Environmental Impact Assessment

June 2015

PAK: National Motorway M-4 Gojra-Shorkot Section Project

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ENVIRONMENTAL IMPACT ASSESSMENT

FAISALABAD-KHANEWAL MOTORWAY (M-4)

National Trade Corridor Highway Investment Program

(NTCHIP)

Submitted to
ASIAN DEVELOPMENT BANK

Submitted by
NATIONAL HIGHWAY AUTHORITY (NHA)

Originally Submitted in March 2007

Updated 2015

List of Abbreviations

Abbreviation	Description
˚C	Degree Centigrade
AADT	Average Annual Daily Traffic
AD	Assistant Director
ADB	Asian Development Bank
APs	Affected Persons
BDL	Below Detectable Level
CBO	Community Based Organization
CC	Construction Contractor
CO	Carbon Mono Oxide
COI	Corridor of Impact
dB(A)	Decibel
DC	Design Consultant
DCR	District Census Report
DD	Deputy Director
DDO	Deputy District Officer
DFO	Divisional Forest Officer
ECR	Environmental Complaints Register
EDO	Executive District Officer
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
EPD	Environmental Protection Department
Ft.	Feet
GM	General Manager
GoP	Government of Pakistan
IEE	Initial Environmental Evaluation
IP's	Indigenous People
IUCN	International Union for Conservation of Nature
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
Km	Kilometers

Abbreviation	Description
LAA	Land Acquisition Act, 1894
LAR	Land Acquisition and Resettlement
M&E	Monitoring and Evaluation
M-4	Motorway (Faisalabad-Khanewal)
MC	Monitoring Consultant
Mm	Millimetre
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan, (Pvt) Ltd.
NGO	Non Governmental Organization
NH&MP	National Highway and Motorway Police
NHA	National Highway Authority
NOx	Nitrogen Oxides
NWFP	North West Frontier Province
O&M	Operation and Maintenance
OM	Operation Manual
PAPs	Project Affected Persons
PEPA	Pakistan Environmental Protection Act
PHV	Peak Hourly Volume
PM_{10}	Particulate Matter (10 Micron)
PTCL	Pakistan Telecommunication Company Limited
PGL	Profile Grade Level (Design Profile)
RAP	Resettlement Action Plan
Rft.	Running Feet
RoW	Right of Way
RPF	Resettlement Policy Framework
SC	Supervision Consultant
Sft.	Square Feet
SNGPL	Sui Northern Gas Pipe Line
SOx	Sulphur Oxides
SPM	Suspended Particulate Matter
SPS	Safeguard Policy Statement
TA	Technical Assistance

Abbreviation	Description
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

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EXECUTIVE SUMMARY

Background of the Project

1. The Government of Pakistan (GOP) gives major emphasis to improving the existing roads and building new motorways and expressways to improve and expand the country's road network. The National Highway Authority (NHA) under the Federal Ministry of Communications is responsible for the 7000 kms long National Highway Network and Motorway systems, which carries 75% to 80% of the total commercial traffic. The road network in Pakistan is expanding rapidly and the pace of this development is gradually accelerating which is continuing till now. In spite of overall resource constraints in the country, Government of Pakistan (GOP) has been making substantial investments to develop National Trade Corridor linking major urban centers. The Asian Development Bank (ADB) has provided funding for the implementation of National Trade Corridor Highway Investment Program (NTCHIP). Construction of Faisalabad-Khanewal Motorway (184 Km) as M-4 is an important step towards this direction.

2. NHA planned for this motorway is to provide a safe, congestion free and high speed facility to commuters of the project area as well. This Motorway will improve the communication network within Punjab province. Overall, the Project will have a positive impact on the economic development of the country due to trade activities.

3. After initial screening criteria based on the ADB's Safeguard Policy Statement, 2009 and Environmental Assessment Guidelines, the Project is categorized as "Category A" for which EIA is required as Project may affect an area larger than the sites or facilities subject to the physical works involved; likely to permanently convert large productive area into non productive and large number of people to be displaced.

4. The Most of the land of the RoW of the Proposed Project is agricultural; however a small quantity of residential and commercial land will also be acquired. The major towns and cities near RoW are Faisalabad, Gojra, Painsara, Shorkot, Toba Tek Singh and Khanewal.

Objectives and Schedule

5. The prime objective of the proposed Project is to improve trade flows and lower transit costs and time by providing a high speed, safe and reliable access controlled Motorway system.

6. The M4 (section-I) is already under construction as tranche 1 of the MFF, construction on the first section is expected to be completed in December 2014. The expected date for start of civil work on section-II is in February 2015 and is expected to complete in February 2017.

Project Components

7 The proposed Motorway Project comprises the construction of two lane dual carriageway from Faisalabad to Khanewal and construction of ten Interchanges at different road crossings. Two Bridges will be constructed one at Sadhnai Spill channel and other on Ravi River. The carriageway will include paved shoulders at inner and outer sides. The outer shoulder of each carriageway will be 3m wide with 0.5 meter rounding and the inner side will be 0.6 meter wide. The project is

divided in the following construction Packages

- Package-I: Faisalabad-Gojra Section (57 Km); Implemented as Tranche-1 under NTCHIP
- Package-II: Gojra - Shorkot Section (62 Km); Will be implemented as Tranche-4 under NTCHIP
- Package-III: Shorkot -Khanewal Section (65 Km);

Relevant Legislation and Guidelines

8. To carry out the present EIA Study, the environmental legislation and Guidelines enforced by the Pakistan Environmental Protection Agency and Asian Development Bank's (ADB) Safeguard Policy Statement (SPS) 2009 have been followed.

Components of the EIA Report

9. The Report contains the identified environmental impacts and their mitigation measures. Besides, the Report also includes the preparation of Environmental Management and Monitoring Plan to cover the mitigation measures, monitoring requirements and institutional responsibilities (during design, construction and operation phases of the proposed Project).

Description of the Project

10. The proposed second portion of M-4 is the construction of 62 km long road, which will start at end point of M-4 section-I (Faisalabad-Gojra) and ends at shorkot. It will be 'four lane dual carriageway with each lane 3.65m wide. The proposed second section of M-4 is consists of three interchanges at different road crossings. The underpasses will be constructed at suitable locations. The Right of Way (RoW) of the proposed project is100m wide; where as it will be 40 m extra at the locations where interchange is constructed.

11. Construction of first section of M-4 i.e. from Faisalabad-Gojra is near completion and the construction of the second portion i.e. Gojra-Shorkot which is 62 km will be started soon after fulfilling all codal formalities, Asian Development Bank is providing financial assistance for the construction of this project. On the second section of M-4 for taking care of Environmental and Social aspects ADB's Safeguard Policy Statement (2009) will be followed. Occupational health & safety of the local population should also be addressed as well as the project workers as stated in SPS. A Grievance Redress Mechanism to receive application and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance will also establish.

Description of the Environment

12. Baseline conditions were studied for the physical, ecological resources and for socioeconomic environment. This alignment of this Motorway passes through Faisalabad, Toba Tek Singh, Jhang and Khanewal Districts. The terrain is quite flat and levelled. All the four districts have mostly agricultural fields with flat and levelled terrain throughout the alignment strip. The climate of the Project Area touches two extremes, characterised by hot summers and mild winters. From April onwards, the summer season continuous usually up to the middle of October after which it becomes cool and the day temperature also begins to recede. May, June and July are the hottest months. The winter season on the

other hand starts from November and continues till March. December, January and February are the coldest months.

13. In Kharif, crops such as sugarcane, fodder, maize and rice are cultivated in Faisalabad and Toba Tek Singh districts. In Jhang district beside agricultural land barren land is also present. Sugarcane, Maize, and rice are the main Kharif crops of this district. Flooded areas were also seen nearby the alignment but none of these areas falls into the Project RoW.
14. Faisalabad is for its textile industries but no textile unit is presently situated along the route. In districts of Toba Tek Singh and Jhang, very little commercial units i.e. only a few sugar mills and spinning units but none of them is along the RoW of the proposed Project. In Khanewal district Roshe Power Plant, a hatchery and pesticide factory are situated at a distance of 5 km from the Project RoW.

15. In order to get true picture of the environmental condition of the Project Area, consultants carried out water, air and noise monitoring by taking services of SGS Pakistan (Pvt) Limited in 2007 and Solution Environmental & Analytical Laboratory done analysis of ambient air, water, and noise in July 2014.

16. Socio-economic environment of the Project Area was studied in detail for developing the baseline information about the affected people of the Project. Section 3 of this report describes the findings of this exercise in detail.

Project Alternatives

17. Options were considered for this Project that included “No project” and Alternate transport modes. These have been discussed in Section 4 of this Report. Finally this option was selected because it fulfils the future Project requirements in the best way.

Environmental Impacts and Mitigation Measures

18. Various probable impacts on the existing resources due to the proposed Project and vice versa were studied under the parameters of resettlement/ land acquisition, change of land use, dismantling of structures, relocation of existing utilities, soil erosion, water bodies, air pollution, noise, flora and fauna etc.

19. The most significant impact of the project is resettlement of residents and taking of agricultural land. The loss in production can be met with by increasing the yield from fields in the agricultural sector. Orchards lost to the project will also have to be raised by the private owners of land. However, the owners of land whose land is to be acquired and the neighbouring farmers can be helped to gain access to modern technology to increase production from their land. Similarly the deficiency in livestock feed/fodder will have to be met from the adjoining areas.

20. Construction activities will result in relocation/rearrangement of various utilities within the RoW, including culverts, PTCL cable, electrical poles, transmission, telephone lines and wells.

21. Mitigation measures to eliminate/minimize those negative impacts have been proposed to bring them to an acceptable level through implementation of the Environmental Management and Monitoring Plans. Proper compensation will be given to the Project affectees in a judicious manner. Mitigation measures have

been suggested for the pre-construction, construction and operational stages of the Project, taking into consideration the environmental impacts of the proposed Project.

Economic Assessment

22. The Economic Assessment describes economic benefits of the proposed Project. Economic Internal Rate of Return (EIRR) is also provided. EIRR comes out as 15.91%, which is above 12% the assumed opportunity cost of capital in Pakistan.

Environmental Management Plan (EMP) Impacts and Mitigation Measures

(construction & operation)

23. The proposed construction of the Motorway will have both positive and negative impacts during the construction and operational phases, for which proper mitigation measures are necessary. During the field surveys, significant efforts were made to identify the major social, cultural and environmental issues related to the construction of Motorway. Various government departments and agencies were also contacted for obtaining salient information along with area resident/ stakeholders. Following is the list of anticipated potential impacts during the

Construction phase of the project:

- Land acquisition and resettlement;
- Cutting of trees/bushes falling within the proposed corridor;
- Disturbance to the public movement during construction;
- Reduction in the daily routine activities of local residents during construction;
- Air and Noise pollution due to the operation of construction machinery;
- Solid waste generation during construction;
- Oil spillages from construction machinery, resulting in soil and groundwater contamination;
- Surface water body contamination by the soil erosion and construction activities; and
- Relocation of public utilities.

24. Following are the potential impacts anticipated to occur during the operational phase of the project:

- Ecological impacts;
- Road safety;
- Pollution prevention and abatement;
- Community development; and
- Landscape.

25. No negative impacts on flora and fauna are envisaged during operational phase of the project. However, improper maintenance of saplings planted as a result of compensation of plants may adversely affect the growth of compensated plants. The impacts of air, water and noise will be reduced by applying pollution prevention technologies and practices in operation phase

according to the international good practices and national and international recognized standards.

26. On the positive side, the proposed construction of the Motorway is expected to generate considerable economic activity as new opportunities for skilled/unskilled manpower will be available as maximum efforts will be made to higher local labor/staff. Similarly, the project area would be developed and market value of the land would be enhanced during the operation phase of the project.

Environmental Management Plan

27. The objective of the Environmental Management Plan (EMP) is to address all the major environmental issues and provide framework for the implementation of the proposed mitigation measures during the construction and operational phases of the project. The proper implementation of the EMP will ensure that all the adverse environmental impacts identified in the EIA are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully adopted by the concerned institutions or regulatory agencies. The implementation of EMP should be carefully coordinated with the design and construction program of the project to ensure that relevant mitigation measures are implemented at the appropriate stage and that adequate resources are properly allocated to achieve the desired results. The EMP will be implemented by NHA with the assistance of consultants. NHA will depute Deputy Director Environment to deal with the environmental related issues.The whole EMP would be added as the part of contract document and contractor will be bound for the compliance. The total environmental cost has been worked out to be Rs. **26951900.**

28. Site Specific Environmental Management Plan (SSEMP) would be prepared by Environmental Engineer (EE) of contractor in coordination with Environmental Engineer of Supervision Consultant (SC) and that would be approved by EALS and ADB.

29. The implementation of the proposed SSEMP involves inputs from various functionaries as EEs of contractor and SC. The contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of project, for which contractor will be paid on the basis of compliance reports. However, if the contractor fails to comply with the implementation of EMP and submission of the compliance reports, deductions will be made from the payments to the contractor claimed under the heads of environmental components.

Public Consultation and Information Disclosure

30. Consultant's EIA team identified the stakeholders of the proposed Project and discussed the Project with them during the detailed field visits. Stakeholders of section-II of M-4 were also contacted in June and October 2014 during the detail project visits, their views and concerns were noted and have been incorporated in section 9 of this Report. After reviewing their concerns, mitigation measures have been suggested for giving them the due compensation.

Grievance Redress Mechanism

31. In order to receive and facilitate the resolution of affected people's (AP) concerns, complaints and grievances about the Project's environmental performance, a Grievance Redress Mechanism (GRM) will be established at the Project. The GRM will address the APs' concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the APs at no costs and without retribution.

Conclusion

32. The proposed Motorway will enhance the trade activities of the country and provide smooth and safe travelling corridor. The proposed Motorway will involve some negative environmental impacts, which are mostly related to pre construction and construction stages of the Project and are however manageable by properly implementing the EMP. No long-term and significant adverse environmental impacts are however envisaged for the operation stage of the Project. Hence, the Project is environmentally feasible provided that the mitigation measures are properly implemented during the Project execution.

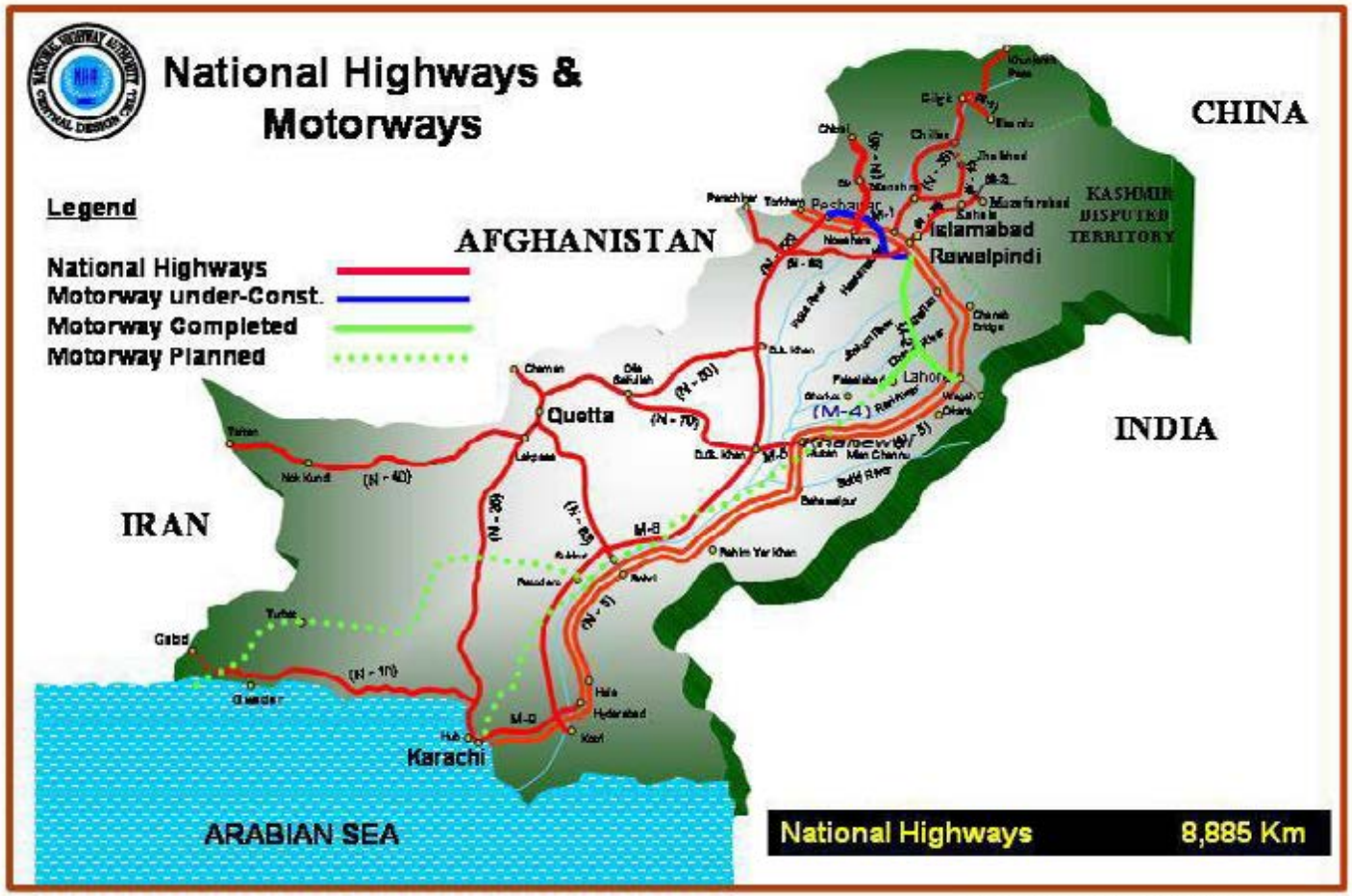


Fig. 1.1: National Highways of Pakistan

SECTION 1

INTRODUCTION

1.0 General

33. National Highway Authority (NHA) plans to construct (M-4) Motorway from Faisalabad to Khanewal. To comply with Pakistan's environmental regulations as conceived in the Pakistan Environmental Protection Act (PEPA) 1997. NHA entrusted NESPAK with the assignment of carrying out an Environmental Impact Assessment Study in 2007 of the proposed Motorway (M-4) Project. Later the EIA report was updated in June 2014 in order to address all the details of Asian Development Bank's Social Safeguard Policy Statement 2009 and Punjab Environment Protection (Amendment) Act 2012. The NTCHIP Program is financed by ADB through a Multi-tranche Financing Facility (MFF-0016) which was approved in 2007. The MFF consists of several tranches, each covering several subprojects.Section-II of M-4 will be implemented under Tranche-4 of NTCHIP.

34. The first section of the project from Faisalabad-Gojra is expected to complete in December 2014 while the construction of the second portion is expected to start in February 2015, the second portion will starts from Gojra and ends up at Shorkot, the total length of this section is 62 km, ROW of the section-II of M-4 will be 100m, it will be four lane carriageway with each lane 3.65m wide with 3m shoulders with 0.5m rounding and the inner side will be 0.6m on each side. As per design the total pavement width of the road will be 13.3m. The National Highway Authority (NHA) will be the Executing Agency (EA) for the project. The Project will provide a dependable road transport network to promote interprovincial connectivity, reduce transportation time to economize the costs, provide all weather road to the community, and improve the developmental pace in the area. Safeguard Policy Statement 2009 of ADB's will be implemented on section-II of M-4 for taking care of all Environmental and social issues.

35. The construction of the proposed Motorway (M-4) will facilitate and enhance the trade activities in the country and will provide time saving and safe and speedy access to various parts of the country. M-4 is the extension of M-3 and will start from the end point of the existing Faisalabad – Pindi Bhattian Motorway (M-4) near Sargodha Road, Faisalabad. Figures 1.1 and 1.2 indicate the National Highway Network and location plan of the Project Area.

36. The proposed Motorway (M-4) is a part of the National Trade Corridor. The road will provide easy access to the traders and farmers for transportation of goods to other parts of the country by reducing the time required for transportation.

