel storage area, whereas, the contractor agreed to manage this hazard immediately.

In nut shell, we were able to witness standards which were being followed to ensure safe work practices.

Phase 2: Habib Rafiq contractors

Site: The Contractor's shade

Issues:

1. Not very professionally done, yet the traffic was being regulated at work sites. The working staff was wearing bright jackets with flags. However, there was communication problem between the two to synchronise the traffic, which would be managed by the contractor on immediate basis.
2. The bitumen boiler was in bad shape, and some were leaking. The contractor managed to avoid its leakage problem efficiently.
3. Signs & signage were missing in all work area, whereas, the contractor agreed to arrange the signage in 3-4 days.
4. Safety was seen in practice and many belts and chains were running with guards. So the cause of accident is negligible.

5. Similarly the electric cable was in a bad shape and should have been discarded due serious electrical hazard; whereas, the contractor agreed to dispose them off on immediate basis.
6. The truck that was used to transport the bitumen was leaking from all side, creating problems where it was falling. After this observation, the contractor agreed to remove such hazardous trucks.
7. The water tank was 8 to 9 feet deep yet no arrangements were made to cordon it off. Whereas, the contractor was making the cordoning on immediate basis.
8. The generator had very high noise level exceeding well beyond the 100 Db level. The contractor had arranged the ear muffs and ear plugs to save his workers from the risks of high level noise in the work area.
9. The site is on the bank of the river and the site management had ensured us that no remains, rubbish or waste would be thrown or mixed in the river.

Observation of Overall Health Safety Conditions of S-2





Annex 3

EMP Compliance Checklist

Flood Emergency Reconstruction Projects (FERP)

Rationale for Monthly Progress Format to Monitor EMP Compliance

As per contract, contractor of each sub project has to prepare and submit monthly environmental compliance reports to review EMP compliance of the project. This compliance report should be part of the overall monthly project progress report. It is envisaged that each contractor may opt different reporting format while submitting the monthly environmental compliance. After discussion with the Team Leader (PMC) and PMU it was decided that a standard monthly progress report format may please be developed to monitor EMP compliance of the sub projects. Contractors were also requested to submit their suggestions for developing the reporting format. Based on the monthly environmental compliance reports a six monthly environmental progress report should be prepared and submitted to ADB.

Simple checklists are developed to monitor monthly environmental compliance of sub-projects. The checklists are generally based on the recommended mitigations measures given in the EMP for environmental safeguard at different stages of the project. Contractor will identify about any impact on any environmental concern categorized in the form of YES and NO during the reporting month. Monthly progress report will be supported with the objectively verifiable indicators (OVIs) like video logs, photographs, letters, copy or grievances registers and test reports etc. In case, any impact happens, corrective action taken should be provided in the remarks column and supported with OVIs.

Flood Emergency and Reconstruction Project (FERP)

Monthly Progress of EMP Compliance

Environmental Concern	Implementation of Mitigation Measures	Yes	No	OVI/Remarks
Camp site	<ul style="list-style-type: none"> • If copy of the Site specific EMP is provided at the camp site? • If the EMP instructions are understood? • If any individual is nominated for implementation of EMP? • If contractor followed the safety precautions as per ILO convention no.62? • If contractor provide PPE to workforce? • If PPE are used by workforce? • If potable water is available to labor? • If wood used as fuel? • If LPG cylinders are provided for cooking or heating purposes? • If First Aid Kit is provided at camp and individual nominated for addressing emergency? 	<input type="checkbox"/> 	<input type="checkbox"/> 	

Project Director _____ Resident Engineer _____ Environmental Specialist _____

Flood Emergency and Reconstruction Project (FERP)

	<ul style="list-style-type: none"> • If campsite is fenced to prevent trespassing? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contractor maintain Environmental Monitoring Record and submit monthly monitoring reports? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contractor maintain Grievances Log and registered the complaints from community? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If camp area have adequate natural drainage? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If arrangement for proper storage and disposal for solid waste is planned? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If Septic Tank and Soak Pits are designed for treatment of effluents? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contract provide training to workers to effectively implement project specific EMP? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contractor prohibit child labor or forced labor? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contractor encourage hiring of local labor? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> • If contractor provided HSE plan and 	<input type="checkbox"/>	<input type="checkbox"/>	

Project Director_____Resident Engineer_____Environmental Specialist_____

Flood Emergency and Reconstruction Project (FERP)

	Emergency Response Procedures?			
	<ul style="list-style-type: none"> If contractor properly dispose off debris materials on approved barren land? 	<input type="checkbox"/>	<input type="checkbox"/>	
	<ul style="list-style-type: none"> If there is any complaint regarding transmission of Communicable diseases (such as STI's and HIV/AIDS) 	<input type="checkbox"/>	<input type="checkbox"/>	
Topsoil Erosion due to Borrow Pits	<ul style="list-style-type: none"> If natural areas with high elevation are available as borrow areas? If borrow areas identified have suitable material and approved by design team? If borrow pits are available in the ROW? If there is any damage to the agriculture land due to borrow pits on agriculture land? If top 15 cm are stripped and stockpiled for redressing? If top 0.5 m is stripped of when deep ditching is carried out? If ditch is filled with construction debris and leveled with stockpiled topsoil layer to maintain the landscape? 	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	

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Flood Emergency and Reconstruction Project (FERP)

	<ul style="list-style-type: none"> • If borrow area is leased whether the land owner is compensated as per lease agreement? 	<input type="checkbox"/>	<input type="checkbox"/>	
Encroachment on rural communities and means of livelihood	<ul style="list-style-type: none"> • If there is any damage to the shops and houses which may lie inside ROW? • If there is any impact on the means of livelihood of the community? 	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	
Encroachment of Precious Ecology	<ul style="list-style-type: none"> • If there is any loss of forests and intrusion into wetlands? • If fuel/oil storage areas are away from watercourses? • If asphalt treatment is carried out during rain? 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Encroachment Historical/ Cultural/ Archeological sites	<ul style="list-style-type: none"> • If there is any damage to the Archeological /Religious/Cultural or Historical sites? 	<input type="checkbox"/>	<input type="checkbox"/>	
Impact on Vegetation	<ul style="list-style-type: none"> • If project activities involve removal of vegetation cover? • If any trees cutting is required on the ROW or shoulders of the road? 	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	

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Flood Emergency and Reconstruction Project (FERP)

Surface and Ground water contamination/Drainage	<ul style="list-style-type: none"> • If any surface water or ground water contamination reported due to oil spillages, solid waste dumping or asphalt laying? • If asphalt treatment is practiced during rain? • If fuel/Oil storage areas are far away from watercourses? • If additional Cross drainage is provided? 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	
Impact on adjacent communities	<ul style="list-style-type: none"> • If project site is fenced to prevent trespassing? • Community consultation has been carried out for project activities/concerns? • If project activities are displayed at proper locations? • If safety signs are properly placed? • If any complaint registered in the Grievance Log 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	

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Flood Emergency and Reconstruction Project (FERP)

Dust generation	<ul style="list-style-type: none">• If there is any record of dust generation during the environmental monitoring?• If proper sprinkling is done on regular basis?	<input type="checkbox"/>	<input type="checkbox"/>	
Impact on human settlements and wildlife habitat	<ul style="list-style-type: none">• If site selected for camp is 100 m from the human settlements and wildlife habitats?	<input type="checkbox"/>	<input type="checkbox"/>	
Safety impacts due to road constructions	<ul style="list-style-type: none">• If safety signs are properly displayed?• If construction machinery is parked at designated areas?• If any complaints registered regarding traffic issues?	<input type="checkbox"/>	<input type="checkbox"/>	
Noise and Vibration	<ul style="list-style-type: none">• If any complaints due to noise and vibration?• If construction activities is carried out in daylight to reduce the impact of noise?	<input type="checkbox"/>	<input type="checkbox"/>	
Damage to Services	<ul style="list-style-type: none">• If any damage reported to public services like electric, water, gas, sewer or telephone lines?	<input type="checkbox"/>	<input type="checkbox"/>	