1.1 Proponent of the Project

37. National Highway Authority (NHA) is the proponent of the proposed Project with the following address:

National Highway Authority
27 Mauve Area, G-9/1,
Islamabad

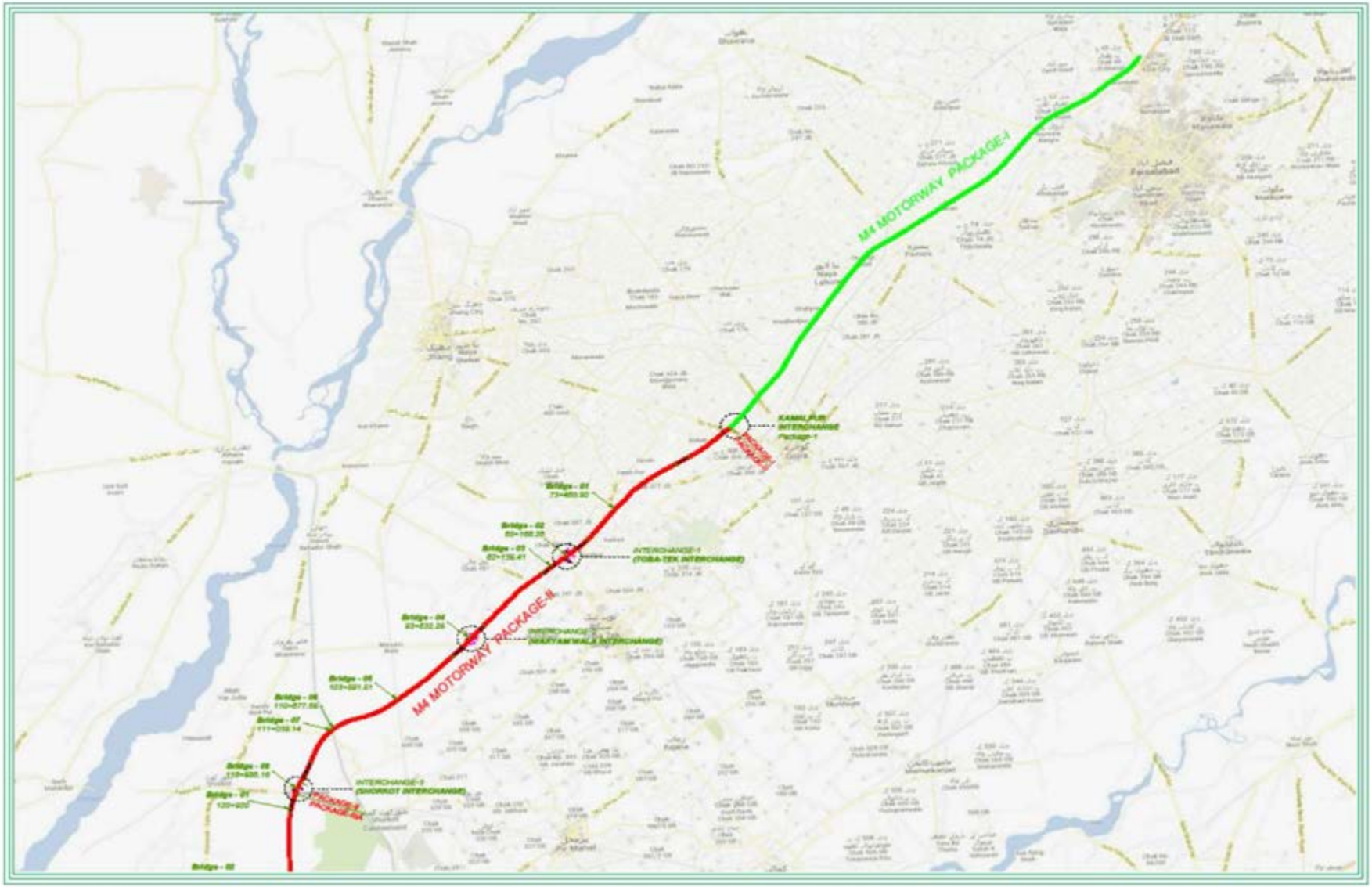
Ph: 051-9032506

1.2 Overview of the Project

38. The length of this Motorway Project is about 184 Km starting from the end point of Faisalabad-Pindi Bhattian Motorway (M-3) near Faisalabad and ending at National Highway Multan- Khanewal Road (N-5). This Project section consists of the following major components:

- Construction of a 4 lane dual carriageway;
- Construction of Interchanges at various road crossings; and
- Construction of bridges and underpasses.

Figure 1.1 Alignment map of Section-I and II of M-4



1.3 Scope of Study

39. The scope of the EIA Study aimed at the identification of the possible impacts of the proposed Project on its immediate surroundings on both short and long term basis. Then based on the nature and levels of those impacts, proper mitigation measures were delineated and cost for inclusion into this EIA Report. This report is due to be submitted for approval to Provincial Environmental Protection Agency (EPA) Punjab before 31st March 2007. The Punjab EPA will carry out a review within 90 days. After the approval of this Report, the Project Proponent and the Contractor will be bound to follow the recommendations of the Report during the execution of engineering activities on site.

40. In order to investigate the environmental, geological and social features of the Project Area, the Consultants carried out two detailed site visits for collecting primary and secondary data to identify and establish the Corridor of Impact (CoI) and various mitigations required to minimise the adverse impacts.

1.4 Project Categorisation

41. Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations 2000, Schedule II, lists down the projects requiring an EIA study as under:

42. "The Projects in schedule-II are generally major Projects and have the potential to affect a large number of people. They also include Projects in environmentally sensitive areas. The impact of such Projects may be irreversible and could lead to significant changes in landuse and the social, physical and biological environment."

43. Schedule-II describes the requirements of EIA for transportation Projects as under:

44. "Federal or Provincial Highways or major roads greater than 50 Million Rupees in value. Maintenance (rebuilding or reconstruction of existing roads) is exempted from the requirement of an EIA".

45. As per EPA Guidelines, the present Project is classified as "Schedule II" that requires an EIA study and approval from the concerned authority, prior to construction (Attached as Annexure -I).

46. Asian Development Bank's Safeguard Policy Statement (SPS) 2009 classify the projects requiring an EIA in Category A as under:

47. "A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area lager than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required".

48. The present Project requires an EIA as it involves significant environmental impacts, i.e. resettlement of people and structures, cutting of trees, change in land use etc.

1.5 Components of the Report

49. This EIA Report has been prepared following the Pakistan Environmental Protection Agency (EPA) Guidelines for environmental assessment and Asian Development Bank (ADB) Safeguard Policy Statement (SPS) 2009. The format of the Report consists of the following components:

Section 1: Introduction

50. This section represents an introduction of the entire EIA Report. It provides information about the Project location and its benefits to the public. It contains the scope of study and overview of the Project. The section also includes the Project categorisation as per EPA criteria.

Section 2: Policy and Legal Framework

51. This section provides an overview of the policy and legal framework, environmental standards and guidelines in Pakistan that have to be followed.

Section 3: Description of the Project

52. In this section salient features of the Project are presented. It provides information about the following:

a) Overview of the proposed Project;
b) Location of the Project;
c) Project components including geometric design standards;
d) Project Right of Way (RoW);
e) Construction material;
f) Schedule of construction;
g) Construction camps; and
h) Workforce and machinery requirements.

Section 4: Description of the Environment

53. It provides an overview of the present environment of the Project area/site. It discusses the following:

a) Methodology of the study;
b) Physical environment;
c) Ecological resources; and
d) Socio-economic environment.

Section 5: Project Alternatives

54. This section discusses the Alternatives of the proposed Project.

Section 6: Environmental Impacts and Mitigation Measures

55. This section provides the information on the anticipated environmental impacts and mitigation measures. It discusses the following:

a) Project corridor;
b) Pre construction/design phase;
c) Construction phase; and
d) Operation phase.

Section 7: Economic Assessment

56. This section describes both tangible and intangible benefits of the proposed Project. It consists of detailed economic analysis of the Project.

Section 8: Environmental Management Plan

57. This section describes the measures suggested for executing the Environmental Management Plan (EMP) at the Project site. It elaborates the following in detail:

e) Objectives of EMP;
f) Key Environmental and social components;
g) Role of functionaries;
h) Specific implementation responsibilities;
i) Environmental monitoring;
j) Environmental management plan;
k) Environmental mitigation cost;
l) Environmental technical assistance and training plan; and
m) Environmental monitoring, mitigation and training costs.

Section 9: Public Consultation and Information Disclosure

58. This section consists of the information based on public consultation and information disclosure to them about the Project. It comprises of the following:

n) Identification of the main stakeholders;
o) Details of scoping sessions;
p) Stakeholders' concerns;
q) Proposed measures for incorporating the stakeholders' concerns;
r) Village meetings; and
s) Future information disclosure plan.

Section 10: Grievance Redress Mechanism

59. This section describes the Grievance Redress Mechanism that is to be established at the Project to address and resolve the complaints of the affected people (APs)

Section 11: Conclusions

60. This section presents the conclusion of the whole study. It explains the following in detail:

t) Identification of the main issues and concerns;
u) Proposed mitigation measures;
v) Benefits of the Project; and
w) Surveillance and Monitoring of the Motorway after Construction.

SECTION 2

POLICY AND LEGAL FRAMEWORK

2.1 General

61. This section provides an overview of the policy framework and national legislation that applies to the proposed project. The project is expected to comply with all national legislation relating to environment in Pakistan, and to obtain all the regulatory clearances required.

2.2 National Policy and Legal Framework

62. The Climate Change Division is the responsible authority for environmental protection policy making in Pakistan.

63. The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed project are pollution prevention and abatement, restoration of rangelands, increasing energy efficiency, conserving biodiversity, supporting forestry and plantations, and the preservation of cultural heritage.

64. Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997 the Pakistan Environmental Protection Council (PEPC) and Pak EPA were primarily responsible for administering PEPA 1997. Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection (Amendment) Act 2012, and the Punjab Environment Protection Department (EPD) is responsible for ensuring the implementation of provisions of the Act in Punjab’s territorial jurisdiction. Punjab EPD is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.

2.3 Regulations for Environmental Assessment, Pakistan EPA

65. Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule I of the IEE/EIA Regulations (SRO 339 (I0/2000), requires the proponent of the project to file an IEE with the concerned provincial EPA. Projects falling under any category specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

2.4 Regulatory Clearances, Punjab EPA

66. In accordance with provincial regulatory requirements, an IEE/EIA satisfying the requirements of the Punjab Environmental Protection (Amendment) Act 2012 which was earlier submitted to Punjab EPA in 2007 for review and approval, and received NOC well before the commencement of construction of M-4.

2.5 Guidelines for Environmental Assessment, Pakistan EPA

67. The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below:

Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA 1997;
Guidelines for Public Consultations; Pakistan EPA May 1997;

2.6 National Environmental Quality Standards (NEQS) 2000

68. The National Environmental Quality Standards (NEQS), 2000, specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers);
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources;
- Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles;
- Maximum allowable noise levels from vehicles;

69. These standards apply to the gaseous emissions and liquid effluents discharged by batching plants, campsites and construction machinery. The standards for vehicles will apply during the construction as well as operation phase of the project. Standards for ambient air quality and noise have also been prescribed.

2.7 ADB's Safeguard Policy Statement (SPS), 2009

70. The Asian Development Bank's Safeguard Policy Statement (SPS) 2009 requires that environmental considerations be incorporated into ADB's funded project to ensure that the project will have minimal environmental impact and be environmentally sound. The occupational health and safety of the local population should also be addressed as well as that of the project workers. A Grievance Redress Mechanism to receive application and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance is also established and provided in Chapter 10.

71. All loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) checklists, consisting of questions relating to (i) the sensitivity and vulnerability of environmental resources in project area, and (ii) the potential for the project to cause significant adverse environmental impacts. Projects are classified into one of the following environmental categories:

- Category A: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area lager than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

- Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A

projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

- Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

- Category FI: A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary (FI).

2.8 Interaction with other Agencies

72. NHA is responsible for ensuring that the project complies with the laws and regulations controlling the environmental concerns of highway construction and operation, and that all preconstruction requisites, such as permits and clearances are met.

2.9 Provincial EPAs

73. NHA will be responsible for providing the complete environmental documentation required by the Punjab EPA and remain committed to the approved project design. No deviation is permitted during project implementation without prior and explicit permission of the Punjab EPA.

2.10 Provincial Departments of Forests and Wildlife

74. The clearing and grubbing for the Project road will involve clearing and uprooting of trees falling under construction limits within the right of way (ROW). However, any removed trees or vegetation under private ownership will be compensated. If there is some disruption to vegetation or trees the project contractor will be responsible for acquiring a 'No-Objection Certificate' (NOC) from the concerned federal or provincial forest department. The application for an NOC will need to be endorsed by the NHA.

2.11 Provincial Governments

75. The NHA and its contractors must ensure that the project meets the criteria of provincial/district governments as related to the establishment of construction camps and plants, and the safe disposal of wastewater, solid waste, and toxic materials. NHA will coordinate and monitor environment-related issues.

2.12 Other Environment Related Legislations

76. Table 2.1 gives a summary of all legislations, guidelines, conventions and corporate requirements:

Table 2.1: Environmental Guidelines and Legislations

Sr. No.	Legislation/guideline	Description
1	Punjab Environmental Protection (Amendment) Act, 2012	Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection (Amendment) Act 2012, and Punjab EPD is responsible for ensuring the implementation of provisions of the Act in Punjab's territorial jurisdiction. Punjab EPD is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.
2	Pakistan Environmental Protection Act (PEPA) 1997	Basic legislative tool empowering the Government of Pakistan to frame and enforce regulations for the protection of environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution, and handling of hazardous wastes. Penalties have been prescribed for those contravening provisions of the Act. Under section 12 of the PEPA 1997, no project involving construction activities or any change in the physical environment can be undertaken unless an IEE or EIA is conducted and a report submitted to the federal or provincial EPA.
3	Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, (2000)	The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA. It also lists Projects not requiring either an EIA or an IEE.
4	National Environmental Quality Standards (1993 and 2000)	The NEQS specify standards for industrial and municipal effluents, gaseous emissions, ambient air requirements and emission levels for Sulfur dioxide and Nitrogen oxide, vehicular emissions and noise levels. The PEPA specifies the imposition of a pollution charge in case of non-compliance with the NEQS. The standards were last revised in 2000.

5	National Environmental Policy (2005) (NEP)	NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, "to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development". The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country.
6	Land Acquisition Act, 1894 Including Later Amendments	The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of road will be acquired under normal conditions based on prevailing market prices or negotiated prices between NHA and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.
7	The Forest Act (1927)	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. No protected forest is situated in the Project Area.
8	Canal and Drainage Act (1873)	This Act prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.
9	Pakistan Penal Code (1860)	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.
10	Protection of Trees and Brushwood Act, 1949	This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department. The Forest Department will be approached for permission to cut trees along the road alignment.

NATIONAL ENVIRONMENTAL AND CONSERVATION STRATEGIES		
11	National Conservation Strategy	Before the approval of NEP the National Conservation Strategy (NCS) was considered as the Government's primary policy document on national environmental issues. At the moment this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas.
12	Biodiversity Action Plan	The plan recognizes EIA as an effective tool for identifying and assessing the effects of a proposed operation on biodiversity

INSTITUTIONAL FRAMEWORK

13	Environment and Conservation	There is a well-established framework for environmental management in Pakistan. The Ministry of Environment deals with environment and biological resources. Within the ministry, the NCS unit established in 1992 is responsible for overseeing the implementation of the strategy. Two organizations, The Pakistan Environmental Protection Council (PEPC) and the Pak EPA are primarily responsible for administering the provisions of the PEPA, 1997. The PEPC oversees the functioning of the Pak EPA. Its members include representatives of the government, industry, non-governmental organizations, and the private sector. The Pak EPA is required to ensure compliance with the NEQS, establish monitoring and evaluation systems, and both identify the need to and institution of legislations whenever necessary. It is thus the primary implementing agency in the hierarchy. The Provincial Environmental Protection Agencies are formed by the respective provinces.
INTERNATIONAL CONVENTIONS		

14	The Convention on Conservation of Migratory Species of Wild Animals, (1981.21)	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species. There are no endangered species of plant life or animal life in the vicinity of the Project.
15	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.
16	International Union for Conservation of Nature and Natural Resources Red List (2000)	Lists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Larkana
INTERNATIONAL ENVIRONMENTAL GUIDELINES		
17	ADB's Safeguard Policy Statement (SPS), 2009	ADB's Safeguard Policy Statement (SPS), 2009 provides guidelines for environmental assessments of development projects. These guidelines help prospective projects identify impacts they will have on various environmental receptors. The guidelines call for carrying out EIAs or IEEs of projects based on severity of their impacts.

SECTION 3

DESCRIPTION OF THE PROJECT

3.0 General

77. The Faisalabad-Khanewal Motorway (M-4) Project will be a crucial Motorway link as it will enable trade and transportation linkage among major cities of the country. The proposed Project will also facilitate residents of Faisalabad, Toba Tek Singh, Khanewal and Multan and will provide easy access towards Multan, Lahore and onward to Islamabad. This EIA is updated to address the environmental factors for section-II of M-4.

78. Prime objectives of the proposed Project are as follows:

- Enhance trade activities in the country;
- To provide in future the Trade linkage of Central Asian Republics with Pakistan.
- Provide safe, high speed and time saving corridor to the travellers;
- Enhance the efficiency of road network; and
- Reduce the number of accidents.

79. The traffic generation, annual incremental rate and increase in speed with/without proposed Motorway is enlisted in Tables 3.1, 3.2 and 3.3.

TABLE-3.1
TOTAL TRAFFIC LIKELY TO USE
FAISALABAD-KHANEWAL MOTORWAY (M-4)

Vehicles/Year	CARS	MINI BUSES	BUSES	LOADER PICKIPS	TRUCKS	TOTAL MOTORIZED TRAFFIC
2008	4069	3595	1570	1198	2395	12827
2009	4386	3851	1647	1274	2528	13687
2010	4709	4111	1726	1352	2663	14561
2011	5113	4421	1813	1442	2812	15601
2012	5523	4737	1900	1534	2964	16659
2013	5997	5105	2008	1642	3148	17900
2014	6484	5484	2118	1754	3336	19177
2015	6985	5873	2231	1868	3530	20487
2016	7583	6331	2351	1998	3741	22004
2017	8198	6802	2474	2131	3957	23562
2018	8678	7160	2556	2228	4107	24730
2019	9159	7519	2637	2326	4257	25898
2020	9639	7877	2719	2423	4408	27066
2021	10207	8284	2806	2531	4568	28396
2022	10775	8691	2892	2639	4728	29725
2023	11343	9097	2979	2747	4888	31054
2024	11911	9504	3065	2855	5048	32384
2025	12479	9911	3152	2963	5208	33713
2026	13138	10375	3242	3081	5379	35215
2027	13798	10840	3332	3199	5550	36718
2028	14457	11304	3421	3317	5721	38221

2029	15116	11769	3511	3435	5892	39723
2030	15776	12233	3601	3553	6063	41226

Source: NESPAK
Note**:** TOTAL TRAFFIC INCLUDES BOTH DIVERTED PLUS GENERATED TRAFFIC

Table-3.2
Growth in Traffic Generation

Year	Generated Traffic (%)
2008	1%
2009	2%
2010	3%
2011	4%
2012	5%
2013	7%
2014	9%
2015	11%
2016	13%
2017 & onwards	15%

Source: NESPAK

Table-3.3
Vehicle Operating Speeds (Km/h)

Description	Car	Mini Buses/ Coasters	Buses	Truck-Tractors
Without Project	55	50	45	40
With Project	120	110	110	110

Source: NESPAK

80. Tables 3.1 and 3.2 clearly indicate that number of vehicles will increase every year and it will reach upto 41,226 by the year 2030. The increase in traffic volume will result in more travel time fuel consumption due to reduced traffic speed, traffic jams and accidents. The design of the proposed Motorway will be carried out on the basis of latest traffic counts. Therefore it is imperative to construct the proposed Motorway Project so that the future traffic and travel safety problems can be encountered.

3.1 Location of the Proposed Project

81. The M-4 Project falls under the administrative jurisdiction of Faisalabad, Toba Tek Singh, Jhang and Khanewal Districts. The proposed section-II of M-4 project will starts from Gojra and ends at Shorkot.

82. The chaks and villages falling en-route of the proposed section-II of M-4 project Toba Tak Singh are 304 JB, 305 JB, 307 JB, 310 JB, 311 JB, 317JB, 360 JB, 378 JB, 383 JB, 384 JB, 385 JB, 388 JB, 390 JB, 396 JB, 398 JB, 400 JB, 401 JB, 438 JB, 469 JB, and villages in Distt Jhang are 487 JB, 488 JB, 489 JB, 490 JB, 406 JB, 505 JB, 494 JB, 496 JB, 500 JB, 504 JB, 501 JB, Rakh Kotla and 7 Gag. Presently the RoW of the proposed Project contains mostly agricultural land.

3.2 Project Components

83. The proposed Motorway Project components include construction of four lanes dual carriageway and construction of Interchanges at different local road crossings. Bridges will be constructed on drains, canal crossings and spill channels. Tree plantation will be done on both side of RoW for the beautification, conversation and safeguard for the environment. The total width of both carriage ways 31.5 (6 lane) and land reserved for plantation will be 30 meters both side (15 meters on one side) within the RoW width of 100 meters. The carriageway will include paved shoulders at inner and outer side. The outer shoulder of each carriageway will be 3 meters wide with 0.5 meter rounding and the inner side will be 0.6 meter.

84. The M-4 Motorway project will be divided into following construction Packages

- Package-I: Faisalabad-Gojra Section(57 Km); implemented as Tranche-1 of NTCHIP
- Package-II: Gojra - Shorkot Section (62 Km);implemented under Tranche-4 of NTCHIP
- Package-III: Shorkot -Khanewal Section (65 Km);

This EIA is updated to discuss the package-II of M-4 from Gojra-Shorkot Section-1 of M-4 (58 Km Faisalabad to Gojra Section) Project is already implemented as Tranche-1 of NTCHIP through ADB Financing under Loan Pak 2400, and the construction works on this section are near completion. Now NHA has planned to implement M-4 Section-2 starting at Gojra (end point of M-4 Section-1) and terminating near Shorkot City. The Section-II of M-4 is subject to be financed by Asian Development Bank as tranche-4 of MFF for NTCHIP, therefore to ensure compliance with IR requirement-II of ADB's Safeguard Policy Statement 2009.

3.2.1 Interchanges

85. In the proposed section-II of M-4 three interchanges will be constructed at Toba Tek Singh-Jhang Road km (80+169), Toba Tek Singh-Warriamwala Road km (93+671), Shorkot Cantt-Shorkot City Road km (118+584). The interchange will be provided with two lanes each lane of 3.5 meters wide with one meter shoulder at outer sides.

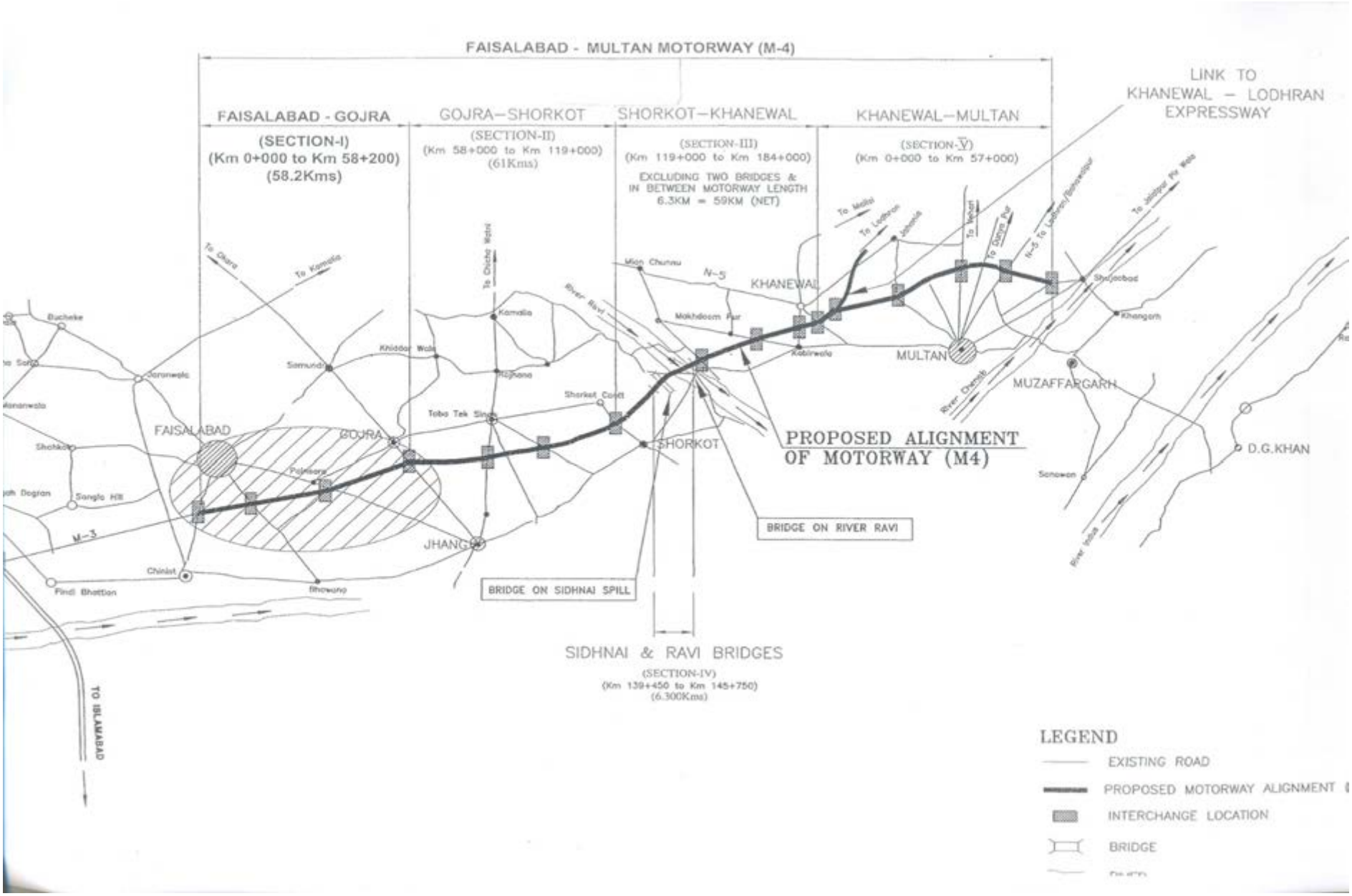
3.2.2 Bridges

86. In the section-II of M-4 motorway following under mentioned bridges will be constructed at different canal and drain crossings: Shown in Table-3.4.

Table-3.4 Bridges

Sr. No	Chainage	Skew	Size (M)	Length (M)	PGL Level
1	73+460.92	35^0	1*25	25	164.34
2	80+168.28	11^0	1*30	30	162.93
3	82+139.41	61^0	1*25	25	160.26
4	93+632.25	45^0	1*30	30	157.31
5	103+591.51	33^0	1*45	45	156.47
6	110+877.85	26^0	4*30	120	151.74
7	111+039.14	27^0	1*40	40	151.99
8	118+588.16	15^0	1*30	30	149.92

Figure 3.1 General Layout Plan of M-4



3.2.3 Underpasses

87. The underpasses will be constructed at various road crossings. The link roads across the RoW of the proposed Project will pass through these underpasses. For these underpasses the width of the land strip shall follow the existing carriageway.

3.2.4 Rest Areas

88. Rest Areas will be provided after a certain distance on the proposed Motorway to facilitate travellers. For these rest area locations, a strip of 150 meters width and 200 meters length will be reserved on either side of the Motorway.

3.2.5 Service Area

89. These locations will be provided to facilitate travellers. The restaurants and Petrol pumps will be located there to provide comfort to people using the proposed Motorway. A strip of 250 meters width and 700 meters length will be reserved for the Service Area. The toilets in the service areas will be equipped with septic tanks of sufficient capacities. Sewage of the septic tanks will be disposed of at the designated waste disposal sites.

3.3 Project Right of Way

90. The Right of Way (RoW) of the proposed Motorway Project is 100 meters wide, while it will be 40 meters at the locations where interchanges will be constructed. Major construction work will generally remain confined within the RoW. About 1156 acres private land will be acquired, 47 acres land will be acquired for interchanges and 347 acres is the Government owned land.

3.4 Construction Materials

91. The materials used in construction and up-gradation of the Motorway would include coarse aggregates (crush), fine aggregates (sand), soil, water, asphalt, reinforcement, cement etc. Almost all these raw materials are locally available in the country. The construction material quarries are already available in the area, which have been approved by the Mines and Mineral Department, Punjab. The construction material for M-4 will be procured from these approved quarries and no new quarry will be dug by the contractor.

(i) Crushed Aggregate

92. A well developed source of crushed aggregate is available at Chiniot and Sargodha. Several medium size crushers are exploiting these quarries. The quantities available are quite large; however, mining leases have already been obtained by various parties.

(ii) Fine Aggregate (sand)

93. This is also available in abundant quantity in the nearby areas of the proposed Project. Good quality sand is available in the River bed of Ravi and Chenab and it is the main source of superior sand for construction needs. The Chenab River sand has some superiority over the River Ravi sand.

(iii) Sub-grade Material

94. Large quantity of sub-grade (soil) is abundantly available at various locations near the Project Site. Borrow pits of suitable material at a reasonable reach will be selected.

(iv) Embankment Material

95. The embankment material will be borrowed in huge quantities in the vicinity of the Project Area. In most cases, the contractors will lease private land in the vicinity on short term basis for the purpose of acquiring earth material, after the approval of NHA designated engineer.

(v) Water

96. Groundwater is available throughout the proposed Motorway alignment. Intensive pumping is done on large scale in the vicinity of the Project Area. The surface water present in the vicinity is generally of good quality. The surface water bodies such as Ravi River and canal water is available in Project Area. The quality of the ground and surface water has been analysed in the Project Area. The laboratory results (Annexure II) show that water from both the sources is suitable for all construction requirements.

(vi) Asphalt, Reinforcement and Cement

97. Asphalt, reinforcement and cement will be transported from Khoshab, D.G. Khan, Rawalpindi, Islamabad and Karachi etc.

3.5 Engineer's Cost Estimate

98. The tentative Engineer's Cost Estimate for the proposed Project is presented in Table 3.5.

Table-3.5 Engineer's Cost Estimate for Section-II of M-4

BILLS	D E S C R I P T I O N	Amount Based on CSR 2014 (Rs.)
1	EARTH WORK	6,215,719,718
2	SUB BASE & BASE	4,958,930,717
3	SURFACE COURSE & PAVEMENT	2,487,782,526
4A	STRUCTURES	2,384,649,025
6	ANCILLARY WORKS	2,582,671,223
4B	PIPE CULVERTS	558,507,657
4C	BRIDGES	647,084,290
6A	MISC ITEMS	2,649,529,636
7	GENERAL ITEMS	249,438,750
	TOTAL	23,253,899,503
	*PROVISIONAL SUM	581,347,488
	GRAND TOTAL	23,835,246,990

***** the work not contained in the contract and required to be executed on urgent basis may be executed and paid through the Provisional Sum after the approval of Contractor's Quotation by the Employer which quotation by the Employer which quotation shall be complete in all respect including Contractor's overheads and profit.

3.6 Construction Schedule

99. The construction work at section-I of M-4 project is near completion and expected to be completed in December 2014, 83 % of the civil work on section-I of M-4 is completed till October 2014. The implementation/construction of the section-II of M-4 is expected to commence in the February 2015 and the estimated completion date will be the end of 2017. At present, the Proposed Project is at the engineering design stage.

3.7 Construction Camps

100. Camp sites will be selected keeping in view the availability of an adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor after approval from NHA.

101. The area requirement for construction camps will depend upon the deployed workforce and the type and quantity of machinery mobilized. In view of the area required, it will not be possible to locate camp sites within the ROW and the contractors will have to acquire land on lease from private landowners.

3.8 Workforce and Machinery Requirements

102. The workforce and the machinery requirements are presented in Tables 3.6 (a) and 3.6 (b) below:

Table 3.6
Workforce Requirement for Construction (Packages-II)

No.	Contractors Staff	Workforce Required
A. Managerial Staff		
1	Project Manager	1
2	Deputy Project Managers	1
3	Office Managers	2
4	Accountants	2
5	Purchasers	4
6	Quantity Surveyors	4
7	Computer Operators	4
B. Site Staff		
1	Material Engineers	2
2	Site Engineers	5
3	Surveyors	5
4	Foremen	12
5	Skilled Labourers	80
6	Semi-skilled Labourers	120
7	Labourers	200
Total		442

Table 3.6 (b)
Estimated Machinery Requirements (Packages-II)

S. No.	Machinery	Nos.
1	Dump trucks	8
2	Graders	4
3	Dozers (D-8)	4
4	Vibratory rollers	3
5	Water boozers	4
6	Loaders	3
7	Asphalt plant	1
8	Asphalt distributor	1
9	Crushing plant	1
10	Air compressors	1
11	Broomers	1
12	Asphalt Paver	3
13	PTR	2
14	Rollers for earth work	15
15	Rollers for asphalt	15
15	Generators (10 KV)	2
16	Concrete batching plant	1
17	Vibrators	3
18	Concrete transit mixers	10
19	Shoulder rumble strip indentation machine	2
20	Slip forming machine for new gersey barriers	2
21	Crane 20 ton	1

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section-4 (Bidding Forms)

SECTION 4

DESCRIPTION OF THE ENVIRONMENT

4.0 General

103. The existing environment in the Project Area has been studied with respect to physical, ecological, cultural and socio-economic aspects. The data presented in this section has been gathered during December 2006 to February 2007, and updated in June to October 2014 in order to address SPS 2009. Section-1 of M-4 (58 Km Faisalabad-Gojra Section) Project is already implemented as Tranche-1 of NTCHIP through ADB Financing under Loan Pak 2400, and the construction works on this section are near completion. Now NHA has planned to implement M-4 Section-II starting at Gojra (end point of M-4 Section-1) and terminating near Shorkot City. The Section-II of M-4 is subject to be financed by Asian Development Bank as tranche-4 of MFF for NTCHIP.

104. The direct "Corridor of Impact" (CoI) due to construction of the Motorway is 328 ft. (100 metres), which is within Right of Way (RoW) of the proposed Motorway Project. However effect of loads generating from the moving traffic will be felt beyond the designed RoW. Therefore indirect CoI is beyond the proposed RoW.

105. There is no any existing road along the proposed Motorway Project; therefore baseline environment of the Project Area is free from environmental pollution such as dust, noise or vehicular emissions. This will allow the determination of baseline conditions against which the incremental impact of the proposed Project will be assessed. Human impacts such as road safety, traffic noise, vehicular emissions and other types of associated pollution are taken into consideration for the operational stage of the proposed Project. These factors are therefore discussed as part of the environmental conditions in the Project Area.

4.1 Methodology

106. The existing information to establish a baseline of the Project Area was collected from different Government Departments/Public Sector agencies. Further, detailed field visits to the site were also carried out in order to have first hand information about the social and environmental conditions/issues of the Project Area.

107. The potential impacts of the proposed Project were ranked on the basis of their magnitude, severity and reversibility.

108. In order to assess the impacts of the proposed Project on the people living in the vicinity of the Project Area, detailed survey was conducted and existing environmental/socio-economic conditions and salient features of the area were duly observed. In addition, the relevant secondary data were also obtained from the District Census Reports for Faisalabad, Toba Tek Singh, Jhang and Khanewal. During the detailed site visit, relevant government agencies/ departments (Annexure III) were also consulted for the relevant data. To establish baseline ambient air, noise and surface and groundwater conditions of the area; air and water samples for laboratory analysis were

collected from locations in all four districts, whereas noise levels were measured at various locations.

109. Locations for air quality, water quality and noise sampling were selected keeping in view their vulnerability to the proposed Project related impacts. These locations were distributed equally in all four districts. In June 2014 for the updation of EIA report, four different locations in section-II of M-4 were selected as the sensitive receptors during the detailed field visits, these locations were based on their vulnerability of being negatively impacted during construction and operational phases of the project. The analysis of noise, air and water were carried out in order to attain the baseline data/information which in future (during construction and operation phase) will be used as the reference data. Detail analysis reports are attached Annexure-II. For the environmental testing the samples of air, noise and water were collected from following under mentioned locations and villages.

i. RD 59+200 Adjacent to water course in Chak No. 305/JB near RoW
ii. RD 86+700 Adjacent to Govt. Elementary School for girls and community houses in Chak No.396 JB
iii. RD 119+500 At Water course in Mouza Rakh Kotla..
iv. RD 120+200 Near the community houses at the end point of Section-II (Mouza 7-Ghag)

110. The above locations were selected as sensitive receptors based on their distance from the proposed alignment of M-4 Section II. These locations were found within 50 meters of RoW. In future during the construction and operational stage these location were carefully monitored and reported.

I) RD 59+200 Chak 305/JB was selected because few community houses and water course was 35 meters away from proposed alignment.
II) RD 86+700 Chak 396/JB was selected because Govt. Elementary School for girls, was just 21 meters away from RoW.
III) Thick population lived at RD 119+500 Mouza Rakh Kotla .
IV) RD 120+200 Mouza 7 Ghag few community houses and hand pumps found near RoW

Locations of sensitive receptors are shown in Figure-4.4.

4.2 Physical Environment

4.2.1 Meteorology

111. The climate of the Project Area touches two extremes, characterised by hot summers and mild winters. From April onwards, the summer season continues usually up to the middle of October after which it becomes cool and the day temperature also begins to recede. May, June and July are the hottest months. The winter season on the other hand starts from November and continues till March. December, January and February are coldest months. The mean maximum and minimum temperature in summer are 41 ^{o}C and 27 ^{o}C respectively and in winter 19 ^{o}C and 4 ^{o}C respectively. Table 4.1 shows the temperature, precipitation and relative humidity recorded at Faisalabad for the period of 30 years.

Table 4.1
Month-Wise 30 Year Mean Maximum and Minimum Temperature, Precipitation and Humidity Data (Faisalabad, Toba Tek Singh and Jhang)

Month	Mean Temperature (^{o}C)		Precipitation (Millimetres)	Relative Humidity (%)
	Maximum	Minimum		
January	19.4	4.1	11.5	66.0
February	21.9	7.1	20.1	61.2
March	26.7	12.3	25.7	58.2
April	33.5	18.0	16.9	46.5
May	38.4	22.7	16.1	37.5
June	40.5	26.9	27.9	41.7
July	37.1	27.0	115.0	61.5
August	36.1	26.6	89.8	65.9
September	35.7	23.7	28.6	59.9
October	33.0	17.0	3.8	54.7
November	27.2	10.1	3.0	62.7
December	21.4	5.1	8.6	66.5
Annual (Average)	30.9	16.7	372.3	56.8

Source: Data Processing Centre, Pakistan Meteorological Department, Karachi, 1961 – 90 (District Census Reports – Faisalabad, Toba Tek Singh and Jhang)

112. The above data represent the temperature, precipitation and relative humidity for Faisalabad, Toba Tek Singh and Jhang as they are close to one another therefore data given in District Census report is same. The mean maximum and minimum temperatures in June (the hottest month) are 40.5 ^{o}C and 26.9 ^{o}C respectively and in January (the coldest month), 19.4 ^{o}C and 4.1 ^{o}C respectively as per records for the 30 year period (1961-1990).

113. The Project Area has very few rainfalls. The summer season continues from July to September and the winter season from December to April. The bulk of monsoon precipitation occurs in July and August, with monthly averages of 115.0 and 89.8 mm respectively. Minimum rainfall occurs in the month of November, which is 3.0 mm.

Table 4.2
Month-Wise 30 Year Mean Maximum and Minimum Temperature, Precipitation and Humidity Data (Khanewal)

Month	Mean Temperature (^{o}C)		Precipitation (Millimetres)	Relative Humidity (%)
	Maximum	Minimum		
January	21.0	4.5	7.2	62.3
February	23.2	7.6	9.5	56.4
March	28.5	13.4	19.5	51.6
April	35.5	19.5	12.9	40.1
May	40.4	24.4	9.7	33.2
June	42.3	28.6	12.3	39.9
July	39.2	28.6	61.3	56.0
August	38.0	28.0	32.6	59.7
September	37.2	24.9	10.8	56.3
October	34.6	18.2	1.7	51.6
November	28.5	10.9	2.4	61.4
December	22.8	5.5	6.9	66.6
Annual (Average)	33.6	17.8	186.8	52.9

Source: Data Processing Centre, Pakistan (District Census Report Khanewal)

4.2.2 Air Quality

114. The air quality in the Project Area is mostly free from pollutants except dust on the roads where interchanges and flyovers are proposed. A lot of dust occurs due to dry atmosphere and the situation gets aggravated by the human activity. Large amount of suspended particulate matter (SPM) is generated when the vehicles move (to overtake other vehicles) on unpaved shoulders of these roads. The proposed Project will not cause any dust problem due to smooth road surface and paved shoulders.

115. For establishing baseline ambient air quality conditions, four monitoring sites were selected in 2014. The air samples collection locations are as under:

I) RD 59+200 Chak 305/JB was selected because few community houses and water course was 35 meters away from proposed alignment.
II) RD 86+700 Chak 396/JB was selected because Govt. Elementary School for girls, was just 21 meters away from RoW.
III) Thick population lived at RD 119+500 Mouza Rakh Kotla .
IV) RD 120+200 Mouza 7 Ghag few community houses and hand pumps found near RoW

Table 4.3
Ambient Air Quality Monitoring

S.No	Locations	Parameters	Unit	Method used	Results	Pak NEQS
1	Chak 305 JB (59+200)	PM_{10}	($\mu g/m^3$)	Integrated method	51	150
2	Chak 396 JB Adjacent to GES(86+700)	PM_{10}	($\mu g/m^3$)	Integrated method	48	150
3	At water course in Mouza Rakh Kotla. (119+500)	PM_{10}	($\mu g/m^3$)	Integrated method	48	150
4	Near end point of Section-II (Mouza 7-Ghag)	PM10	($\mu g/m^3$)	Integrated method	64	150

116. Sampling locations were selected in section-II of M-4 these were collected near from RoW of the proposed motorway i.e. near community houses, schools and agriculture fields. Sampling was conducted once in 24 hour period. Samples were taken at downwind side and from 5 – 10 metres from the edge of the road. During sampling, average temperatures were 35 to 40^0C respectively. Sampling locations and laboratory reports are provided in Annexure II.

117. Ambient air quality standards developed in Pakistan is 150$\mu g/m^3$, therefore for the analyses done in July 2014 were compared with, PAK NEQS standards.

118. Table 4.3 indicates that the value of PM_{10} remain within the NEQS standards on all four locations This may be due to the reason that the sites at present are away from any road and construction activity.

4.2.3 Noise

119. As the existing status of the Project area is mostly agricultural fields and some road crossings therefore noise is serious issue only at road crossings. The average value of noise taken at the selected points was within the NEQS limits and is expected that in the construction and operation phase this will go beyond limits. Roadside noise levels were measured from the edge of the road (about 7.5 m from the source). Average noise level along the road is between 30 – 48 dB(A). Table 4.4 presents the noise levels recorded at different locations. Average values for the section are all well within the NEQS i.e. 65 dB(A). Noise along the proposed Motorway from Gojra to ShorKot Section II of M-4 is not a serious issue as it is a new alignment. Noise levels monitoring were carried out at four different locations where ambient air quality was monitored keeping in view the distance from the community of proposed alignment. These locations have already been shown in figure 4.1. The monitored data for noise is presented in Annexure-II. Environment Team of EALA NHA will ensure the implementation of EMP in order to mitigate the negative impacts if arise.