Project Director_____Resident Engineer_____Environmental Specialist_____

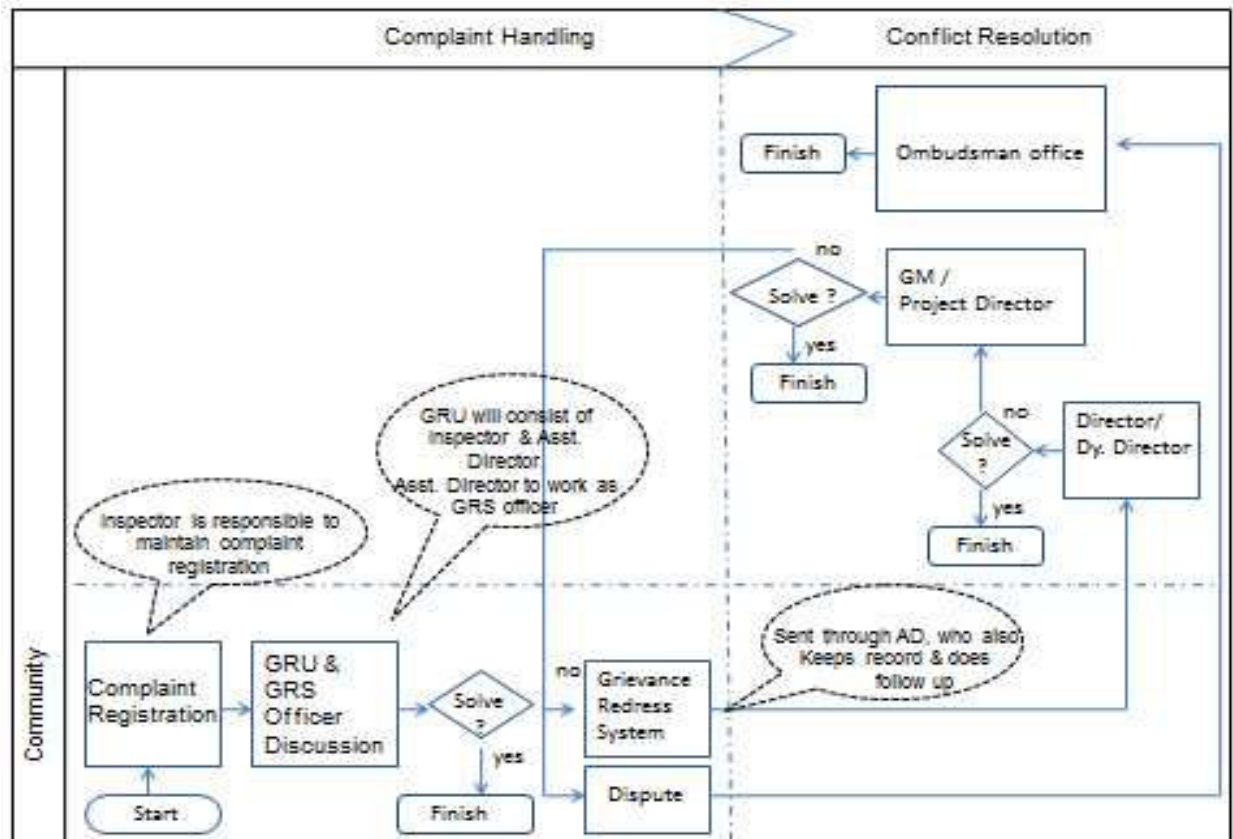
Flood Emergency and Reconstruction Project (FERP)

Transportation of construction materials	<ul style="list-style-type: none">• If transport trucks are weighed to verify they don't exceed the bridge and pavement structure?	<input type="checkbox"/>	<input type="checkbox"/>	
Asphalt plants	<ul style="list-style-type: none">• If asphalt material is taken from existing approved plants?• If any complaint registered about the asphalt plants?	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	
Quarrying materials	<ul style="list-style-type: none">• If materials taken from existing quarry sites?• If any complaint registered about the quarry sites?	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	

Project Director_____Resident Engineer_____Environmental Specialist_____

ANNEX 4

GRIEVANCE REDRESS SYSTEM



Annexure 5

EIA/IEE MITIGATIONAL MEASURES

General

This section identifies the overall impacts of pre-construction, construction and operational phase of the proposed Project on the physical, biological and socio-economic environment of the Project Area. This assessment also includes the impact of traffic volume due to the improved communication infrastructure. In addition, it also narrates the measures that will mitigate the project's adverse environmental impacts.

The environmental impacts matrices have also been developed to indicate magnitude of the impacts on different environmental settings for both construction and operational phases. The following scale has been used for the evaluation of impacts on different environmental settings:

N/A = Not Applicable

O = Insignificant / No Impact

-1 = Low Adverse (low/short-term damage to the environment)

-2 = Medium Adverse (moderate damage to the environment)

-3 = High Adverse (severe damage to the environment)

+1 = Low Beneficial (less beneficial to the environment)

+2 = Medium Beneficial (moderate beneficial to the environment)

+3 = High Beneficial (highly beneficial to the environment)

Pre-Construction/Design Phase

Following is the brief description of impacts envisaged and the recommended mitigation measures during Pre-construction and Design Phases.

Topography

The topography in the Project Area will change but only to some extent due to the construction of Project related structures such as embankments, bridges, flyovers and Interchanges.

Visual changes to the topography will be of permanent but slightly adverse in nature and have no mitigation measures except that the Project design should consider aesthetic concerns.

Land Acquisition and Resettlement

One of the major project related impact will be the land acquisition for the Project ROW that will result in causing disturbance to the effected residents of the Project Area. Moreover, the land required for the Projects are mostly fertile agricultural land with mainly scattered population and the families preferred to construct homes in their own piece of land than developing a community. Few villages were also coming in the ROW of the Project. This impact would be permanent and likely to cause major negative impact in nature.

Mitigation measures involved careful alignment and route selection by the designer to minimize the impact by avoiding the residences of these families. Proper access was provided to the farmers to cultivate the divided land at a minimum travel distance. Also adequate budget was provided in the Project's budget for the compensation to the affected people as per Land Acquisition Act, 1894 and framing of a judicious and fair compensation package for provision of compensation on at least the prevailing market rates.