Table 4.4
Noise Levels at Various Locations

(i) Project Location: Adjacent to community in Chalk No. 305/JB (Pre- Construction Phase)

Sr. No.	Location	Noise Level (dBA) Mint.	Noise Level (dBA) Max.	Average Noise Levels (Leq)
1	Left side of RD	35.6	47.1	41.4
2	Extreme Left side of RD	34.9	47.4	41.2
3	Right side of RD	33.3	39.7	36.5
4	Extreme Right side of RD	35.2	42.2	38.7
5	Left side of road	36.4	44.0	40.2
6	Right side of road	34.8	40.2	37.5
NEQS				**Commercial Area Day Time: 65 dB A**

(ii) Project Location: Adjacent to Govt. Elementary School for girls in Chalk No. 396 JB (Pre-Construction Phase)

Sr. No	Location	Noise Level (dRA) Min.	Noise Level (dBA) Max	Average Noise Levels (Leq)
1.	Left side of RD	36.1	41.9	39.0
2.	Extreme Left Side RD	39.7	51.6	45.6
3.	Right side of RD	40.2	50.9	45.6
4.	Extreme Right Side RD	39.2	42.6	40.9
5.	Left side of RD	37.8	52.6	45.2
6.	Right side of RD	36.2	46.4	41.3

(iii) Project Location: At water Course in Mouza Rakh Kotla (Pre-Construction Phase)

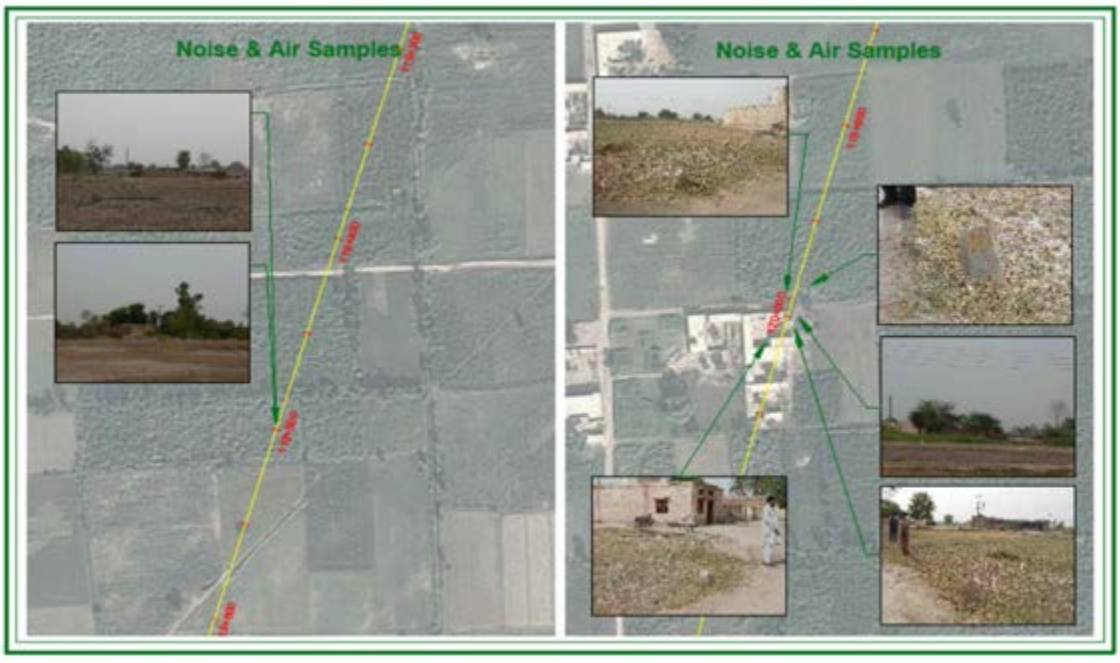
Sr. No	Location	Noise Level (dBA) Min.	Noise Level (dBA) Max	Average Noise Levels (Leq)
1.	Left side of RD	38.7	51.3	45.0
2.	Extreme Left Side RD	42.2	45.2	43.7
3.	Right side of RD	36.8	44.6	40.7
4.	Extreme Right Side RD	39.3	48.9	44.1
5.	Left side of RD	36.4	50.8	43.6
6.	Right side of RD	38.4	49.3	43.8

(iv) Project Location: Near end point of section –II Mouza 7

Sr. No	Location	Noise Level (dRA) Min.	Noise Level (dBA) Max	Average Noise Levels (Leq)
1.	Left side of RD	41.7	55.3	48.5
2.	Extreme Left Side RD	35.2	58.6	46.9
3.	Right side of RD	38.8	53.2	46.0
4.	Extreme Right Side RD	36.2	48.2	42.2
5.	Left side of RD	38.6	59.8	49.2
6.	Right side of RD	39.7	54.3	47.0

Figure 4.1 (i) Shows the locations of samples collected for Air and Noise

Figure 4.1 (ii) Shows the locations of samples collected for Air and Noise



4.2.4 Surface Water and Groundwater

120. The main sources of water in the Project Area are Ravi River and Chenab River. The canals and water courses system from these two sources is the main irrigation system in the Project Area. The Jhang Branch, Guggera Branch and Burala Branch are the major irrigation system for the Project area. This system irrigates the land of the Project Area in Faisalabad, Jhang and Toba Tek Singh districts, where as the Project Area in Khanewal district is irrigated through Sadhnai canal and Abdul Hakeem distributary. The Sadhnai canal and Abdul Hakeem Distributary are very important sources of irrigation in Khanewal district.

121. Jhang Branch, Guggera Branch and Burala Branch, Sadhnai Canal system and Abdul Hakeem distributary are the major irrigation source for all four districts. The land is also irrigated by tubewells in the Project Area.

122. Small scale waterlogging and salinity problems were also observed in the Project Area in Khanewal district, but none of these areas comes in the Motorway alignment. These waterlogged and saline areas are more than one kilometre far from the Motorway alignment.

123. In June 2014 samples for the groundwater were collected from Chak 396 JB adjacent to Government Elementary School (86+700) and near end point of Section-II (Mouza 7-Ghag) at RD 120+200 community use hand pumps and tube wells as a source for drinking water and other domestic use in these areas.For the surface water, samples were collected from RD 59+200 Chak 305/JB and RD 119+500 in Mouza Rakh Kotla, the water channels at these locations are being presently used by the community for the irrigation purposes. Sample collection locations are shown in Figure 4.2.

124. Table 4.5 shows the quality of surface water and 4.6 shows the quality of ground water is being used for domestic purpose whereas surface water is used for agriculture requirements. The main source of drinking water in the Project area are wells whereas hand pumps are also used at some locations for domestic purpose. The groundwater and surface water monitoring was carried out in Year 2014.

Table 4.5 – Surface Water Sampling

Sr.No.	Parameters	Adjacent to water course in Chak 305/JB RD (59+200)	At water course in Mouza Rakh Kotla RD (119+500)	WHO Limits
1	pH	8.5	8.5	6.5 - 8.5
2	Total dissolved Solids (TDS) (mg/L)	390	89	1000
3	Chloride (Cl) (mg/L)	34	14	250
4	Ca Hardness (mg/L)	62	10	NS
5	Nitrates (NO_3) (mg/L)	11	8	50
6	Sodium (mg/L)	130	30	200
7	Turbidity (NTU)	0	0	5

8	Fluoride (F) (mg/L)	0.27	0.17	1.5
9	Nitrites (NO_2) (mg/L)	0.08	0.06	3
10	Chromium (mg/L)	BDL	BDL	0.050
11	Temperature (^oC)	24	24	-
12	Total Hardness $CaCo_3$ (mg/L)	82.58	15.33	500
1	Total Coli Forms Number/100 ml	0	0	0/100ml
2	Faecal Coliforms (E.Coli) Number/100 ml	0	0	0/100ml
3	Chemical Oxygen Demand (COD) (mg/L)	118	132	150
4	Biological Oxygen Demand (BOD) (mg/L)	54	58	80

Table 4.6 – Ground Water Sampling

Sr.No.	Parameters	Adjacent to Govt.Elementary School for girls in Chak No.396 RD (86+700)	Near end point of Section-II (Mouza 7-Ghag) RD (120+200)	WHO Limits
1	pH	9.91	8.25	6.5 - 8.5
2	Total dissolved Solids (TDS) (mg/L)	1201	89	1000
3	Chloride (Cl) (mg/L)	68	14	250
4	Hardness (mg/L)	279.2	10	NS
5	Nitrates (NO_3) (mg/L)	11	8	50
6	Sodium (mg/L)	130	30	200
7	Turbidity (NTU)	0	0	5
8	Fluoride (F) (mg/L)	0.27	0.17	1.5
9	Nitrites (NO_2) (mg/L)	0.08	0.06	3
10	Chromium (mg/L)	BDL	BDL	0.050
11	Temperature (^oC)	26	24	-
1	Total Coli Forms Number/100 ml	0	0	0/100ml
2	Faecal Coliforms (E.Coli) Number/100 ml	0	0	0/100ml

Figure 4.2 (i) Shows the RD's on map for the samples taken for surface and the ground water

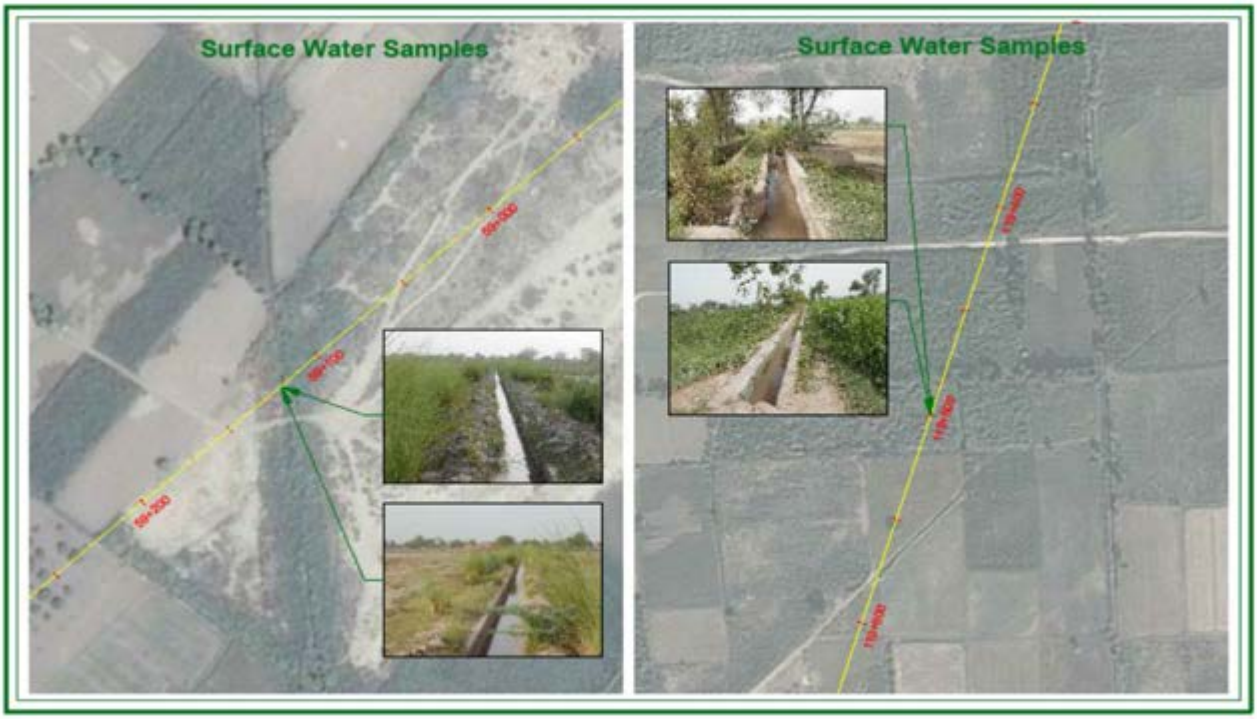
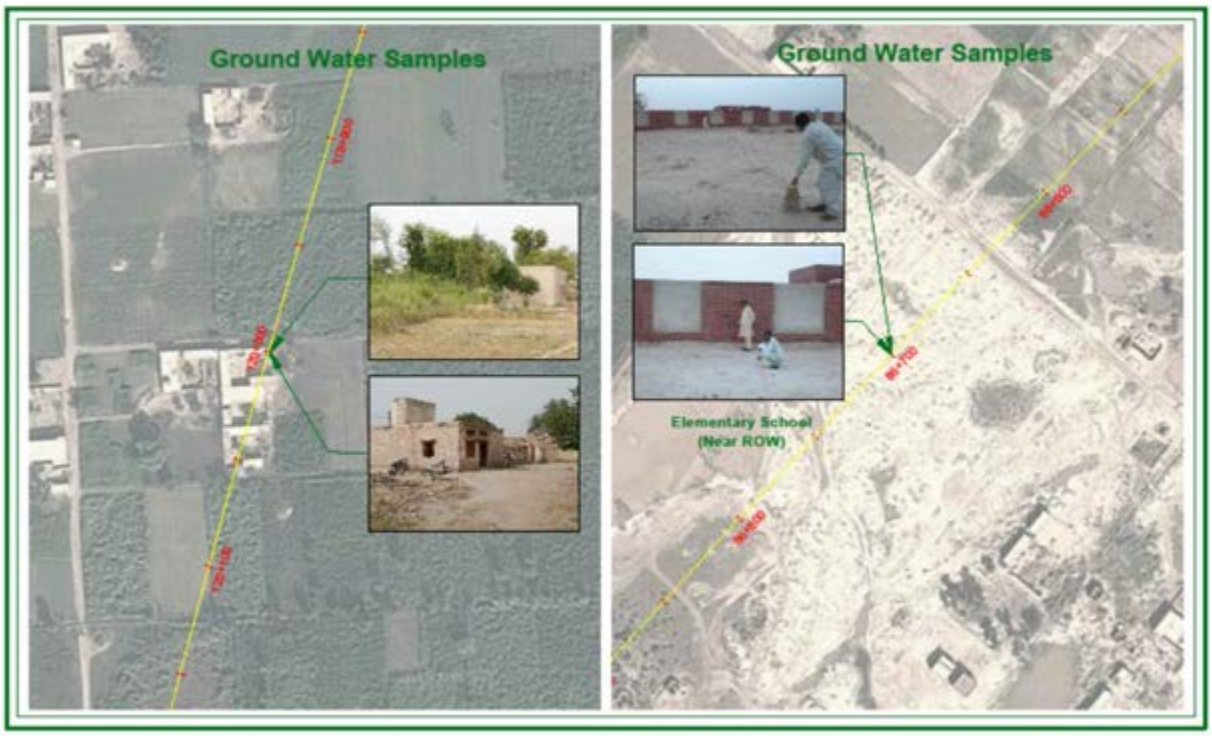


Figure 4.2 (ii) Shows the RD's on map for the samples taken for surface and the ground water

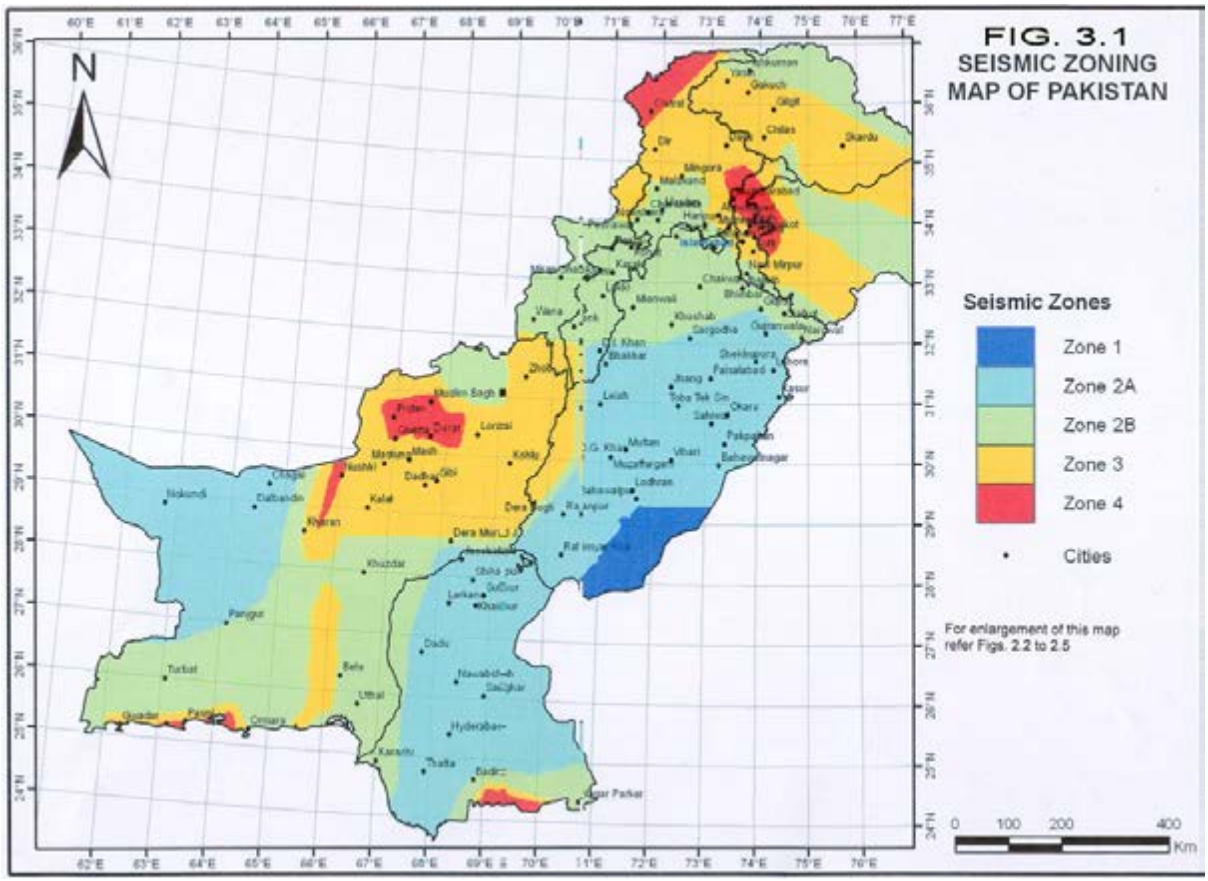


4.2.5 Topography and Geology

125. Topography of the Project Area is totally flat with mild slope from North to South. Project Area is 500 metre above the mean sea level. The soil of all four districts is fertile. The soil in the Project Area is rich alluvial loam. In Jhang district soil is part of Sandal Bar except rock that is not in Project Area. The sand is abundant in Ravi and Chenab river bed and this sand is superior for building material.

4.2.6 Seismicity

126. According to the seismic zoning map of Pakistan, the Project Area lies in Zone 1 of Modified Mercalli (M.M.) intensity scale, i.e. minor damage. Distant earthquakes may cause damage to structures with fundamental period greater than 1.0 second, corresponds to intensity V and VI of the M.M. scale as given in Fig. 4.3.



4.2.7 Agriculture and Crop Pattern

127. Agriculture along M-4 is predominantly irrigated agriculture. The Project Area depends on perennial canals from Sagir Head Works and Abdul Hakeem Head Works. The shortage of water is generally experienced in winter and in sowing season it greatly hampers Kharif cultivation.

128. The Project Area of M-4 Motorway passes through four districts. Cropping patterns in these districts are different from each other. In Faisalabad Sugarcane and Fodder is Kharif crop. In Toba Tek Singh Sugarcane, Maize, and Rice are Kharif crops. In Khanewal district Kharif season crops are Cotton, Rice and Sugarcane. Wheat is predominantly Rabi season crop of all areas. Table 4.7 represents the major crops and respective Tehsils of the Project Area. Cotton is also grown in some areas of Khanewal and Toba Tek Singh. Vegetables are grown in some areas of Faisalabad

and Toba Tek Singh. Citrus orchards are found in district Toba Tek Singh and mango orchards are found in district Khanewal.

Table 4.7
Major Crops/ Cropping Pattern in the Project Areas

S. No.	Tehsil	Cropping Pattern	
		Rabbi	Kharif
1	Faisalabad	Wheat, Fodder	Sugarcane, Fodder, Rice, Potato
2	Gojra(District Toba Tek Singh)	Wheat, Vegetables	Sugarcane, Cotton, Fodder, Potato
3	Toba Tek Singh	Wheat, Fodder	Sugarcane, Cotton, Fodder
3	Shorkot	Wheat, Fodder	Rice, Sugarcane, Cotton
4	Kabir wala (District Khanewal)	Wheat, Gram	Rice, Cotton, Fodder, Vegetable
5	Khanewal	Wheat, Gram	Cotton, Rice, Sugarcane, Maize

Courtesy: Agriculture Extension Departments (Faisalabad, Toba Tek Singh, Jhang and Khanewal)

4.2.8 Industrial and Commercial Activities

129. The route of M-4 has been designed through agriculture fields therefore chances of commercial units along the route are negligible. Faisalabad the starting point of M-4 is famous all over the world for its textile industries but no textile unit is presently situated along the route. In districts of Toba Tek Singh and Jhang, very little commercial units i.e. only a few sugar mills and spinning units but none of them is along the RoW of the proposed Project. In Khanewal district Roshe Power Plant, a hatchery and pesticide factory in the vicinity of the route where the route crosses Kabirwala-Khanewal road.

4.3 Ecological Resources

4.3.1 Flora

130 The Project Area falls under the Tropical Thorn Forest however, the natural vegetation has been replaced by the agricultural crops. Major crops grown in the area include wheat, oilseeds and fodder during winter, and sugar cane, maize, rice, fodder, and cotton in summer.

(i) Trees: Citrus and guava orchards are common towards the north eastern side, replaced by mango orchards towards south western end. Tree plantation campaigns have motivated the farmers to grow trees along the field borders or along the water channels. A total of 18000 trees were estimated to be growing in the project area. Shisham (Dalbergia sissoo) and Kikar (Acacia nilotica) are the main species. Other species growing in the area are Eucalypts (Eucalyptus camaldulensis), Semul (Bombax ceiba), Bakain / Dharek (Melia Azedarac), Jaman (Syzigium cumini), Sukh chain (Pongamia glabra), Mulberry (Morus alba), Beri (Ziziphus mauritiana) and Khajoor (Phoenix dactylifera). Roadside plantations running parallel or across the project area include Shisham, Kikar, Farash (Tamarix aphylla) and Eucalyptus. Bohr (Ficus bengalensis), Neem (Azadiracta indica), Ber and Bakain are commonly planted at the farm houses.

(ii) Natural Vegetation: Natural vegetation including Karir (Capparis aphylla), Aak (Calotropis procera), Kana (Saccharum bengalensis), Khabbal (Cynodon dactylon), Lamb (Aristida depressa), Gorkha (Lasiurus sindicus) is present only in the

graveyards or at open areas along the existing roads and canals. Mesquit (Prosopis glandulosa) has invaded many open areas. Koondar (Typha angustata) grows along water ponds and wet places.

4.3.2 Fauna

i) Mammals

131. Naturally occurring mammals have also been eradicated with the removal of natural Tropical Thorn Forests only the agriculture associated species remain. Jackal (Canis aureus), Mongoose (Herpestes edwardsi and H. javanicus), Jungle cat (Felis chaus), Hedgehog (Hemiechinus collaris) and Five striped Palm squirrel (Funambulus pennantii) commonly occur. Porcupine (Hystrix indica) also occurs in the area. Small mammals including Bandicoot or Indian mole rat (Bandicota bengalensis), Soft furred rat (Millardia meltada), Field mouse (Mus musculus), Indian gerbil (Tatera indica), and House shrew (Suncus murinus) are the common pests of agricultural crops.

132. Domestic livestock include buffalo, cattle, goats and sheep. Donkeys are kept to pull carts in the area. Some farmers are also engaged in horse breeding. Camel may be found occasionally. Livestock are mainly farm fed. Goats and sheep herds may be raised by feeding on wastelands.

ii) Reptiles

133. Cobra (Naja naja), Saw scale viper (Echinus carinatus), Russell's viper (Daboia russelii russelii) Du-muhi (Eryx johnii) and Striped keelback (Amphiesma stolatum) are known to occur in the area. House gecho (Hemidactylus brooki) is common. Common tree lizard (Calotes versicolor versicolor) may also occur in orchards. Monitor Lizard (Varanus bengalensis) and Fat tailed lizard (Uromastix hardwickii) occur in open areas. Two species of fresh water turtles viz., Indian soft–shell (Aspideretes gangeticus), and Indian flapshell (Lissemys punctata andersoni) have been reported. They are usually present near the ponds, canals and in the fields during the wet season.

iii) Amphibians

134. Bullfrog (Hoplobatrachus tigerinus), Pahari tidda maindak (Fejervarya limnocharis) and Indus valley toad (Bufo stomaticus) are also present in the area.

iv) Birds

135. Because of intensive agriculture pesticide use is a common practice. This has impacted the bird populations adversely. Black and Grey partridges (Francolinus francolinus and F. pondicerianus), are the worst hit as they are also hunted and captured to be kept as pets. Species known to occur in the area are: Cattle egret (Bubulcus ibis), pond heron (Ardeola grayii), Common and Bank myna (Acridotheres tristis and A. ginginianus), Red vented bulbul (Pycnonotus cafer), Jungle babbler (Turdoides striatus), Blyth's reed warbler (Acrocephalus dumetorum), Indian great reed warbler (A. stentoreus), Black kite (Mivus migrans), Black shouldered kite (Elanus caeruleus), Koel (Eudynamys scolopacea), Black drongo or King crow (Dicrurus macrocercus) Common crow (Corvus splendens), and house sparrow (Passer domesticus). Common quails (Coturnix coturnix) visit the area on their spring and winter migration.

4.3.3 Wetlands

136. There are no wetlands of significance in the vicinity of the Project Area. Sidhnai Barrage on the Rive Ravi is located about 4 km from the alignment of the Project Area near Abdul Hakim, but the wetland hardly ever gets the migratory waterfowl. Migratory waterfowl may however visit in small numbers the bed of River Ravi crossing the Project Area near Abdul Hakim during winter.

137. The Proposed road section also crosses canals and distributaries. Such areas do not support any populations of waterfowl; however canalside plantations support the population of song birds, species as already described.

4.3.4 Aquatic Biota

138. Aquatic fauna reported from the rivers and canals of the Project Area is mainly fish, which include the carp fishes viz., mori (*Cirrhinus mrigala*), thaila (*Catla catla*), rohu (*Labeo rohita*), silver carp (*Hypophthalmichthys molitrix*), gulpham (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*) catfishes viz., malli (*Wallago attu*), khagga (*Rita rita*), macchva (*Bugarius bugarius*), sanghara (*Mystus sienghala*) and exotic now naturalized tilapia species (Tilapia mozambica, T. nilotica, T. nilotica).

139. The welfare of fish depends on the availability of food which occurs in the form of invertebrate groups including Rotifers (*Brachionus, Synchaeta, Asplanchna*), Oligochaetes (*Stylaria, Nais*), Crustaceans (*Daphnia magna, D. longispina, Cyclops* sp.) and insects belonging to groups like Ephemeroptera, Plecoptera, Odonata, Megaloptera, Trichoptera, Diptera, Hemiptera and Coleoptera. The fauna is similar to that found in the fish farms established in central Punjab and in standing water.

140. The aquatic flora in the Project Area consists of species usually found in the standing water along the canals and fish ponds including *Typha angustata, Polygonum flaccidum, Vallisneria spiralis, Potamogeton graminea, P. crispus, Hydrilla verticillata, Monochoria vaginalis.* No rare or endangered species occur in the Project Area.

4.3.5 Sensitive Areas

141. The nearest Protected Areas in the vicinity of the Project Area are Shorkot and Khanewal Irrigated Forest Plantations both located eight and ten kilometers from the alignment of the Project Area. Figure 4.4 shows sensitive receptors along the Sectio-II M-4.

142. Shisham and Eucalyptus are grown as commercial crops. Both the plantations have been declared as Wildlife Sanctuaries. Black and Grey partridges, song birds, birds of prey, Wild boar, Jackal, Wild cat, Desert hare, Mongoose and Porcupine commonly occur. Cobra, Viper, Krait and Coluberids are the snakes. Hunting is not allowed in the Wildlife Sanctuaries but poaching is not uncommon.

i) Wildlife Sanctuaries: The Wildlife Sanctuaries are too far away from the Project Area to be affected in any significant manner.

ii) Archaeological site: There are no known sites of Archaeological or Cultural importance located within 1 Km of the Project Area.

iii) Wet Lands: There are no major wet lands in the Project Area. Small ponds were however observed to be scattered along the entire route of the Project.

Figure 4.4 (i) Show the locations of the sensitive receptors with respect to Environmental Monitoring RD 86+700-87+100

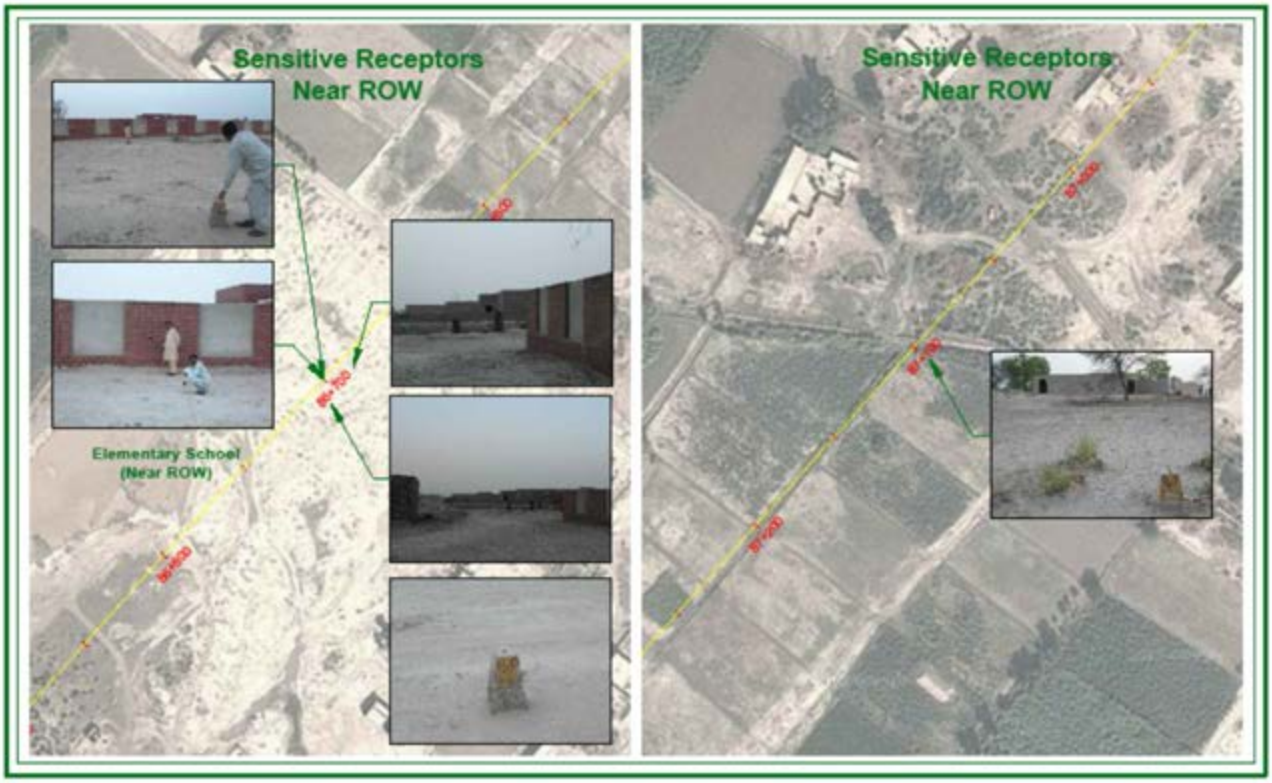
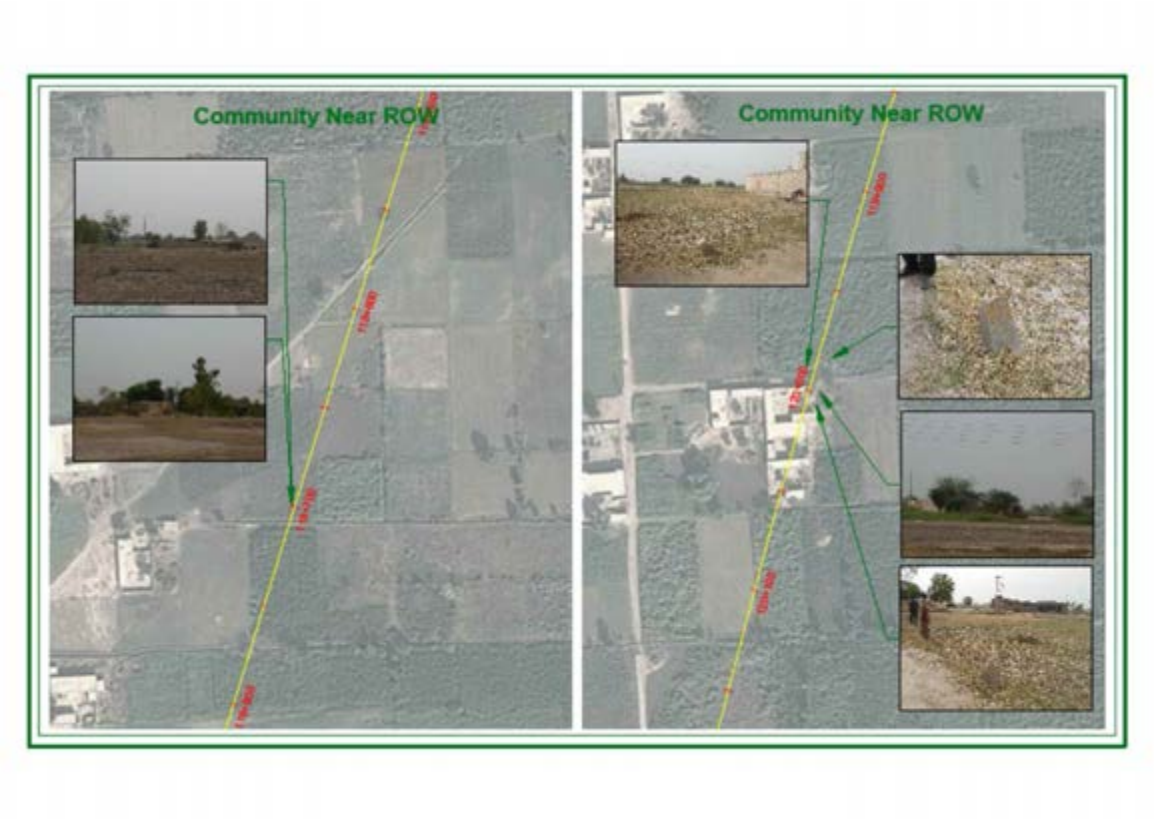


Figure 4.4 (ii)Show the locations of the sensitive receptors with respect to Environmental Monitoring RD 59+100-59+300

Figure 4.4 (iii)Show the locations of the sensitive receptors with respect to Environmental Monitoring RD 119+500-120+000



4.3.6 Endangered Species

143. There are no faunal or floral species included in the Red Data Book of IUCN. Population of all bird species including black and grey partridges has however been reduced due to pesticide sprays on agricultural crops. Shisham trees have been dying off mainly because of drought conditions and may be due to some unknown disease which has not as yet been identified hence the number of Shisham trees has greatly been reduced in recent years. Eucalyptus has been blamed for transpiring excess water from the aquifer and as a result Government as a policy matter has forbidden it's planting on good lands especially along irrigated agricultural land
s. Its planting in waterlogged and saline areas is advocated. Such areas hardly exist in the Project Area.

4.4 Socio-economic Environment

144. Motorway passes from rural areas of the Punjab and socio cultural conditions of all districts are almost same. Most of the people living in the surrounding villages are farmers, *Punjabi* is their mother tongue. In some areas *Saraiki* is also spoken as mother tongue. In almost all areas dress patron is same, *Shalwar kameez* and *dothi kurta* are the common dresses of males and females. Some modern young males also wear pants and shirts. The history of colonization exercised a profound influence on socio-economic pattern of the areas. People belong to different races but due to frequent inter-marriages, these castes have intermingled and it is now difficult to distinguish their entity and thus tribal system is no more dominated in the culture. In fact a common culture has emerged. Most of the people are engaged in agriculture or agro based businesses. Almost all the land holders have landholding size around 10 Acres therefore they belong to lower middle class. The information given in this section is collected in the socioeconomic survey conducted between January 2007 and February 2007. For the updation of the EIA report for section-II of M-4 new

survey was conducted in June and October 2014 the gathered information shows the same scenario as it was in 2007.

4.4.1 Demographic Profile

(a) Faisalabad Tehsil

145. Total population of Faisalabad Sadar Tehsil was 924,110 with a growth rate of 1.94% as recorded in 1998 Census. Population composition was 108 females as compared to 100 males. 97% of the population resided in rural areas and just 3% lived in rural areas. Average household size was 7.4.

(b) Gojra

146. This Tehsil had a population of 495,096 with a growth rate of 1.94%, as recorded in 1998 Census. Population composition was 105 females compared to 100 males. 24% population resided in urban areas and 76% lived in rural areas. Average household size was 7.2.

(c) Toba Tek Singh

147. Total population of the Tehsil was 617,035 with a growth rate of 2.07% as recorded in 1998 Census. Population composition was 107 females compared to 100 males. 90% of population resided in rural areas and just 10% lived in urban areas. Average household size was 5.6.

(d) Shorkot

148. Tehsil had a population of 670,255 with a growth rate of 2.23% as recorded in 1998 Census. Male to female ratio was 108:100. Eighty five (85) % of population resided in rural areas and 15% lived in urban areas. Average household size was 6.9.

(e) Kabirwala

149. Total population of the Tehsil was 659,612 with a growth rate of 2.19% as recorded in 1998 Census. Population composition was 107 females compared to 100 males. 15% population resided in urban areas and 85% lived in rural areas. Average household size was 7.3.

4.4.2 Settlement Patterns

150. M-4 starts from Faisalabad distric and Ends in Khanewal district. It passes from tehsil areas of Faisalabad, Gojra, Toba Tek Singh, Shorkot, Kabirwala and Khanewal. In tehsils of Faisalabad, Gojra and Toba Tek Singh, people live in villages and a few people live in their farm houses (Bhanis, Deras), therefore very few house and civic structures is coming in the Row. On the other hand in tehsils of Shorkot, Kabirwala and Khanewal, there is no formal pattern of villages establishing and people make their homes in their agriculture lands which is colloquially called Dera or Bhani, in this portion of road many houses and residences are coming in the RoW. It was thoroughly checked/confirmed during the survey conducted for section-II of M-4 in June and the public consultation sections organized in October 2014 that whether any ill-legal settlement or community area formed in the proposed section of M-4 or not. The survey negates any such development. Earlier the information was collected in 2006/2007, NHA acquired the land in section-II for the construction of M-4 by following the Land Acquisition Act and ADB's resettlement policy.

4.4.3 Races and Tribes

151. The population of these all districts is derived from Semitic or from indo-Aryan races. Most of these tribes are predecessors of different tribes who came with different attackers from Afghanistan and Central Asia and remained here. In colonial age British government developed canal command systems in these districts and did first land reforms in 1902. At that time British government allotted agricultural land to different farmer tribes and settled them here by bringing them here from different central districts of the combined Punjab like Sialkot, Amratsar, Gurdaspur, Gujranwala, Gujrat and other areas. At the time of partition in 1947 (the largest migration of human history) many refugees from Indian Punjab also settled in these areas. These tribes who came here from different regions were also of same clan who used to already live here. By living here side by side from centuries, homogeneity of culture and races has been developed among these people because of blood relations with each other. Generally these tribes can be divided in two classes, farmer tribes and non farmer tribes. Farmer's tribes are those who are mainly involved in farming and non farmer's tribes are those who are engaged in allied agro professions.

4.4.4 Indigenous People

152. Although people living around the project areas belong to different races and tribes and have different cast pattern but there is no community identified who has close culture, close economy and close community (Confined to a limited area). Therefore no any indigenous community exists and there is no danger of elimination or affecting negatively of any community by the proposed project execution.

4.4.5 Caste System

153. Project Area lies in rural areas of the Punjab. Following caste and tribes were identified during the field survey.

Table 4.8
List of Different Castes in Respective Tehsils

S. No.	Tehsils	Castes
1	Faisalabad	Sayyed, Jatt, Arain, Malik, Rajput,Sheikh
2	Gojra	Sayyed, Jatt, Arain, Malik, Rajput, Sheikh
3	Toba Tek Singh	Sayyed, Jatt, Arain, Malik, Rajput, Sheikh
4	Shorkot	Sayyed, Naul, Supra, Sheikh
5	Kabirwala	Sayyed, Haraj, Gill, Mohanas, Wahlas, Noon, Rajput Sanghara, Bandash, Mughal, Sheikh
6	Khanewal	Sayyed, Haraj, Gill, Sanghara, Bandash, Mughal, Sheikh

Source: EIA Field Survey Team (NESPAK)

4.4.6 Religion

154. Religion plays a vital role in people's life. Majority of the Project Area population is Muslim. Cultural festivals are mostly related with religious traditional events. The visit to shrines (termed as Ziarat) is a very common among people. Only minority identified are Christian in the areas which are less than 1 percent.

4.4.7 Socio-economic Survey

155. The information regarding socio-economic conditions is derived from primary and secondary sources. Methodology adopted for survey was based on collection of comprehensive information by utilization of all available resources with time effectiveness. The detailed socioeconomic survey was conducted from 19.01.2007 to 27.01.2007 to analyse the socioeconomic impacts and the concerns of the people of the Project Area. Following methodology was opted for socioeconomic survey, census of all affectees and development of baseline socio-economic conditions.

In the year 2014 for the updation of EIA report for section-II of M-4 fresh socio-economic survey was not repeated/redone. The socio-economic conditions are almost the same as they were recorded during the last survey, it is expected that the changes/improvements in the economic conditions can be seen once the project gets completed and road become operational.

4.4.8 Methodology

156. To study the socioeconomic condition of the project area all available resources were utilized for this purpose first of all reconnaissance survey was conducted by the Consultant team. Then a comprehensive field survey was carried out afterward. During this survey, primary data was collected through following data collection tools:

(i) Village Profile
(ii) Household census survey
(iii) Survey of all commercial structures
(iv) Socio-economic survey
(v) Women survey

157. Village profile, which contained comprehensive socio-economic information regarding village was filled for all the villages situated along the route. Household survey forms and commercial forms were filled by all the houses and commercial units which were falling within the RoW. To develop the socio-economic baseline, socio-economic survey and women survey were carried out from 200 males and 100 females randomly from all areas along the Project route.

158. Beside this primary information collected directly from the field. Information from secondary sources was also collected. For this purpose all available documents were studied i.e. (District Population Census Reports 1998 for the concerned districts, Design utility folders, prepared by the design Engineering consultants, IUCN literature and Asian Development Bank Guidelines for socio-economic survey. Meetings were done with the officials of revenue, agricultural and irrigation departments; feedback of all these meetings is also kept in view in study of socio-economic environment.

4.4.9 Analysis of the Respondents

159. Totally 200 questionnaires were filled from males and 100 from females at different locations in the Project Area. In these respondents people from all walks of life was included like residents of surrounding localities, passengers, key influential persons, protagonists of the village communities, women and all possible potential stakeholders. These respondents were representative of all walks of life with different professional back grounds. These people are also consulted regarding problems forecasted by them by the construction of M-4. Beside this focus group sessions were also carried out in the villages adjacent to the RoW to know the view point of general public.

4.4.10 Population Composition

160. Following population composition: male to female population ratio is based on the finding of data collected from the field.

Table 4.9
Population Composition

S. No.	Tehsils (Talukas)	Male(%age)	Female(%age)	Total
1	Faisalabad	52	48	100
2	Gojra	49	51	100
3	Toba Tek Singh	51	49	100
4	Shorkot	52	48	100
5	Kabirwala	52	48	100
6	Khanewal	51	49	100

Source: EIA Field Survey Team (NESPAK)

4.4.11 General Profile

161. Out of the 200 male respondents, 71% were married, 29% were unmarried, 55% were literate, 45% were illiterate, 63% were employed and 37% were unemployed (including students). Table 4.10 presents the general demographic profile of the Project Area.

Table 4.10
General Profile of Male Respondents

S. No.	Respondents	No.	Percentage (%)
1	Married	142	71
2	Unmarried	58	29
3	Literate	111	55
4	Illiterate	89	45
5	Employed	126	63
6	Unemployed	74	37

Source: EIA Field Survey Team (NESPAK)

162. Out of the 100 female respondents, 67% were married, 31% were unmarried, 31% were literate, 69% were illiterate, 26% were employed and 74% were unemployed (including students). Table 4.11 presents the general demographic profile of the Project Area.

Table 4.11
General Profile of Female Respondents

S. No.	Respondents	No.	Percentage (%)
1	Married	67	67
2	Unmarried	33	33
3	Literate	31	31
4	Illiterate	69	69
5	Employed	26	26
6	Unemployed	74	74

Source: EIA Field Survey Team (NESPAK)

4.4.12 Respondents' Age Group

163. Respondents were selected from various age groups. 18% of the respondents were less than 25 years old, 20% belonged to age group between 26 to 35 years, 22% fell in the age group between 36 to 45 years, 20% between 46 to 55 years and 20% of

the respondents were more than 56 years old. Table 4.12 presents the distribution of respondents according to age group.

Table 4.12
Respondents' Age Group

S. No.	Age Group	Both Sexes	Percentage	Male	Percentage	Female	Percentage
1	15-25	54	18	40	20	14	14
2	26-35	60	20	34	17	26	26
3	36-45	66	22	38	19	28	28
4	46-55	60	20	36	18	24	24
5	56-65	60	20	52	26	8	8
		300	**100**	**200**	**100**	**100**	**100**

Source: EIA Field Survey Team (NESPAK)

4.4.13 Education Level

164. Literate respondents had different education levels. Out of 142 literate respondents: 30% had primary level of education, 28% had education up to Matriculation and 24% had qualification up to intermediate and 26% were graduate or postgraduate. Educational status of the respondents is shown in the Table 4.13.

Table 4.13
Educational Status

S. No.	Education level				
1	Respondents	Primary	Middle/ Secondary	Intermediate	Graduation/ Post Graduation
2	Male	32	32	27	20
3	Female	10	8	7	6
Total		**42**	**40**	**34**	**26**
Percentage		**30**	**28**	**24**	**18**

Source: EIA Field Survey Team (NESPAK)

4.4.14 Social Amenities

165. During socio-economic survey to develop the social baseline of the Project Area, the respondents were inquired about the utilities in their homes. Almost all the respondents had electricity in their homes whereas 95% had the facility of water supply in their homes. On the other hand 54%, 23% and 15% of the respondents respectively had the facility of sewerage system, landline phone and Sui gas at their homes. Table 4.14 presents the social amenities available in the area.