Changes in Land Value

The proposed Projects were expected to increase the land values, especially in villages where little or no road infrastructure is present and the seasonal drains with gravels on their beds are used as access road to their residences i.e. villages through which the proposed Expressway will pass. Land owners will have an opportunity to sell their land on increased prices and start new businesses. This impact was major positive in nature.

Social Issues

Due to the proposed Projects, entry/exit problems and bifurcation of settlements, agricultural land/fields occurred for the residents as well as hindrance in agricultural activities, i.e. hindrance in movement of agricultural machinery and transportation of agricultural products. This resulted in causing inconvenience to the residents/farmers and affecting their daily activities; also reducing the frequent interactions between families. This impact is permanent and of moderate negative in nature.

Mitigation measures included provision of pedestrian underpasses (after every 2 to 3 kilometer) and vehicular underpasses in the design to minimize the impacts.

Physical Cultural Resources

Since no Physical Cultural Resources are falling within the Right of Way (ROW) of the proposed alignments of the roads and bridges, so there was no need for relocation of such resource. Cultural resources such as graveyards, mosques and shrine were situated in nearby communities and are visited by local people. Specially, mosques are visited five times a day by local people.

Mitigation measures included provision of pedestrian corridors near the communities which have important Physical Cultural Resource

Biodiversity Conservation and Natural Resource Management

Flora

Due to the proposed Project, number of trees of various species was affected. This may have an adverse affect on the ecological habitat of the Project Area. This impact would be permanent and of moderate negative in nature.

The proposed mitigation measures will include:

- Incorporate technical design measures to minimize removal of these trees, if possible such as change in alignment;

- Plan for compensatory planting for eight trees against each fallen tree of similar floral function;
- Provision of compensation in the Project Budget for the loss of fruit trees to the affected people;
- Disallow introduction of exotic species with known environmental setbacks (Eucalyptus, etc.);

Air Quality and Noise Level

Due to the construction, noise and air pollution and associated health risks may increase. This impact was permanent and moderately negative in nature.

Mitigation measures will include:

- Incorporate technical design features that enable continuous traffic flux and avoid congestions e.g. sign boards, speed limits and bays;
- Consider noise barriers in sensitive areas (populated areas through which the proposed Expressway will pass) in the form of high boundary walls (concrete or wood) and earth berms etc.; and
- Plantation plan for tall species of trees on either side of proposed Expressway.

Creation and Burning of Wastes

Production and burning of wastes at or near camp sites caused air pollution associated with burning garbage. This impact was temporary and minor negative in nature.

Mitigation measures included:

- Planning for burning sites with reasonable distance from the human settlements;
- Disallow sitting for work camps, including waste dump sites, in a distance closer than one (1) kilometer to any inhabited areas;

- Incorporate technical design features for refuse collection containers at sites that would minimize burning impacts;
- Devise plan(s) for safe handling, storage and disposal of harmful materials.

Excavation of Earth

The excavation of earth from borrow areas and 80 meter ROW may result in change of edaphic characteristics, loss of fertile top soil of 80 meter ROW and may affect the agriculture of the Project Area. The fertile plough layer will be wasted if the construction of the Project is carried out on top of the fertile layer. This impact is permanent but major negative in nature.

Mitigation measures will include:

- Plain agricultural land will be avoided for borrowing of materials, as far as possible by the landowners for lowering the land to create new irrigation polders; and
- Contractor needs to obtain approval for excavation and submit the plan of rehabilitating the site after excavation;
- The top one meter plough layer could be excavated, stored and used during the rehabilitation of the borrow areas.

Public Utilities

Due to the Project, public utilities affected may create disruption of public services and economics. This impact is however temporary and minor negative in nature.

Mitigation measures will include:

- Incorporate technical design features to minimize affect on public utilities; and
- All public utilities likely to be affected by the proposed Project need to be relocated well ahead of the commencement of construction work.

Change in Hydrologic Regime

The project has an extensive network of drainage channels/ nullahs falling in to various Rivers. Ground water is recharged from this network and high fluctuation results in ground water table during the moon soon seasons and dry season. Wells and hand pumps are the main source for drinking water, especially, in the first packages of the project area. These wells could be dried by changing the drainage pattern of the area and that would be major negative irreversible impact. For the crossing of drains and water courses small bridges and culverts would be constructed.

Mitigation measure would involve:

- Proper design of bridges on Nullahs to accommodate design flows;
- Small bridges will be constructed on drains coming in the ROW;
- Provision of box culverts to control flood damages and provision of safety of embankments; and
- Provision of sufficient sizes of drains to take design flows.

Loss of Agricultural Land

Due to the Project mainly agricultural land will be affected and crop yield will be disturbed. But in the long run, due to the construction of the Expressway project, better transport facilities and opportunities will be available to the farmers to enhance the crop yield. This impact is insignificant in nature. No Mitigation measures were required.

Construction Phase

Following is the brief description of impacts and their mitigation envisaged during the Construction Phase.