Table 4.14
Social Amenities

S. No.	Social Facility	Number	Percentage (%)
1	Electricity	190	95
2	Sewerage(open Drains)	109	54
3	Telephone(Land Line)	46	23
4	Water Supply	30	15
5	Sui Gas	17	9

Source: EIA Field Survey Team (NESPAK)

4.4.15 Professional Status

166. Table 4.15 presents the professional status of the respondents. 29 % of the respondents were farmers. Among the respondents "economically active", 29 % were farmers, 16 % were businessmen and 10 % were labourers. 17% respondents were engaged in allied agriculture professions, like cattle farming, milk selling etc., 17% respondents were unemployed.

Table 4.15
Professional Status

S. No.	Profession	Number of Respondents	Percentage (%)
1	Agriculture	58	29
2	Business	33	16
3	Labor work	19	10
4	Service	14	7
5	Agro based Business	42	21
6	unemployed	34	17
		200	**100**

Source: EIA Field Survey Team (NESPAK)

4.4.16 Household Income Levels

167. During the socio-economic survey, respondents were inquired about their total monthly income from all sources. Table 4.16 shows the income levels of the respondents. Majority of the respondents i.e. 23% had their income ranging between Rs.10000-15000/month. 19% had income below Rs.5000/month. 22 % respondents belonged to the income group ranging between Rs.5000-10000/month, 19% between Rs.15,000 to 20,000/month and just 17% had an income more than Rs.25,000/month.

Table 4.16
Income Levels

S. No.	Monthly Income Group (Pak Rs.)	Number	Percentage
1	1,000-5,000	39	19
2	5,000-10,000	44	22
3	10,000-15,000	46	23
4	15,000-20,000	38	19
5	25,000+	33	17
		200	100

Source: EIA Field Survey Team (NESPAK)

4.4.17 Land Holding

168. During the survey it was identified that about 29% of the respondents belonged to the agricultural sector and some of those respondents had leased out their lands as a second business/ source of income. Majority of the respondents had very small land holdings; almost 83% of the respondents had landholdings of less than 10 acres. Only 2% had landholdings of more than 20 acres. The land holding status of the respondents is shown in Table 4.17.

Table 4.17
Land Holding

S. No.	Land in Acres	No.	Percentage (%)
1	1-5	30	52
2	5-10	18	31
3	10-15	6	10
4	15-20	3	5
5	20+	1	2
		58	**100**

Source: EIA Field Survey Team (NESPAK)

4.4.18 Borrowing Status

169. During the public consultation it was identified that a reasonable proportion of the respondents, i.e. 37 % had borrowed money from different sources such as Agriculture Bank, feudal lord, or relatives. Table 4.18 shows the barrowing status of the respondents.

Table 4.18
Borrowing Capacity

S. No.	Borrowing Status	Number	Percentage (%)
1	Under debt	81	37
2	Without any debt	119	63
		200	**100**

Source: EIA Field Survey Team (NESPAK)

4.4.19 Housing Characteristics

170. 29% of the respondents live in kacha houses, 45% respondents have semi pacca houses and 26% live in kacha (mud) houses. Table 4.19 shows the characteristics and percentage of houses in the Project Area.

Table 4.19
Types of Construction

S. No.	Construction Type	Number	Percentage
1	Kacha	58	29
2	Semi Pacca	90	45
3	Pacca	52	26
		200	**100**

Source: EIA Field Survey Team (NESPAK)

4.4.20 Gender Component

171. Gender is a critical issue that is connected to any sustainable development process, which is usually perceived as woman specific issues. In order to assess the socio-economic condition of the women of the area, a Gender component survey was conducted by taking a reasonable sample of women. A total of 100 women from the project area were interviewed by the female staff, so that they could feel comfortable. Regarding the level of awareness about the project, mostly the women were aware about the construction of Road project.

172. Table 4.20 shows the condition of women surveyed according to the table 23% women surveyed had access to school 45% had access to college level education and only 32% ladies had access to university level education this shows that they were free in getting education if they like and these educational facilities were in their surroundings. On the other hand 26% women consult leady health visitor, 18% consult government doctor, 32% consult private doctor and 24% consult quacks in case of sickness.

Table 4.20
Social Condition of Women of the Project Area

Age	Access to Education Facility			Access to Health Facility			
	School	College	University	Lady Health Visitor	Govt Doctors	Private Doctors	Quacks
16-25	12	11	6	6	4	4	2
26-35	8	6	5	5	2	4	4
36-45	2	11	7	7	6	6	4
46-55	1	9	8	5	2	10	6
56& above	-	8	6	3	4	8	8
	23	**45**	**32**	**26**	**18**	**32**	**24**
	23	**45**	**32**	**26**	**18**	**32**	**24**

Source: EIA Field Survey Team (NESPAK)

4.4.21 Culture and Tradition

173. The food of the inhabitants is very simple. Maize, wheat and rice are eaten in the project area. The use of Desi ghee and lassi is very popular in the rural area. Milk is also available in sufficient quantity. The people of the area are fond of meat especially various forms of beef. The use of ornaments among the females is also common. The females decorate themselves with ear-ring and bangles with rare use of cuba (egg like cups), connected by chains or a flat circle shaped gold hanging on fore-head.

4.4.22 Education Facilities

174. Educational facilities in the Project Area are not inadequate, but quality of education is not up to the merit. Respondents showed their apprehensions about the quality of education. In total 103 villages situated along the road totally 88 government schools for boys and 98 schools for girls beside this there was 92 private schools were also found in these villages during field survey. Table 4.21 below shows the status of educational institution along the CoI.

Table 4.21
Education Facilities in the Project Area

S. No.	Govt. Schools	Male	Female	Private School (Male+Female)
1	Primarry	54	61	58
2	Middle	25	27	26
3	High	9	10	8
Total		88	98	92

Source: EIA Field Survey Team (NESPAK)

4.4.23 Roads and Communication

175. Communication network is a fundamental prerequisite for economic activity to take place. The surrounding villages of the project area are well connected with main road and district headquarters through metalled roads.

4.4.24 Concerns Regarding the Project

176. During the field survey people were inquired about their views regarding the proposed Project. People have positive thinking and hopes about the project but fears and doubts for unforeseen issues are also in their minds. Almost all the people showed their concerns regarding the proposed Project. Respondents had multiple choices and they gave more than one response. The frequency of the responses of the respondents is shown in Table 4.22 below.

Table 4.22
Stakeholders Concerns

S. No.	Concerns	No. of Respondents
1	Livelihood will be disturbed in case loSingh agriculture land and businesses	287
2	People will never given judicious compensation against land acquired	273
2	Residential area will be affected	102
3	No compensation payment is given to affectees, especially tenant	162
4	Jobs will not be provided to local people during construction	130
5	Privacy will be disturbed due to construction work	132

Source: EIA Field Survey Team (NESPAK)

4.4.25 Resettlement Issue

177. During the detailed field visit resettlement issues were critically observed. During the survey it was identified that designer has tried to avoid the settlements. During the detailed field visit it was found no archaeological site or graveyard, nor any other structure of religious value or cultural importance is going to be demolished due to the execution of the proposed project. Only one Jamia mosque in Shorkot tehsil adjacent to a farm house needs relocation. Almost 200 house and 20 shops will need relocation for execution of the project. 80% of these houses are pacca (cement and brick masonry) and 20% of these houses are made of mud and bricks.

178. NHA through consultant prepared LARPs for each section of M-4, and for section-II which comes under tranche 4 of NTCHIP LARP is under updation/finalization and will be completely submitted to ADB in October 2014, while it is being carefully taken in consideration to avoid any archaeological site, graveyard or any other religious and cultural important structure. Details can be obtained from LARP Section-II.

4.4.26 Non-Governmental Organizations (NGOs)

179. In these districts and particularly in rural areas of these districts no international NGO's is working. The only non government organization working in these rural communities is Punjab Rural Support Programme. The main focus of this organization is on agriculture, health and infrastructure.

SECTION 5

PROJECT ALTERNATIVES

5.0 General

180. It is very important to evaluate different alternatives to arrive at the best environmentally and technically best possible options. Different alternatives were taken into consideration at the design stage of the proposed Project and they are briefly described in the following paragraphs:
The alignment of the project which was finalized in 2006/2007 under tranche-I will remain the same and will be followed in 2014/2015 for the construction of section-II of M-4 under tranche-II. The alignment of section-II will pass through following villages, the chaks and villages falling en-route of the proposed section-II of M-4 project Toba Tak Singh are 304 JB, 305 JB, 307 JB, 310 JB, 311 JB, 317JB, 360 JB, 378 JB, 383 JB, 384 JB, 385 JB, 388 JB, 390 JB, 396 JB, 398 JB, 400 JB, 401 JB, 438 JB, 469 JB, and villages in Distt Jhang are 487 JB, 488 JB, 489 JB, 490 JB, 406 JB, 505 JB, 494 JB, 496 JB, 500 JB, 504 JB, 501 JB, Rakh Kotla and 7 Gag. During the finalization of the alignment of whole M-4 and especially section-II all factors regarding social, environmental and economical aspects were carefully considered, and it was confirmed during the planning and the selection/finalization of alignment that no archaeological site, any grave yard, shrine, temple or mosque comes in RoW of the proposed project and the minimization of resettlement factor as well.

5.1 Alternative-1: No Project

181. According to the Traffic Projection Survey (refer to Tables 3.1, 3.2 & 3.3), it is estimated that in the future years; large number of people will be using the Faisalabad-Khanewal Motorway (M-4). According to the survey, total daily traffic will increase and attain rate of 7.49 per cent per year up to the year 2010 and it will be 7.08 per cent up to the year 2020. At the start of operation of the proposed Project, it is estimated that there will be approximately 13,035 vehicles using the proposed Motorway Project.

5.2 Alternative-2: Pindi Bhattian to D.G. Khan Motorway (NHA Selected Alternative) - Motorway Length 370 kms (approximately)

182. This Corridor was preferred by National Highway Authority. From Pindi Bhattian, it passes well to the north and west of Faisalabad, and then south westwards past Jhang about 15 kms to the north west of that town. It then leads straight to the City of Shorkot and crosses the River Chenab on a new bridge near the existing pontoon bridge. From this bridge, it leads south west across the Thal Desert to the River Indus approximately 25 kms downstream of the Taunsa Barrage. Having crossed the River Indus, it skirts the west and south of D.G. Khan allowing for future connections to Gawadar, Karachi etc.

5.3 Alternative 3: Pindi Bhattian to D.G. Khan Motorway (Punjab Government Selected Alternative) - Motorway Length 375 kms (approximately)

183. The Corridors preferred by NHA and the Government of Punjab are co-incident from Pindi Bhattian to Shergarh in the Thal Desert. From Shergarh, the option selected by the Government of Punjab follows the right bank of the River Chenab passing lMuzaffargarh to the north-west and crossing the River Indus 15 kms south of the

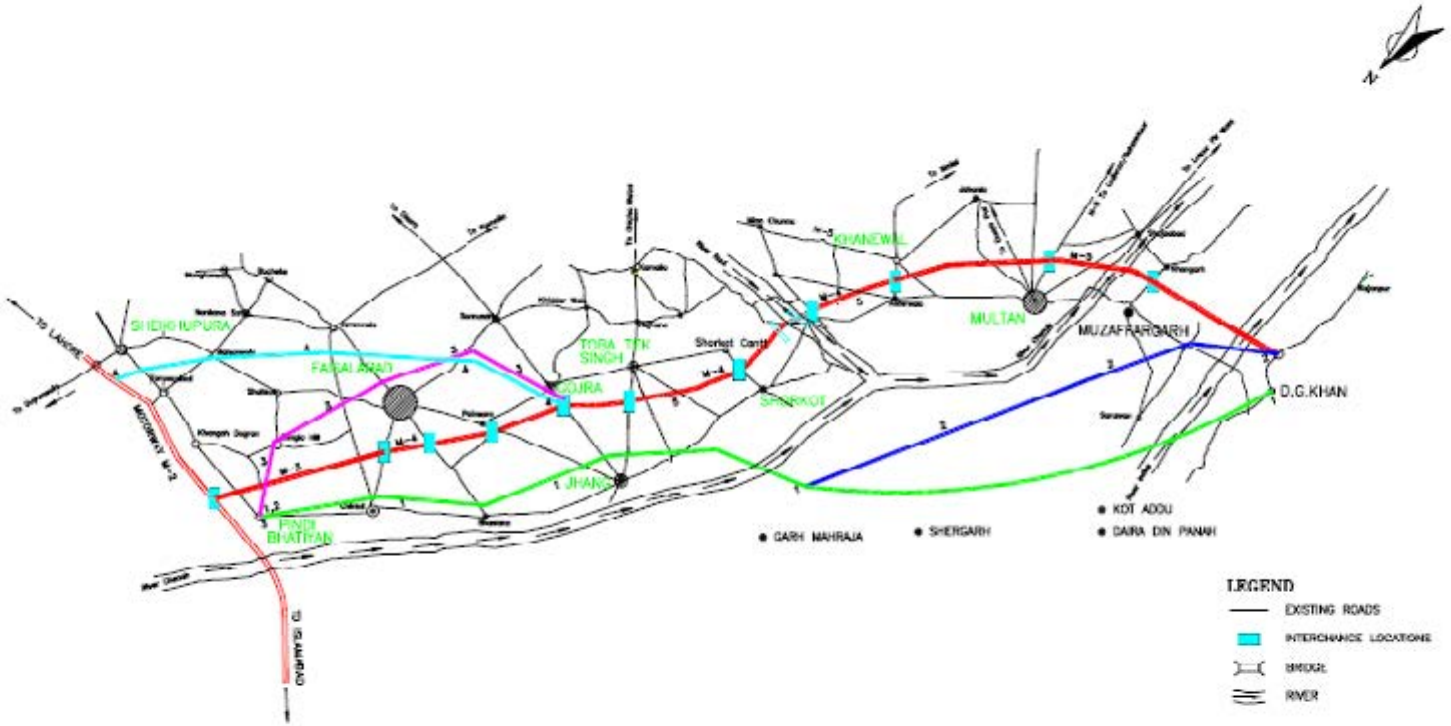
existing bridge. The suggested alignment then swings to west 20 kms south west of D.G. Khan.

5.4 Alternative 4: Pindi Bhattian to D. G. Khan Motorway (BCEOM and NESPAK Selected Alternative) – Motorway Length 405 kms (approximately)

184. This Corridor was proposed by BCEOM (French Engineering Consultants) and NESPAK (a joint venture). It was divided into the following three Sections and in each section (with the exception of Section 3) four alternatives were taken into consideration.

Figure 4.5 shows alternative alignment of section-II M-4

FIGURE 4.1: ALTERNATE ALIGNMENTS



Section 1: Pindi Bhattian – Shorkot Cantonment

185. Within Section 1, the following four possible alternatives were considered as A, B, C and D:

Alternative A passes west of Faisalabad and then swings west towards Jhang before turning south to Shorkot Cantonment;

Alternative B follows the same route as Alternative A as far as Faisalabad and then takes a shorter direct route to Shorkot Cantonment;

Alternative C from Pindi Bhattian passes Faisalabad to the east and then turns sharply to the west to join Alternative B; and

Alternative D follows the same route as Alternative C to Faisalabad and then takes a shorter direct route to Shorkot Cantonment.

Section 2: Shorkot Cantonment – Muzaffargarh

186. Within Section 2, the following four possible alternatives (A, B, C, D) were considered:

Alternative 'A' strikes west from Shorkot Cantonment to cross the River Chenab downstream of the existing pontoon bridge to the west of the City of Shorkot. It then passes through the thinly populated area referred to as the Thal Desert before turning south to the west of Multan. This alternative avoids a crossing over the River Ravi.

Alternative 'B' strikes south from Shorkot Cantonment crossing the River Ravi near the existing bridge and then swinging south west to pass to the north and west of Multan near the airport.

Alternative 'C' follows the same route as Alternative B but continues south passing to the north of Khanewal and south and east of Multan.

Alternative 'D' takes a south to south easterly direction from Shorkot Cantonment crossing the River Ravi upstream of the existing bridge and continuing south of Khanewal to join Alternative C to the south-east of Multan.

Section 3: Pindi Bhattian – Shorkot Cantonment

187. This section crosses both the River Chenab and River Indus. The constrains imposed by these major physical features are such that it was felt that advantage had to be taken of the existing investment in, for instance, the extensive training works. No alternatives are therefore proposed. The only feasible route is along the existing corridor.

188. All the above Sections and the corresponding alternatives were compared on the basis of these criteria i.e. length, traffic, hydrology and major bridges. The results obtained through the comparative analysis indicated Corridor C as preferred alternative in Sections 1 and 2. In Section 3, only the existing corridor was considered and was retained.

5.5 Alternative 5: Sheikhupura – Multan – D. G. Khan Motorway

189. The Sheikhupura – Multan – D.G. Khan section of Pakistan Motorway would start from Lahore – Islamabad section of Motorway in the vicinity of the city of Sheikhupura and move in the south-westerly direction, crossing Sheikhupura – Pindi Bhattian Road on the eastern side of Farooqabad Town. The existing Lahore – Sheikhupura – Faisalabad Road is crossed by the Project Motorway on the eastern side of the town of Manawala. Traversing through the agricultural areas, the alignment passes almost midway between the city of Faisalabad and Jaranwala Town. Passing south of Faisalabad and after crossing over the Faisalabad – Dijkot Road, the alignment takes west wardly turn to bypass the town of Gojra from north-western side. After crossing Jhang – Toba Tek Singh Road, it passes almost midway between Shorkot City and Shorkot Cantonment avoiding the sensitive defence related area. The River Ravi is proposed to be crossed between old Sidnahi and New Sidnahi barrage where river bed is well-defined, stable and straight. Passing almost midway between Khanewal and Kabirwala, the alignment crosses over National Highway (N-5) near Khanewal before moving further towards the city of Multan. While passing south of Multan, various radial roads such as Multan – Jahania, Multan – Dunyapur, Multan – Bahawalpur (N-5), and Multan Shujahabad are crossed over by this Motorway. Between Multan and D.G. Khan, the Motorway are east-west, crossing the Rivers Chenab and Indus 8-10 kms downstream of the existing bridge.

190. The total Motorway length has been calculated as 402 kms approximately and divided into four sections as described below:

From M-1 near Sheikhupura to Faisalabad – Dijkot Road, length 103 kms (approximately)

From Faisalabad – Dijkot Road to Shorkot – Shorkot Cantt, length 102 kms (approximately)

From Shorkot – Shorkot Cantt Road to Multan – Bahawalpur Road, length 112 kms (approximately)
From Multan – Bahawalpur Road to D.G. Khan – Karachi Road (N-55), length 85 kms (approximately)

5.6 Alternative 6: Faisalabad – Khanewal Motorway (M-4)

191. This option was selected by considering the factors such as low resettlement cost, less environmental damage and mitigations cost, high speed, safe, shorter distance and the linkage with existing Pindi-Bhatiyan-Faisalabad Motorway. As this Motorway Project consists of complete new alignment therefore there will be no disruption to the existing traffic system during construction. The construction of the proposed Motorway will lessen the burden of the existing Faisalabad-Khanewal road and will also decrease travel time for non-stop travellers from Faisalabad to Kanewal and other cities close to interchanges. It will also minimise resettlement of structures and other utilities. Provision of new Interchanges at various road crossings will facilitate the traffic joining Motorway and leaving it.

5.7 Project Alternatives and Impacts on Environment, Social and Economic Conditions

192 All the above mentioned alternatives were considered with respect to their impacts on environment, social and economic conditions. Table 5.1 presents summary of these alternatives and their respective impacts.

Table 5.1

Comparative Analysis of Different Project Alternatives

Project Alternatives	**Impacts**		
	Environmental	**Social**	**Economic**
Alternative 1: No Project	Increased air and noise pollution due to traffic jams on the existing Faisalabad – Khanewal Road – Higher emissions of CO, NO_x, SO_x, PM_{10}, Volatile Organic Compounds (VOC), and Photochemical Oxidants will affect the environment in the following ways: ▪ Damage to plants by choking the leaf pores and restricting photosynthesis; ▪ Impairment of atmospheric visibility affecting transportation safety; ▪ Deterioration of aesthetic quality of atmosphere, land and water; ▪ Soiling of materials, physical properties and infrastructure; ▪ Chlorosis and Plasmolysis in plants; ▪ Damage to materials and property, by acid rains, resulting from oxidation of sulphur oxides to sulphuric acid, after reacting with water vapours; ▪ Formation of photochemical oxidants; ▪ Damage to materials and property, by acid rains, resulting	▪ Longer travelling times ▪ Traffic accidents ▪ Health impacts due to air and noise pollution caused by increased traffic load on the existing Faisalabad – Khanewal Road	The increased traffic load on the existing Faisalabad – Khanewal Road in future will not only cause traffic jams but also deteriorate its condition thus affecting trade activities in different parts of the country. This will be a major economic impact. Other associated impacts include increased fuel cost and wear and tear of vehicles.