Topography

The project area dos not have plane topography. Extensive work is involved for preparation and clearing of the land. This may involve blasting; dismantling of damaged

pavements; cutting and filling of the land in the ROW and borrow pits including erosion of topsoil cover. This impact is permanent and minor negative in nature.

In addition to proper landscaping, construction of stone pitching/rip rap across the embankments, and the following mitigation measures will help to minimize the impacts of the Project.

Mitigation measures will include:

- Where the use of agricultural land is unavoidable, the top 30 cm of the plough layer will be stripped of and stockpiled for redressing the land after the required borrow material has been removed;
- Where deep ditching is to be carried out, the top 1m layer of the ditching area will be stripped and stockpiled. The ditch will initially be filled up with scrap material from construction and then levelled with the stockpiled topsoil;
- Low embankments will be protected from erosion by planting indigenous grasses that can flourish under relatively dry conditions;
- High embankments will be protected by constructing stone pitching or a riprap across the embankment;
- Ditches or borrow pits that cannot be fully rehabilitated will be landscaped to minimize erosion and to avoid creating hazards for people and livestock; and
- Landowners will be compensated according to the terms of lease agreements negotiated with them and the restoration actions agreed upon by the Contractor will be duly carried out.

Soil

The project area may also include rolling terrain with fertile silty land prone to soil erosion. Soil erosion may occur on these areas, at contractors' camps and at embankment works as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation; whereas, contamination of soil may be caused by oil and chemical spills at asphalt plant sites,

workshop areas and equipment washing yards. Also, due to unauthorized use of borrow areas and quarries, soil erosion may occur resulting in degradation of landscape. This may limit the future use of land for agricultural purposes. This impact is, however, of temporary and moderate negative in nature.

Mitigation measures will include:

- Low embankments will be protected by planting Vetiver grass that can flourish in relatively dry conditions;
- High embankments will be protected by constructing stone pitching or riprap across embankments. This practice will also be applied across cross-drainage structures where embankments are more susceptible to erosion by water run-off;
- Soil contamination by asphalt will be minimized by placing all containers in caissons;
- All spoils will be disposed off as desired and the site will be restored back to its original conditions before handing over;
- Non-bituminous wastes from construction activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites, and covered;
- In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;
- As applicable and needed, plantation of grasses and shrubs will be done for slope protection;
- Soil erosion checking measures such as the formation of sediment basins, slope drains, etc, will be carried out;
- Productive land or land adjacent to agricultural / irrigated land may not be preferred for excavation;

- Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands should be given preference for borrowing materials; and
- Aggregate required for Expressway construction procured from quarries and river beds will need approval from authorities.

Blasting

Blasting is required where the alignment is passing through the hills. Blasting will generate short-term impacts such as noise and vibration, and long-term impact on land stability.

To minimize the short term impacts, blasting should take place at predetermined times notified to communities and local residents. Blasting should also be conducted in accordance with best international practices, in which the explosive charges are controlled to minimize the vibrations and noise. To minimize the long term impacts, geological and soil conditions will be carefully assessed to avoid blasting in sensitive locations.

Land Acquisition, Resettlement and Compensation

Due to the construction, land acquisition and resettlement will occur in villages through which the proposed alignments may pass. This will result in loss of infrastructure, livelihood, commercial activities, disturbance to people, decrease in loss of fertile plough layer at camp sites, asphalt plants and drop in the elevation of borrow areas. The compensation for the structures, plots, tube wells, crops, private and public properties etc. will be implemented as per law.

Mitigation measures will involve land management and providing judicious compensation to the affectees by providing sufficient budget in the Project cost. The process of land acquisition and compensation will be followed in a transparent manner to minimize the impacts enabling restoration of livelihoods of the population to be resettled. Affected population will be given priority in providing jobs during construction, which will be an additional measure to restore their livelihoods.

According to Land Acquisition Act 1894, the following points are to be considered while determining compensation to the Project affectees:

- *The market value of land at the date of publication of notification under section 4 sub section (1);*
- *The damage sustained by the person interested, by reason of the taking of any standing crops, or trees which may be on the land at the time of the collector's taking possession thereof;*
- *The damage if any sustained by the person interested at the time of the collector's taking possession of the land by reason of acquisition injuriously affecting his other property, moveable, or immoveable, in any other manner, or his earning;*
- *As a consequence of the acquisition of the land by the collector, the person affected is compelled to change his residence or place of business, the reasonable expenses incidental to such change.*

Physical Cultural Resources

During construction work access of the local people to mosques, shrines and graveyards may get limited due to elevation of road level or blockage of existing tracks. Mitigation measures include provision of passages at appropriate location

Construction Camps/Camp Sites

Due to the proposed camp sites, loss of vegetation and assets on the selected land and dissatisfaction of rehabilitation measures during and after completion of construction phase may occur. However, it will be a temporary and minor negative impact. However, a range of impacts those either remain likely to occur or are unavoidable. For these impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence, and any associated adverse effects.

Some mitigation measures will include:

- All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites;

- The contractor(s) will provide plan for removal & rehabilitation of site upon completion;
- Photographical and botanical inventory of vegetation before clearing the site; and
- Compensatory plantation to be scheduled when construction works near end.

Health and Safety

Occupational Health and Safety

Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling and transport of hazardous construction material. Workers will be provided with safe and healthy working environment taking into account risks inherent to the particular sector and specific classes of hazards in Project area.

Mitigation measures will include;

- Obligatory insurance against accidents for labourers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Layout plan for camp site, indicating safety measures taken by the contractor, e.g. fire fighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers;
- Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines;
- Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;

- Proper maintenance of facilities for workers will be monitored;
- Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves etc;
- Ensure strict use of wearing these protective clothing during work activities;
- Elaboration of a contingency planning in case of major accidents;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads;

Community Health and Safety

The construction activities and vehicular movement at construction sites and access service roads may also result in road side accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. This is a temporary and minor negative impact. Quality of ground water and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents etc. The labour works with different transmittable diseases may cause spread out of those diseases in the local residents. The borrow pit areas located near the residential, settlements, may cause accident for the people moving near to those areas.

Mitigation measures will include;

- There should be proper control on construction activities and Oil spillage leakage of vehicles.
- The Borrow areas should be fenced properly and banned for the movement of the residents.

- The labour works with different transmittable diseases should be restricted within the construction site.
- Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity & social links;
- Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;
- Provision of proper safety and diversion signage, particularly at urban areas and at sensitive/accident-prone spots.
- Setting up speed limits in close consultation with the local stakeholders; and
- If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools).
- The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as HIV/AIDS, should be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health service.
- Reducing the impacts of vector borne diseases on long-term health effect of workers should be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes
- Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements.
- Eliminate any unusable impounding of water

- During construction work pedestrian and vehicular passages should be provided for crossing near settlement
- Bridges and other structures have to be structurally stable enough to bear maximum ground acceleration recorded for the area in past.
- Fencing should be strong enough so that it can not be broken easily by local people for making passages.
- Discharge of any wastewater at upstream of the point of public supply should be restricted.
- Batching plants should be installed away from settlements
- Use of water should not disturb public water availability. Source of water should be selected carefully.

Burrow/ Open Pits

Borrow/ open pits and its excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments. Borrow/ Open pits may also result in potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife. This will also degrade hygienic condition of the Project area. This impact is permanent and minor negative in nature.

Mitigation measures will include:

- Conversion of borrow pits into fish farms and care in selection of borrow areas;
- Necessary permits must be obtain for any borrow pits from the competent authorities;
- No excavations are allowed within distance of 500 m to ROW;
- In borrow pits the depth of the pit will be regulated so that the sides of the excavation will have a slope not steeper than 1:4;

- Soil erosion along the borrow pit shall be regularly checked to prevent / mitigate impacts on adjacent lands; and
- In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites.

Pollution Prevention and Abatement

Pollution Prevention technologies and practices will be applied in construction phase according to the International good practices and national and international recognized standards. National Environmental Quality standards (NEQS) will be adopted as performance indicators.

Different types of waste, especially construction waste, are expected to be generated in large quantities from different activities of the proposed project. Small quantities of hazardous waste may also be generated. During the construction phase, gaseous emission may occur from a wide variety of activities. The impacts of different project activities and their appropriate preventive and abatement techniques and mitigation measures are discussed below:

a) Air Quality

Air quality will be affected by fugitive dust emissions from construction machinery, asphalt plants and vehicular traffic. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability.

The critical sources of air pollution during the construction phase will be:

- Asphalt plants that generate toxic emissions which contain unburnt carbon particles, sulphur compounds and dust from batch preparation;
- Quarry areas that generate fugitive dust during crushing;
- Traffic diversion routes marked along dirt tracks that generate fugitive dust when in use by vehicular traffic; and

- Transportation of materials and other construction activities that create dust emissions.

During construction, the continuous operation of machinery and movement of heavy trucks and vehicles may generate gaseous emissions and have a minor negative impact on the surrounding environment.

The overall impact on the quality of air during the construction phase will, however, be limited to the Project's implementation phase only.

Air Sensitive Receivers

Air sensitive receivers of the Project Area include general public, dispensary, nursery, school, mosques, factories, monuments, fruit gardens etc. Any other premises or places having similar sensitivity to the air pollutants may also be considered to be the sensitive receptors/receivers.