Project Alternatives	Impacts		
	Environmental	**Social**	**Economic**
	from oxidation of oxides of nitrogen to nitric acid, after reacting with water vapours; ▪ Retardation of growth in plants; ▪ Leaf discoloration and cell collapse in plant; and ▪ Damage to rubber, textiles, paints and other materials.		
Alternative 2: Pindi Bhattian – D.G. Khan Motorway (National Highway Authority Alternative) – 370 kms	▪ It will pass through the unproductive Thal Desert for a distance of 75 kms. ▪ Positive impacts on air and noise during the operation phase	▪ Little land acquisition and compensation. ▪ Considerable distance from N5, being at the closest a distance of 45 kms away from Multan. ▪ It will not provide easy or short length access to Multan, Muzaffargarh and Khanewal.	▪ It will open-up new areas for Industrial Development subject to the provision of necessary infrastructure support. ▪ This route would include two of the most expensive and time-consuming bridge river crossings over the Indus and Chenab, which could jeopardize the implementation schedule. ▪ Less attractive to intercity traffic. ▪ Having crossed the River Indus, it skirts the west and south of D.G. Khan allowing for future connections to Karachi, Gawadar etc.
Alternative 3: Pindi Bhattian – D.G. Khan Motorway (Punjab Government Alternative) – 375 kms	▪ It will pass through the inexpensive Thal Desert area for a distance of 75 kms immediately west of the Chenab River. ▪ Positive impacts on air and noise during the operation phase	▪ It is well away from N5. ▪ No easy or short access to Khanewal.	▪ It will open up new areas for possible development. ▪ This alignment will pass closer to both Multan and Muzaffargarh at 20 kms and 10 kms respectively. ▪ It will demand a new link road to Multan and for this purpose requiring a new bridge over the Chenab River ▪ It will demand three expensive

Project Alternatives	Impacts		
	Environmental	**Social**	**Economic**
			bridges over crossings. ▪ Less attractive for the development of inter-city traffic. ▪ Technical risks on these river crossings could jeopardize the overall implementation schedule.
Alternative 4: Pindi Bhattian - D.G. Khan Motorway (BCEOM-NESPAK alternative) – 405 kms	Positive impacts on air and noise during the operation phase	▪ The proposed will pass closer to the major population centres throughout the province of Punjab and ease their links with the capital Islamabad. ▪ This Motorway Corridor will serve the maximum number of potential Motorway users. ▪ It will provide a by-pass route to the towns of Faisalabad and Multan. ▪ The likely impact on acquisition and compensation for agricultural lands is more than for Alternatives 2 and 3.	▪ It will promote the most economical bridge over crossings in terms of both capital expenditure and time of construction period. ▪ This Motorway Corridor will best serve the present inter-city traffic and will allow for the development of services once constructed. ▪ By locating the proposed M1 (referred to as Lahore – Islamabad Motorway in 1992) and M3 (referred to as Pindi Bhattian – D.G. Khan Motorway in 1992) Motorway interchange at 15 kms short of Pindi Bhattian and passing south of Faisalabad, it will make this corridor more attractive for Lahore to Faisalabad traffic. ▪ It will not be the shortest route from Islamabad to Karachi.
Alternative 5: Sheikhupura – Multan-D.G. Khan Motorway (BCEOM-NESPAK alternative) – 402 kms	▪ It will traverse through the flat agricultural areas where numerous villages are located. The proposed alignment will help in maintaining sufficient desired distance from the villages all along the alignment and thus results in minimum disturbance to	▪ The Motorway alignment has been fixed keeping in view the extent of the existing urban areas and possible future extensions in foreseeable future. ▪ After crossing Jhang – Toba Tek Singh Road, it will pass almost midway between Shorkot city and Shorkot cantonment avoiding the sensitive	▪ Combination of the already planned interchange on Sheikhupura – Gujranwala road with the new interchange required for this Project will result in a very complicated and expensive arrangement.

Project Alternatives	Impacts		
	Environmental	**Social**	**Economic**
	the village life. ▪ The alignment will be aesthetically pleasing and will blend well with topography. ▪ Positive impacts on air and noise during the operation phase	defense related area. ▪ The city of Sheikhupura itself is on the southern side not very far from M1 (referred to as Lahore – Islamabad Motorway in 1992) alignment, which makes it difficult to create another take off point for the project motorway because otherwise built up area shall have to be acquired. ▪ The motorway end point has been selected on Indus Highway (N-55) about 8 kms south of D.G. Khan well clear of existing urban area and to allow for future expansion of the city.	
Alternative 6: Faisalabad – Khanewal Motorway (M-4) – 184 kms	▪ Positive impacts on air and noise during the operation phase ▪ Less environmental damage. ▪ Less mitigation cost	▪ It will reduce traffic congestion and travel time by providing safe and good quality route for movement of people and goods. ▪ It will minimise resettlement of structures and other utilities.	▪ The Motorway will enhance economic development by providing high speed safe trade corridor for the movement of goods and passengers to and from other areas of the Province. ▪ Less fuel consumption ▪ Less wear and tear ▪ Due to shorter route comparatively less resettlement of structures ▪ Comparatively low resettlement cost.

5.8 Selection of the Preferred Alternative

193. The alternatives (2-5) were studied in the year 1992 for the Motorway (M-3) from Pindi-Bhattian to D. G. Khan (later named as Sheikhupura – Multan - D.G. Khan Motorway). Frequent changes have been made ever since. M-1 (formerly used for Lahore – Islamabad Motorway) was replaced with M-2. M-1 is now meant for Islamabad – Peshawar Motorway. M-3, being approved by NHA, was supposed to start from Sheikhupura and end all the way up to D. G. Khan. But later on, the former M-3 (Pindi Bhattian to D.G. Khan Motorway) was confined to Pindi Bhattian – Faisalabad Motorway with modifications in the design especially in the Section between Pindi Bhattian to Faisalabad. M-4 (the preferred alternative) is a part of the formerly known M-3 Project (Pindi Bhattian to D.G. Khan), and it will start from Faisalabad and end at Khanewal while traversing along a number of cities such as Gojra, Toba Tek Singh, Shorkot Cantt and Kabirwala. Minor modifications have been made especially near Faisalabad and rest of the route follows the same route as approved by NHA under the M-3 Project (Sheikhupura – Multan – D. G. Khan). As already discussed, most of the alternatives are merging at Gojra. Through the construction of M-4, the route from Faisalabad to Gojra will be the shortest. The major reason for changes in the design was to reduce cost by shortening the length and minimizing resettlement.

SECTION 6

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.0 General

194. This section identifies the overall impacts of construction/operation works on the physical, biological and socio-economic environment of the Project Area. This segment also includes the impact of traffic volume due to improved road conditions. In addition, it also narrates the measures that will mitigate the Project's adverse environmental effects.

Following is a description of the perceived environmental impacts (positive/negative) of the proposed Project with their proposed mitigation measures.

6.1 Project Corridor

195. The Project corridor is delineated according to two criteria: right of way (RoW); which the NHA is legally entitled to, and Corridor of Impact (CoI), i.e. the width of the corridor that will be impacted, directly or indirectly, by the proposed Project during the construction and operational phases.

a) Project Right of Way (RoW)

196. The proposed Project corridor will have a well defined RoW that will be 100 meters (328 ft) for the entire length of the Motorway except interchanges where RoW will be 40 meters. Major construction works will generally remain confined within the RoW. All the infrastructure and commercial activities within the existing or proposed RoW need to be relocated as they will have direct impact of the Project.

b) Corridor of Impact (CoI)

197. The corridor of the proposed Impact (CoI) was delineated as the extent, which has direct or indirect impact of Project. Direct impacts of the Project are relocation of houses, utilities and air and noise pollution impact on workers during construction. All direct impacts are constrained within the RoW. Indirect impacts, caused by noise, dust emissions, camp sites and borrow sites could be beyond the RoW. The direct CoI of the surface water bodies will be confined within the RoW of the proposed Project and will be temporary only for the construction period.

6.2 Pre-Construction/Design Phase

198. Following is the brief description of impacts envisaged during the Pre-construction/ Design Phase:

6.2.1 Topography

199. The topography in the Project Area will change to some extent because of construction of the proposed Project related structures such as embankments, culverts etc. Visual changes to the topography would be permanent and minor negative in nature. However, the aesthetic elements (such as plantation) will be incorporated in the design to overcome the impacts.

6.2.2 Soil Erosion and Contamination

200. Soil erosion will take place around road cuttings and embankments, which will be mitigated by incorporating the following measures in the design:

- The provision for vegetation with a fast growing crop and a native seed mix immediately after fill placement to prevent scour and to encourage stabilization will be made in the design. Use of stone pitching or riprap will also be provided in the design at appropriate places especially around flyovers, bridges, culverts;
- Provision for rip-rap in discharge zones from drainage structures will be made in the design to reduce erosion;
- Down drains/chutes will be lined with rip-rap/masonry or concrete to prevent erosion;
- Side slopes will be adjusted to a gradient necessary to reduce erosion potential or, if steeper, stabilized, covered with riprap or other material to prevent soil erosion; and
- The proposed Project Site, through which the alignment is proposed, will be investigated for the presence of naturally occurring contaminants such as asbestos, arsenic; likelihood of erodibility of soil; contours, terrain stability, slope gradient; physical and chemical properties of soil such as soil depth, particle size distribution, permeability, dispersibility, pH, salinity; and likelihood of seismic activity. If any contaminated soils are found, they shall be removed and deposited in a sealed pit in an area agreed with the concerned authority. The seismic factor shall also be considered at the design stage.

6.2.3 Land Acquisition and Resettlement

201. The major issue in the proposed Project will be land acquisition and resettlement. This will result in landlessness, homelessness, joblessness, marginalization, loss of access to common property resources, food insecurity, morbidity and mortality, and social disarticulation due to land acquisition and severance (blocking access across it due to be being fenced on both sides). Though, effort has been made to avoid relocation of houses while selecting the alignment of the proposed Motorway. Even then the land acquisition and resettlement will take place for those affected by loss of agricultural land (most of the owners with small landholdings) and associated infrastructures (farm houses, tube wells, poultry farms etc.).

202. The proposed Motorway will be constructed on a new alignment for which about 4794 acres of land will be acquired. The current land acquisition process and procedures are not adequate enough to ensure fair and justifiable compensation to the affectees. Serious negative impacts may result if proper mitigation measures are not adopted.

203. The most significant impact of the Project is the taking of about 4794 acres of agricultural land out of production. The loss in production will be met with by increasing the yield from fields in the agricultural sector. Orchards lost to the Project will also have to be raised by the private owners of land. However the owners of land whose land is to be acquired and the neighbouring farmers will be helped to gain access to modern technology to increase production from their land. Similarly the deficiency in livestock feed/fodder will have to be met from the adjoining areas.

204. This impact would be permanent and major negative in nature and the mitigation measures will involve careful alignment and route selection by the designer to

minimise the impact. Also adequate budget will be provided in the Project cost for the compensation to the affected people as per Land Acquisition Act, 1894 and ADB's Resettlement Guidelines for the lost assets and restoration of their livelihoods.

205. Entire Motorway Project will be fenced except at the interchanges; therefore, it will not cause substantial increase in the price of land. It is expected that land values will increase near interchanges. This Impact would be a minor positive in nature.

206. During the field visits to the Project Area, resettlement issues were critically observed. During the route survey care was taken to avoid the settlements. About 200 mud/ brick structures will be demolished. During field visits, it was found that no archaeological site or graveyard, nor any other structure of religious value or cultural significance is going to be demolished due to the execution of the proposed Project. Only one Jamia Mosque at Shorkot Tehsil adjacent to a farm house needs to be relocated.

207. The mitigation measures include:

- Developing proper judicious compensation package for affectees;
- Developing plan for the new construction of affected mosque i.e. Jamia Masjid Shorkot.
- Giving compensation amount before the affectees shifting; and
- Providing underpasses at the existing crossings that movement across the Motorway is not halted.

6.2.4 Flora

208. It has been estimated that a total of 52610 trees will be felled from the agricultural fields in the Project Area of section-II of M-4. This loss will be compensated by planting strips on both sides of the motorway which, on an average, are estimated to be about 30 meters wide.

209. Compensatory Planting shall be done in rows (avenues). Three rows and row to row distance of 4 meters shall be planted in 62 km long motorway section-II. A total of 93000 (46500 number of plants will be raised on one side of RoW) saplings shall be planted. Planting shall go hand in hand with the construction of the road structure. Planting of this nature and extent shall be a huge task and will have to be outsourced by the contractor. The contractor will develop the plan for planting in consultation with the Provincial Forest Department. Permission from the Forest Department will also have to be sought for cutting trees from the roadside or along the water courses if these fall within the ROW. Planting will be done as soon as the construction of the road is completed. Maintenance is the key to the establishment of the plantation. Regular monitoring of plantation will be carried out by the contractor during the maintance period of the project as well. Any failures will be immediately beaten up. 25% is the usual percentage provided for beating up of failures.

210. The indigenous species of the trees most suited to the tract like Shisham, Kikar, Bakain, Dharek, Siris (*Albizzia procera*), Farash, Sukh chain, Jaman, Bohar, Peepal (Ficus reliogosa), Gullahr (*Ficus glomerata*), Sohanjana *(Moringa oleifera*), Karir and Wan (*Salvadora oleoides*) are helpful in providing shade, ground cover, aquifer recharge, and habitat (including shelter and food) for the wildlife are recommended for plantation. The compact plantations shall be effective live screens against night glare, dust, noise and pollutant emissions. These vegetated strips shall develop into a complete ecosystem. Flowering and fruiting shrubs will be planted along the road to

beautify the landscape. Planting will however be done keeping in view the principles of landscape designing.

- A total of 93,000 (46500 on one side of the road) sapling trees will be planted
- The compact plantation will be done on both sides;
- The indigenous trees most suited to the tract like Shisham, Kikar, Bakain, Dharek, Siris (*Albizzia procera*), Farash, Sukh chain, Jaman, Bohar, Peepal (Ficus reliogosa), Gullahr (*Ficus glomerata*), Sohanjana *(Moringa oleifera*), Karir and Wan (*Salvadora oleoides*) will be planted;
- If a tree of rare species is growing within the ROW and is required to be removed, it will not be felled but uprooted and transplanted in close consultation with the Forest Department, and forest department will regularly monitor the plantation program;
- Effort will be made to save as many trees as possible even if they are young or poll stage. Proper irrigation and maintenance of plants will be ensured;
- An awareness campaign targeted on the neighbourhood farmers will be carried to popularize the planting of trees; and
- Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides.

6.2.5 Change in Hydrologic Regime

211. As the proposed Motorway does not pass through any flood prone areas therefore, no change in hydrological regime will occur. For any water channel or water bodies crossings will be provided therefore no change in water flow pattern will be caused. For the crossing of canals and drains small bridges will be constructed. For the crossing of water courses, culverts and other possible arrangement will be done. The direct CoI of the surface water bodies will be confined within the RoW of the Project, and it will be minor and temporary in nature.

212. Possible impacts are temporary and minor negative, however following mitigation measures will be incorporated:

- Proper design of bridges on water channels to accommodate design flows;
- Small bridges will be constructed on canals and 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.

6.2.6 Water logging and Salinity

213. Almost 3-5% of the land along the Proposed Project corridor Section was seen affected by water logging and salinity. The waterlogged areas are more than 1 km far from the proposed Motorway therefore it is obvious that it will not affect the proposed Project. However to keep effective drainage system, pipe and box culverts at suitable location will be provided in the design.

6.2.7 Restricted Access Problems

214. As the Proposed Motorway will be fenced therefore the communities along the alignment will face crossing problems. This is a major negative impact due to the proposed Project. To mitigate this impact, underpasses and flyovers will be provided in the design at the shorter distances and at places wherever there are existing crossing paths.

6.2.8 Public Utilities

215. Due to the proposed Project, public utilities will be affected creating disruption of public services and inconvenience to the local residents. This impact is temporary and may be considered as moderately negative in nature. Mitigation measures will include:

- Provision in the design and budget for the relocation of the existing utility infrastructures wherever required; and
- All public utilities (e.g. water pipes, power/ telephone lines likely to be affected by the proposed Motorway will be relocated well ahead of time before the actual commencement of the construction work.

6.2.9 Noise Problems

216. Fast movement of vehicles on the Proposed Motorway will create excessive noise for the communities along the alignment which will be a cause of disturbance for them. This will be a moderate negative impact. To mitigate this impact noise barriers will be constructed wherever there will be populated area within 500 meters along the route by thick plantation or constructing sound barriers wherever possible. Provision of plantation on 62 km of length will be provided.

6.3 Construction Phase

217 Following is the brief description of impacts envisaged during the Construction Phase:

6.3.1 Topography

218. As a result of construction, topography of the Project Area will be changed. One of the important activities during construction will be the cutting and dismantling of existing infrastructure and borrow areas that will have impact on the topography of the Project Area.

219. This impact is temporary and minor negative in nature. Mitigation measure for this impact is proper landscaping. All the affected areas will be restored to their original levels.

6.3.2 Borrow/ Open Pits

220. 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.

221. Borrow/ Open pits may also become 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.

222. This impact is permanent and moderate negative in nature. Mitigation measures will include:

- Necessary permits will be obtained for any borrow pits from the competent authorities;

- In borrow pits, the depth of the pits 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 will be regularly checked to prevent/ mitigate impacts on adjacent lands;
- In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites; and
- Borrow pits will be used for construction waste, but during the excavation, top 20 cm soil cover will be preserved for vegetation after the filling of the pits. This is the best way to restore the flora of that area.

6.3.3 Air Quality

223. Air quality may be affected from the following sources:

- Construction machinery;
- Hydrocarbons from asphalt plants and vehicular traffic;
- Dust emissions due to movement of construction machinery on earthen service roads.

224. Impacts of air emissions may be carried over long distances depending upon the wind speed, direction, temperature of the surrounding air and atmospheric stability. Emissions from crushers and quarry sites will cause health impacts, i.e. coughing, flue, difficulty in inhaling, irritation in eyes and reduction in visibility. This impact is temporary and major negative in nature.

225. Mitigation measures will include:

- Dust control by equipping asphalt hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions;
- Asphalt hot mix and batching plants will be located 500 meters away from the residential areas, schools and hospitals;
- Surface treating or overlaying diversion tracks with shingle, and sprinkling water across diversion tracks;
- Ensuring that haul trucks carrying aggregate fill materials are kept covered with canvass sheet to help contain construction material being transported between sites;
- Enforcing the NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery;
- Dust mask will be provided to the workers. Proper dust collection system will be ensured at crushers and continuous sprinkling of water; and
- Air Quality Monitoring will be carried out as per schedule given in Environmental Monitoring Plan

6.3.4 Construction Waste Disposal (Wastewater, Oil, Solid Waste etc.)

226. Due to construction activities waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery and solid waste etc. This will result in unhygienic conditions, health risk to work force and general public at the camp site.

227. Following are the types and sources of construction waste:

- Oil, grease etc. from construction machinery;
- Solid waste from waste construction material and food;
- Wastewater from washing and sprinkling; and

- Sanitary waste from staff toilets.

228. This impact is temporary and moderate negative in nature. 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;
- Waste will be disposed at designated sites and no waste will be disposed in the productive agricultural field;
- The hazardous waste will be transported to nearby incineration facility;
- Solid Waste generated during construction will be safely disposed in approved and demarcated waste disposal sites and the contractor will not dispose waste into productive agricultural lands and will also provide a proper waste management plan;
- Sanitary wastes generating from staff and labour camps must be disposed of in environment friendly manner, i.e. provision of septic tank etc. for toilet wastes; and
- Aggregate waste material of existing road will be reused in up-gradation of road.

6.3.5 Siting of Construction Camps and Other Facilities

229. The precise locations for construction camps and other facilities such as workshops, equipment washing yards, borrow pits, quarries, crushing plants, asphalt plants, batching plants, construction material storage areas, haul routes and disposal sites for construction waste will be finally decided by NHA in consultation with Contractors. However, the siting of these facilities may cause a number of issues such as loss of plantation and vegetation, permanent physical and visual impact on the area, siltation and pollution risks if construction materials are extracted from the River Chenab bed. The impacts of these facilities would be temporary and moderate negative in nature, which will be mitigated by adopting the following measures:

- The construction camps and workshops shall not be located in sensitive areas and shall not be within 500 meters distance from the existing settlements;
- Efforts will be made to minimize vegetation loss while making site arrangements for construction camps and other facilities;
- Cutting of trees shall be prohibited by contractor(s) and workers near camp sites failing which three new trees will be planted by the Contractor(s) for each tree cut;
- The crushing plants shall not be located in environmentally sensitive areas or existing settlements;
- The sites for borrow pits shall be selected on the basis of type of soil strata, depth of water table, ground topography, prevalent vegetation state etc. and shall not be located within 100 meters from RoW of the proposed Project. They shall be prohibited where they might interfere with the existing or designed drainage pattern. The River locations shall be prohibited where there is greater likelihood of damaging the River bank or carrying fine material downstream. The Contractor(s) shall also ensure that borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of stagnant water bodies, which are favorable places for mosquito breeding. The depth of construction materials such as gravel removed from the River bank shall be kept one tenth of the total width of the River and this activity shall not interrupt the River flow or undermine the River banks;

- Asphalt hot mix and batching plants shall not be located within 1000 meters of the existing settlements and shall be located sufficiently away from agricultural activities, industrial establishments and sensitive areas including, but not limited to, educational and health facilities;
- Only licensed quarry operations will be used for material sources. If licensed quarries are not available then the contractors may be made responsible for setting up their dedicated crusher plants at approved quarry sites;
- The construction material storage areas shall not be located in sensitive areas and shall be sheltered or sited within hoardings;
- The Contractor(s) shall use the selected routes for transport of construction materials. Any damage caused to these routes by overloading or heavy vehicles shall be borne by the Contractor(s);
- Landowners shall be compensated according to the terms of lease agreements negotiated with them for constructing camps and other facilities; and
- The sites for camps and associated facilities shall be reinstated by the Contractor(s) after decommissioning of the proposed Project.