Based on the criteria set out above, the representative ASRs have been identified close to the Project

Mitigation measures will include:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor's camps should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations. Regular water sprinkling of the Site should be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions;

- Quarry areas and asphalt plants should be located atleast 500m downwind from populated areas, wildlife habitats and contractor's camps to minimize the impact of dust emissions;
- Asphalt, hot mix and batching plants should be equipped with dust control equipment as a pollution preventive measure such as fabric filters or wet scrubbers to reduce level of dust emissions;
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works; and
- Ensure precautions to reduce the level of dust emissions from hot mix plants, crushers and batching plants should be taken up; e.g. providing them as applicable, with protection canvasses and dust extraction units. Mixing equipment should be well sealed and equipped as per existing standards.

The majority of dust problems caused during the construction phase of the Projects could be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following:

- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;
- All excavation work should be sprinkled with water;
- Construction workers should be provided with masks for protection against the inhalation of dust,
- Vehicle speed in the Project Area should be prescribed not more than 20 km/ hr and controlled accordingly; and
- Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases.

b) Noise

Noise is most pervasive environmental problems in the urban areas especially on the road side. Noise is a by-product of human activity, and area of exposure increases as function of mobility and construction activities. Main sources are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers asphalt plants and other equipments. The above machinery is expected to generate noise levels that would be severe in the areas whereas previously no roadside construction is done as in the case of the proposed Project. Noise generated by construction machinery is likely to affect sensitive receptors located within 50 meter of the proposed Expressway. This impact is temporary and minor negative in nature.

Tables: illustrate maximum permissible noise levels for different situations and is given below;

Table : Maximum Limits of Noise Levels

Noise Level dB (A)	Situation
194	Lung damage
180	Ear drum rupture
150	Absolute limit with ears protected
150	Maximum of instantaneous noise
135	Absolute maximum with ears unprotected
100	Prolonged noise causing permanent damage
90	Factory work for an 8-hour day, 5 days a week
85	Ear protection should be worn

Noise Level dB (A)	Situation
80	Noise on building or construction sites
70	Normal road traffic near residential areas

Source: “*Environmental Degradation*” by Engr. Col. Mumtaz Hussain

- Above 85 dB (A) ear protection devices should be worn.

Noise Sensitive Receivers

Representative noise sensitive receivers (NSRs) were identified during the site visit of the Project Area. As some of the part of the Project Area is highly residential with the structures along the roads on both sides of the proposed alignment, therefore, the first layer of these noise sensitive receivers provides acoustic shielding to those receivers behind them. The noise sensitive receivers include the following:

Residential Uses : All domestic premises including temporary housing

Institutional Uses : Schools

Worship Places : Mosques

Others : Dispensary, Hospitals

Mitigatory measures will include:

- Selecting less noisy machinery
- Providing workers with ear muffs and ear plugs
- Changing work schedules.
- Avoiding work during night and near the hospital areas

Waste and Hazardous Waste

Due to construction activities waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and solid waste etc. As the project deals with the construction of the road, so no hazardous waste will be generated during the construction waste. But the handling and storage of oil, asphalt/bitumen may be a source of environmental pollution as a hazardous waste. This will result in unhygienic conditions, health risk to work force and public at the camp site. This impact is temporary and minor negative in nature. Pesticides may be used while raising plants for planting on both sides of road. Most of the pesticides are hazardous for human. Insecticides may also be used at the camp sites and there use also needs to be regulated.

Mitigation measures will include:

- Wastewater effluent from contractor's workshop and equipment washing yards would be passed through gravel/ sand beds to remove oil/ grease contaminants before discharging it into natural streams;
- Training of working force in the storage and handling of materials and chemicals that can potentially cause soil contamination;
- Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc.;

Resource Conservation

Almost all the materials to be used in the construction of road and bridges are non-renewable and therefore their sustainable use is necessary for the future use. Large quantities of water are used in the construction of concrete structures and in watering the unfinished surfaces. Use of water is of major concern while developing resource conservation strategy. Although plenty of water is available in the project area but its use

might affect the community water consumption. Other construction material like aggregate and sand are locally available and there is no concern of scarcity in future use. Bitumen is not locally produced and its sources are not locally available so its sustainable use is prerequisite.

Mitigation measures will include:

- Wastage of water should be reduced by training the workers involved in water use.
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water.
- Water jets and sprays should be used for watering surfaces rather than using overflow system.
- Source of water should be carefully selected. Water use should not disturb the existing community water supplies.
- Unnecessary equipment washings should be avoided
- Use minimum amount of bitumen for road surfacing.

Surface and Groundwater

Surface waters might get contaminated due to the disposal of construction waste generated during the project activity; earth and stone work activities, this contamination will not only endanger the aquatic life but may also result in jeopardizing the health of natives that use this water for meeting domestic requirement. In addition to that, construction waste, if left unattended will result in forming leachate that will percolate through the soil strata and will reach underground water table and hence, will end up contaminating it. Also the water for construction and consumption may come in conflict with local water demand.

There is a possibility that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater, if they are not handled properly. During the construction phase, the sanitary wastewater will be

generated at the workers' camp(s). If this wastewater is allowed to stagnate in water ponds on the site, it can percolate into the soil, thereby, contaminating groundwater. This impact is temporary and minor negative in nature.

Mitigation measures will include;

- Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;
- The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements;
- water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- For construction purposes, water shall be drawn from surface water bodies on priority and as available;
- Regular water quality monitoring according to determined sampling schedule;
- The contractor shall ensure that construction debris do not find their way into the drainage or irrigation canals which may get clogged;
- Work on irrigation canal areas will be kept to a minimum, protective walls be (re-constructed);
- To maintain the surface water flow/drainage, proper mitigation measures will be taken along the Expressway, like drainage structures in urban areas;

Biodiversity Conservation and Natural Resource Management

Flora

Trees are vital ecosystem, which perform variety of functions for the improvement of environment such as reduction in air pollution, noise abatement, cooling effect on earth, supply of oxygen etc. Due to the proposed Projects, numbers of trees of different species and belonging to different age groups will be cut due to the proposed Project.

Establishment of contractor's camps and warehouses for storage of equipments, material etc. shall involve clearing of vegetation from the area causing a negative impact. During the entire construction period, dust laden polluted air will form a dust film on the leaves, thus blocking sunshine and stomata, thereby hindering photosynthesis process and cause quaintly causing detrimental effect on the plant health. Also during the construction activities, the contractor's workers may damage the vegetation including trees (for use as firewood to fulfill the camp's requirements).

This may affect the ecological habitat of the Area. This impact will be permanent and moderate negative in nature.

Mitigation measures will include:

- Flowering and fruiting shrubs will be planted along the Expressway to beautify the landscape. Planting would however be done keeping in view the principles of landscape designing;
- An awareness campaign targeted on the neighborhood farmers shall be run to popularize the planting of trees; and
- Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides.
- The contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands.
- Construction vehicles, equipments and machinery will remain confined within their designated areas of movement.
- Contractor will supply gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed.
- Camp sites and asphalt plants will be established on waste/barren land rather than on forested or agriculturally productive land. However if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to the trees, under growth and crops.

- Compensation for trees required to be cut on account of their coming in the ROW of Expressway must be paid to farmers/owners in accordance with market rates.

Fauna

The usual fauna found in the Project Area have already been mentioned earlier. Due to the implementation of the proposed Project, the free movement of fauna would be disturbed as the construction will restrict their free movement. Another impact on the fauna of the Project Area will be the probable dislocation of the birds/animals (rodents) from their nests and burrows.

Reptiles like snakes and lizards, living in the holes or underground shall either get killed or move to the adjacent areas. Similarly, birds like sparrows, mainas, crows, who have nests on the trees located in the ROW or who frequently visit the Project Area in search of food shall receive a negative impact and shall have to move to adjoining areas. These trees provide resting and nesting places to the animals and birds, so the cutting of these trees will have negative effect on fauna. However, this impact will be temporary and minor negative in nature.

Also, due to the leakages/spills from the construction equipment/machinery the local ponds/water storages and water courses where the animals/birds drink water may get contaminated; thus, affecting/endangering the fauna of the Project Area. This impact is temporary and minor negative in nature.

Mitigation measure will include:

- Plantation of large number of trees along the proposed Expressway to regain the ecological habitat;
- New and good condition machinery with minimum noise will be used in construction;
- Noisy work will not be carried out in night time so that there should be no disturbance to local birds and animals;
- Contractor will ensure that the no hunting, trapping of animal will be carried out during construction;

- Borrow pits will be fenced so that no animal can fall into these;
- The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly waste of the camps will be properly disposed off to prevent the chances of eating by wild animals, which may prove hazardous to them.
- Special measures will be adopted to minimize impacts on wild birds such as avoiding noise generating activities during the critical period of breeding.
- Alternate nesting facilities shall be tried for those birds disturbed during hatching season.

Anticipated Impacts during Operational Phase

The anticipated environmental impacts related to the proposed Project have been studied for the operational stage of the Project as discussed hereunder.

Flora

No negative impacts are envisaged on the flora of the area during the operational phase. However, improper maintenance of the saplings planted against the trees cut for the proposed Project may adversely affect the growth of those saplings which were planted to improve the environmental aesthetics of the Project Area. Raising of new trees in two rows on either side of the Expressways (except the bridges), shall render a positive impact on the flora of the area and will also cause a positive impact on the landscape of the area, which shall be of permanent in nature.

Presence of adequate flora will absorb CO₂ gas, through photosynthesis, emitted from an expected large number of cars, vehicles and public transport, thus purifying air of hazardous particles. Although it shall take 10-15 years, before these plants become trees, this planting on Expressway, shall not only compensate for the loss of trees, but shall contribute towards improvement of flora and environments of the tract.