6.3.6 Soil Erosion and Contamination

230. The proposed Project is planned to be constructed on already fertile soil, which will be lost if not stripped, stored and reused properly. Soil erosion generally takes place where ground cover is removed and inadequately re-established. Due to construction of the proposed Project, soil erosion and contamination may take place around borrow pits, road cuttings, embankments, construction camps, workshop areas, equipment washing yards, asphalt plants, batching plants, fuel and chemical storage areas, etc. Soil erosion and contamination may affect the road stability, increased flood risk (by more rapid and higher levels of runoff), silting up of water bodies, landscape value and in worst cases may reduce the economic productivity of land and biodiversity in the Project Area. The impacts of soil erosion and contamination would be temporary and moderate negative. The following mitigation measures are proposed to alleviate or avoid these impacts:

- Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands shall be used for borrowing materials;
- The excavation of earth fill shall be limited to an approximate depth of 50 to 100 cm;

231. In case the use of agricultural land is unavoidable, the top 30 cm of the plough layer shall be stripped off and stockpiled. Where deep ditching is to be carried out, the top 1 meter layer of the ditching area shall be stripped and stockpiled for redressing the land after the required borrow material has been removed;

- Drainage interception ditches shall be built around the borrow pits to prevent surface run off causing erosion during the rainy season;
- The denuded ground cover shall be re-vegetated as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover;
- The road embankments and road cuttings shall be vegetated with a fast growing crop and a native seed mix immediately after fill placement to prevent scour and to encourage stabilization. Use of stone pitching or riprap shall be made at appropriate places especially around overpasses, bridges, culverts;
- Discharge zones from drainage structures shall be furnished with rip-rap to reduce erosion;
- Down drains/chutes shall be lined with rip-rap/masonry or concrete to prevent erosion;

- Side slopes shall be adjusted to a gradient necessary to reduce erosion potential or, if steeper, stabilized, covered with riprap or other material to prevent soil erosion;
- Construction shall be restricted to dry season to avoid soil erosion;
- Soil erosion checking measures such as the formation of sediment basins etc, shall be taken;
- Soil contamination by bitumen, fuel and chemical storages shall be minimized by siting them on an impervious base within an embanked area and secured by fencing. The base and walls of the embankment shall be impermeable and of sufficient capacity to contain 110 per cent of the total volume of stored fuels and chemicals; and
- The disposal of waste asphalt shall be made in approved locations such as borrow pits or natural depressions and shall not be within the RoW. Unless located in areas with impervious soils, encapsulation with pre-laid impervious liners including walls and capping is required with the objective to prevent water percolating through the waste materials and leaching toxic chemicals into the surrounding soils. On completion of disposal at the site, the area shall be capped with a compacted thickness of at least 0.5 meters of impermeable soil covered with at least 200 mm of top soil and shall be finally landscaped.

6.3.7 Noise

232. Noise is one of the most pervasive environmental problems in the urban areas especially on the road side. Noise pollution will be due to increase in mobility and construction activity. However, this impact will be temporary but moderate negative in nature. All mitigation measures mentioned below will be taken in order to minimize the impacts of noise in the Project Area. These measures include, but are not limited to the following:

- Selection of latest equipment and plant with reduced noise level ensured by suitable in-built damping techniques and appropriate muffling devices;
- Confining excessively noisy work to normal working hours in the day;
- Providing the construction workers with suitable hearing protection like ear cap, ear muffs etc.;
- No construction work will be done during night time, no heavy machinery like percussion hammers and pneumatic drills, especially during night time;
- Locating the rock crushing, concrete mixing and material shipment yards away from residential areas, particularly schools, hospitals and nursing homes; and
- Noise quality monitoring will be carried out as per schedule given in Environmental Monitoring Plan.
- All efforts will be done to minimize the noise and continue monitoring will be done near the sensitive receptors in order to keep the noise level at 65 dB(A) near communities, schools or any sensitive receptors.

Table 6.1
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
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.

Table 6.2
General Noise Levels of Machinery and Equipment

S. No.	Equipment	Noise-Level in dB (A)
1	Earth Moving Machinery	75-85
2	Material Handling Equipment	75
3	Stationary Equipment	75
4	Tools, Hammers and Drivers	80-95

Source: The General Services Administration, Construction Noise Specification, USEPA 1972

Table 6.3
Construction Equipment Noise Levels

S. No.	Equipment	Observation Point to the Source (meters)	Noise dB(A)
1	Wheeled loading	5	90
2	Grader	5	90
3	Vibration pavement roller	5	86
4	2-wheel vibration pavement roller	5	81
5	3-wheel pavement roller	5	81
6	Tire pavement roller	5	76
7	Bulldozer	5	86
8	Wheeled pneumatic dredger	5	84
9	Sprayer	5	87
10	Power generator	5	98
11	Impact drill	5	87
12	Impact pile driver	5	112
13	Truck	5	92
14	Concrete mixer	5	91
15	Concrete pump	5	85
16	Mobile lift	5	96
17	Pneumatic hammer and rock crusher	5	98
18	Breaker	5	84
19	Pneumatic spanner	5	95

Source: Guangzhou City Center Inner Ring Road Project, Environmental Assessment Report (1997)

6.3.8 Surface and Groundwater

233. Surface water might get contaminated due to the disposal of construction waste generated due to the Project activity; this contamination will not only endanger the aquatic life but will also result in jeopardizing the health of natives that use this water

for meeting domestic requirement. The impact on these water bodies will be only for the period of construction and will vanish as the construction work is over. In addition to that, construction waste, if left unattended will result in forming leachate which will percolate through the soil strata and will reach underground water table and hence, will end up contaminating it.

234. This impact is temporary and minor negative in nature. Following are the mitigation measures:

- The surface and groundwater reserves will be adequately protected by installing screens and barriers to protect the source of contamination such as construction and oily waste that will degrade its potable quality;
- The proponent will ensure that the construction work is confined within the RoW and water bodies are prevented from pollution during construction;
- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements;
- Regular water quality monitoring according to determined sampling schedule;
- The contractor will ensure that construction debris do not find their way into the rivers, drainage or irrigation canals which may get clogged;
- Work on irrigation canal areas will be kept to a minimum, protective walls be constructed;
- To maintain the surface water flow/drainage, proper mitigation measures will be taken along the road, like drainage structures in urban areas;
- Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;
- Construction work close to the streams or other water bodies will be avoided, especially during monsoon period; and
- Wastes will be collected, stored and taken to approved disposal site.

6.3.9 Flora and Fauna

235. It has been estimated that a total of 27302 trees will have to be felled both fruit and non-fruit trees from the agricultural fields in the section-II of M-4. These trees were the private property of the residents of section-II of M-4 and all aftees were compensated and details are present in the LARP of section-II (M-4). All the afeectes were allowed do take there plant and it will be on their decretion to plant the same number or more in their private land. This loss will be more than compensated by planting strips on both sides of the motorway which, on an average, is estimated to be about 30 meters wide. After the project area is fenced, the natural vegetation shall establish itself. The indigenous trees most suited to the tract like Shisham, Kikar, Bakain, Dharek, Siris (*Albizzia procera*), Farash, Sukh chain, Jaman, Bohar, Peepal (*Ficus reliogosa*), Gullahr (*Ficus glomerata*), Sohanjana *(Moringa oleifera*), Karir and Wan (*Salvadora oleoides*) could be planted. These trees shall be helpful in providing shade, ground cover, aquifer recharge, and habitat (including shelter and food) for the wildlife. Following mitigations will be adopted:

- The compact plantations will be effective live screens against night glare, dust, noise and pollutant emissions. These vegetated strips shall develop into a complete ecosystem. Flowering and fruiting shrubs will be planted along the road to beautify the landscape. Planting will however be done keeping in view the principles of landscape designing;
- Effort will be made to save as many trees as possible even if they are young or poll stage. Proper irrigation and maintenance of plants will be ensured, Plantation plan can be found in EMP.

236. Black and Grey Partridges are the only huntable species that might occur in the Project Area. Their hunting is allowed as per legislation during the hunting season to a fixed bag limit in open areas on Sundays and holidays. Any hunting outside of this is liable to be checked by the Wildlife Department staff. However such hunting shall hardly impact the wildlife populations in the area.

237. No rare or endangered aquatic faunal or floral species occur in the area. The Provincial Fisheries Department auctions fishing rights in the rivers and canals. The water reservoirs like Sidhnai are stocked with carp fingerlings. The canals are not stocked but the fish stock from the rivers escapes to canals. Fishing is not allowed without a permit and any illegal catch is liable to be punished. Reports about illegal fishing in these areas are almost non-existent. Occasional cases may be reported which may not have any significant impact on the biodiversity of the wetlands.

238. The Project will pose minor negative impact on the fauna present in the area. There is no presence of any game reserve or wild life sanctuary along the proposed alignment, therefore no negative impact will happen. However following mitigation measures will be taken:

- Illegal animal and fish hunting will not be allowed and punishment will be enforced in case of violation;
- Wildlife Department will check and confirm that no hunting is made;
- 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 will be no disturbance to local birds and animals;
- Contractor will ensure that the no hunting, trapping of animal will be carried out during construction; and
- Borrow pits will be fenced so that no animal will fell into these.

6.3.10 Social and Cultural Problems

239. Due to construction of the proposed Project, exit/entry problems for the residents/ movement of the people to the mosque/shrines may be disturbed. However, the major issue in the proposed Project is land acquisition, which will take place in the project affected areas. This will result in loss of agricultural land, infrastructure (farm houses, tube wells, poultry farms), livelihood, loss of fertile plough layer at camp sites and associated facilities (workshops, asphalt plants etc.).

240. National Environmental Policy of the Government of Pakistan emphasizes on the achievement of environmental sustainability and poverty reduction to enhance the economic growth. Increased economic activity in the Project Area by involvement of local people in the Project related activity. Local labour will be hired, which will provide them an opportunity to develop their skills and capacities. After serving in this Project, the local will utilize their skills in future endeavours.

241. As a result of Motorway Project, prices of lands near interchanges and service areas will increase that will be a positive thing for the local people. After the construction of interchanges and service areas, local people will get a chance to open shops and hotels in its vicinity. This will provide them earning opportunities, which will enhance economic profile of the area. This is a minor positive impact.

242. Change in local lifestyle and culture may occur when the local and migrant workers will come in contact during the construction works. This impact is permanent and

minor positive. Those impacts will be mitigated by adding appropriate clauses in the construction contract to avoid any law and order situation.

243. Regarding the resettlement issue It is required that these settlements will be relocated and handled in such a way that those affectees might not be turned into poor or vulnerable groups. These issues are discussed in detail in Resettlement Action Plan.

244. People will face minor exit/entry problems during the construction activities. Only one mosque will fall in the RoW and that is Jamia Masjid (main mosque) situated in Tehsil Shorkot. The impact of construction on entry/exit problem is of minor nature as there is no major shrine located in the immediate vicinity of RoW.

245. This impact is temporary and minor negative in nature. Mitigation measures will include:

- Timely completion of the construction work and provision of alternative routes during the construction;
- Providing alternative ways in order for the local people to perform their routine tasks;
- Timely and adequate compensation package to the Project Affected Persons (PAPs);
- Adding appropriate clauses in the construction contracts to avoid any law and order situation;
- Timely and full public consultation and announcement of mobilizing equipment;
- Establishment of formal links with affected communities;
- Plan for social grievance redress mechanisms;
- Seek assistance from and cooperation with local NGOs;
- Familiarize outside labourers on local etiquettes;
- Local labour shall be employed with an agreed ratio (>75%) for construction works;
- An agreed minimum unskilled labour employment for women with equal remuneration as men agreed at an early stage; and
- The drinking water requirement shall be met preferably by resorting to other sources rather than using the community resources.

6.3.11 Traffic Management

246. Due to construction activities traffic management may be a problem in the Project area. This may result in traffic jams and cause inconvenience to the people passing through the road crossings at proposed interchanges due to movement of vehicles carrying construction materials.

247. This impact is temporary and minor negative in nature and will be mitigated by providing proper alternative traffic management plan during construction of the proposed Motorway. Interchanges will be constructed in a way that traffic flow is not disturbed; alternative routes will be clearly defined. Proper traffic management with marking will be done on the road crossings near proposed interchanges.

6.3.12 Utilities

248. Various utilities such as electrical poles, transmission lines, telephone lines and wells are situated within the RoW of the proposed Motorway. These utilities will be relocated before the start of construction activities. These utilities if not handled

properly will cause difficulties to the peoples of Project Area. To handle this problem following mitigation measures will be taken:

- Strengthening of utilities, wherever required; and
- Close coordination with the concerned departments to curtail inconvenience to the residents of the Project area

6.4 Operational Phase

6.4.1 Noise

249. Due to increase in traffic volume, noise is expected to increase. As presently project area is free from noise pollution therefore this impact is permanent and major negative in nature. To cope with this issue, adequate noise barriers such as indigenous tree species will be planted along the fence to reduce the noise pollution. Further improvement will be made with the help of National Highway and Motorway Police (NH&MP) by enforcing the laws and getting the vehicles tested, regularly after a specific time period, by some reputable vehicle testing laboratory and obtaining a clearance certificate. Noise monitoring will be carried out as per Environmental Monitoring Plan.

6.4.2 Deterioration of vehicles

250. The proposed Motorway, due to smooth road surface will result in less wear and tear of vehicles; it will also result in less fuel consumption. This impact is permanent and major positive in nature.

6.4.3 Soil Erosion and Contamination

251. During the operational phase, soil erosion may take place at different road structures (bridges, embankments, culverts etc.), which may increase the flood risk by rapid flash of storm-water runoff and also undermine these structures. Soil contamination can take place on border areas by road runoff containing heavy metals (e.g. lead). If these areas are used for growing vegetables for human consumption, it can have adverse impacts on human health. The research has shown that the increase in heavy metals is generally limited to a narrow border along the edge of the road and concentrations rapidly fall away with distance from the hard shoulder. The following mitigation measures are proposed to reduce the impacts on soil:

- In case soil erosion takes place, proper remedial measures will be undertaken to stop future impacts of loss of soils and the associated impacts caused by soil erosion; and
- Vegetation for human use will be banned within the proposed RoW.

6.4.4 Road Safety

252. The increased vehicular movement and speed may result in road safety issues like traffic accidents. The accidents may also be due to tiredness. The impacts on road safety would be permanent and moderate negative. They will be mitigated by enforcing speed limits and imposing penalties on the traffic violators. Rest areas will also be provided for those in need for rest during travel. Traffic signs will be provided to facilitate road users about speed limits, rest areas, eating establishments etc. Warning messages such as "*speed thrills but kills*" or "*better late than never*" etc. will

also be displayed at appropriate locations to aware drivers about likely accidents due to over speeding. All the lanes, median, sharp bends will be reflectorized to facilitate travellers in the night time. Proper lighting arrangement on the proposed Motorway will be done at required places.

6.4.5 Landscaping

253. The settlements in the immediate vicinity of the proposed Motorway will be directly affected due to this Project, which would be minor negative impact and will be mitigated by tree plantation along the proposed Corridor. It would also serve as physical barrier between the road and the existing settlements as well as future developments.

6.4.6 Land Use

254. The proposed Project may induce land use changes in the form of development of commercial establishments (restaurants, petrol and gas filling stations), educational institutes etc. The changes in land use may affect the land value, which will vary depending upon the location. The impacts on land use would be permanent and both moderate negative especially for those whose land values have not increased and medium beneficial for businessmen and those having escalated land values (especially near interchanges). However, all the facilities with the exception of restaurants and petrol/gas filling stations likely to pop up in the future will be prohibited within the RoW. The permission will be sought from the concerned authority for the development of any establishment along the proposed Project corridor.

6.4.7 Air Quality

255. The existing status of the project area is that there are agricultural fields due to this no or minor air pollution in the Project Area. Therefore this impact is permanent but minor negative.

256. Mitigation measures will include:

- Setting up of system to monitor air quality along the Project Area in accordance with acceptable International standards;
- Monitoring emissions of vehicles as per NEQS;
- Trees will be planted along the fence of the proposed Motorway, these will work noise barrier. For suitable plantation Forest Department will be consulted.

6.4.8 Time Saving

257. Due to increase in speed and undisturbed flow of traffic, travelling time will be saved to reach destination. Trade will improve due to better transport opportunities. This impact is permanent and major positive in nature.

6.4.9 Socio-economic Conditions

258. The operation of the proposed Motorway would lead to opening up markets to rural economic activities by reducing the production and transportation cost thereby stimulating agricultural production. The proposed Project will promote better business

opportunities such as new petrol pumps and hotels. This impact is permanent and major positive in nature.

259. This would be a high beneficial impact but at the same time, it would be major negative for those who cannot access the Motorway except from interchanges. To overcome this problem, interchanges at the existing important routes will be provided in the design.

6.4.10 Water Quality

a) Surface Water

260. The surface water bodies may get flooded and polluted due to uncontrolled release of contaminated storm-water/road runoff from road surfaces. The pollutants associated with the road-runoff include: (a) hydrocarbons such as fuel and polycyclic aromatic hydrocarbons from wear and tear of the road surface, tyres, lubricants leaking from vehicles and from un burnt fuels; (b) heavy metals including cadmium, copper, zinc, iron derived from un burnt fuels, corrosive products from vehicles, wear and tear of tyres and road surfacing. Some heavy metals are largely soluble (copper for example) and insoluble (zinc for example); and (c) suspended solids including insoluble heavy metals as colloidal materials. The worst contamination generally takes place during the first flush of runoff from roads after a spell of dry weather. The level of pollution is directly related to the traffic volume.

261. The pollution risk from accidental spillage may increase moderately. In the long run, the increased traffic volume of traffic and faster traffic speeds would increase the risk of accidental spillage, which could have medium adverse impact on surface water quality. The natural drainage of road runoff across embankments or discharge of runoff into water bodies from large area of carriageway may have medium adverse impacts on ponding and the flood risk to downstream locations. The following mitigation measures are proposed to attenuate surface water quality related impacts:

- In order to discharge rapid removal of storm-water/road runoff, cross slopes and longitudinal drainage will be provided in the design. Well-designed cross drainage structures limit ponding across embankments;
- Retention basins with reedbeds provided in the design will improve the quality of polluted storm-water/road runoff;
- Cleaning of drainage structures will be carried out in case they are blocked by debris etc.; and
- The surface water quality monitoring will also be carried out at defined intervals and for environmental quality monitoring parameters suggested in the Environmental Monitoring Plan. If these parameters are above the prescribed limits, suitable control measures will be taken.

b) Groundwater

262. Groundwater may get polluted due to contaminated road runoff on earthen shoulders and embankments planted with grasses. However, the areas in the immediate vicinity of the proposed Motorway will be avoided for vegetation due to the risk of contamination. Groundwater quality monitoring will be carried out as per schedule suggested in the Environmental Monitoring Plan.

SECTION 7

ECONOMIC ASSESSMENT

7.0 General

263. This section includes the overall economic benefits in relation to environmental costs resulting due to implementation of the proposed project.

7.1 Economic Benefits

264. The economic benefits resulting due to the implementation of the proposed Motorway Project will include:

i) Decreasing the vehicle operating cost and travel time costs due to better/ improved road facility, reduced traffic congestion, uninterrupted and smooth traffic flow;

ii) Improvement in the trade opportunities in country;

iii) Decrease in travelling costs and vehicles maintenance costs

iv) Uplift in the overall economy of the Punjab Province and

v) Improvement in the commercial activity in the Project Area, resulting in economic uplift of the people of the Project Area.

7.2 Environmental Costs

265. In the year 2007 for the whole M-4 project the total environmental cost has been worked out to be Rs. 3,969.199 million (US $ 66.187 million). This includes Rs. 3,864.969 million (US $ 64.42 million) as Land Acquisition and Resettlement Cost, Rs. 97.5 million (US $ 1.625 million) as mitigation cost, Rs. 6.53 million (US $ 0.109 million) as Monitoring Cost, and Rs. 0.2 million (US $ 0.033 million) for training cost. The environmental costs have been added to the Project Investment cost of 23,549.46 million (US $ 392.491 million). The total investment costs in financial terms thus come out to be Rs. 27,518.66 million (Us $ 458.644 million). This cost has been converted into economic terms as Rs. 24,766.79 million by applying SCF (Standard Conversion Factor) of 0.90.

For the implementation of section-II tranche 4 i.e. section-II of M-4 separate Environmental mitigation and monitoring cost has been calculated in the year 2014, the total cost has been worked out is which Rs. 26,951,900 (US $ 269519). This includes Rs. 5,178,000 (US $ 51780) cost as Monitoring cost, Rs. 700,000 (US $ 7000) cost as the technical training cost, Rs. 21,073,900 (US $ 24234.5) as tree plantation cost.

266. Tentative annual Operation and Maintenance (O&M) cost and costs have been worked out as Rs. 160 million.

267. Economic Internal Rate of Return (EIRR) has been thus worked out, against total cost of Rs. 24846.59 million, as 15.91%, which is well above 12% the assumed opportunity cost of capital in Pakistan, thus rendering this Project economically viable for implementation.

SECTION 8

ENVIRONMENTAL MANAGEMENT PLAN

8.0 General

268. This section provides an approach for managing and monitoring environment related issues and describes the institutional framework for environmental management and resource allocations to be carried out by the National Highway Authority (NHA) for mitigating negative impacts of the proposed Faisalabad-Khanewal Motorway (M-4) Project.

8.1 Objectives of Environmental Management Plan (EMP)

269. The EMP will help the NHA, address the upcoming adverse environmental impacts of the proposed Motorway Project, enhance the Project's overall benefits and introduce standards of good environmental practices. The primary objectives of the EMP are to:

1. Define the responsibilities of the Project proponents in accordance with the three Project phases (design, construction and operation);
2. Facilitate the implementation of the mitigation measures by providing the technical details of each Project impact, and proposing an implementation schedule of the proposed mitigation measures;
3. Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented;
4. Identify training requirements at various levels and provide a plan for the implementation of training sessions;
5. Identify the resources required to implement the EMP and outline corresponding financing arrangements; and
6. Providing a cost estimate for all proposed EMP actions.

8.2 Key Environmental and Social Components

270. The key environmental and social issues associated with this Project are as follows:

1. Resettling commercial structures owned by squatters presently operating within the proposed construction limit of the project corridor;

2. Appropriately locating temporary construction camps, asphalt plants, and waste disposal sites, and the environmental impact of operating these facilities;

3. Regulating the procurement of borrow material and topsoil erosion during construction;

4. Avoiding the obstruction of Motorway drainage system during construction and operation;

5. Enhancing and maintaining avenue tree plantation along the entire length of the project corridor;

6. Minimizing the impact on cultural sites or structures and community-owned assets during construction and operation; and

7. Ensuring pedestrian and traffic safety during construction and operation.

8. Preparation and approval of Site Specific Environmental Management Plan.

8.3 Role of Functionaries for Implementation of EMP

8.3.1 General

271. This sub section describes the methodology required for the implementation of EMP in conjunction with the NHA, Design Consultants, EIA Team, Supervision Consultants and Contractors. The executing agency of the Project will be National Highway Authority (NHA). General Manager (M-4) will be the overall Incharge of the Project. The GM (M-4) will delegate the supervisory responsibilities of the Project to the Project Director who will have professional staff supported by a team of consultants including Environmental Monitoring Specialists/Consultants.

272. Environmental Protection Agency (EPA) Punjab will act as the overall regulatory body. The specific roles of key functionaries are described hereafter.

273. The Organizational setup of the management plan is shown in Fig. 8.1.

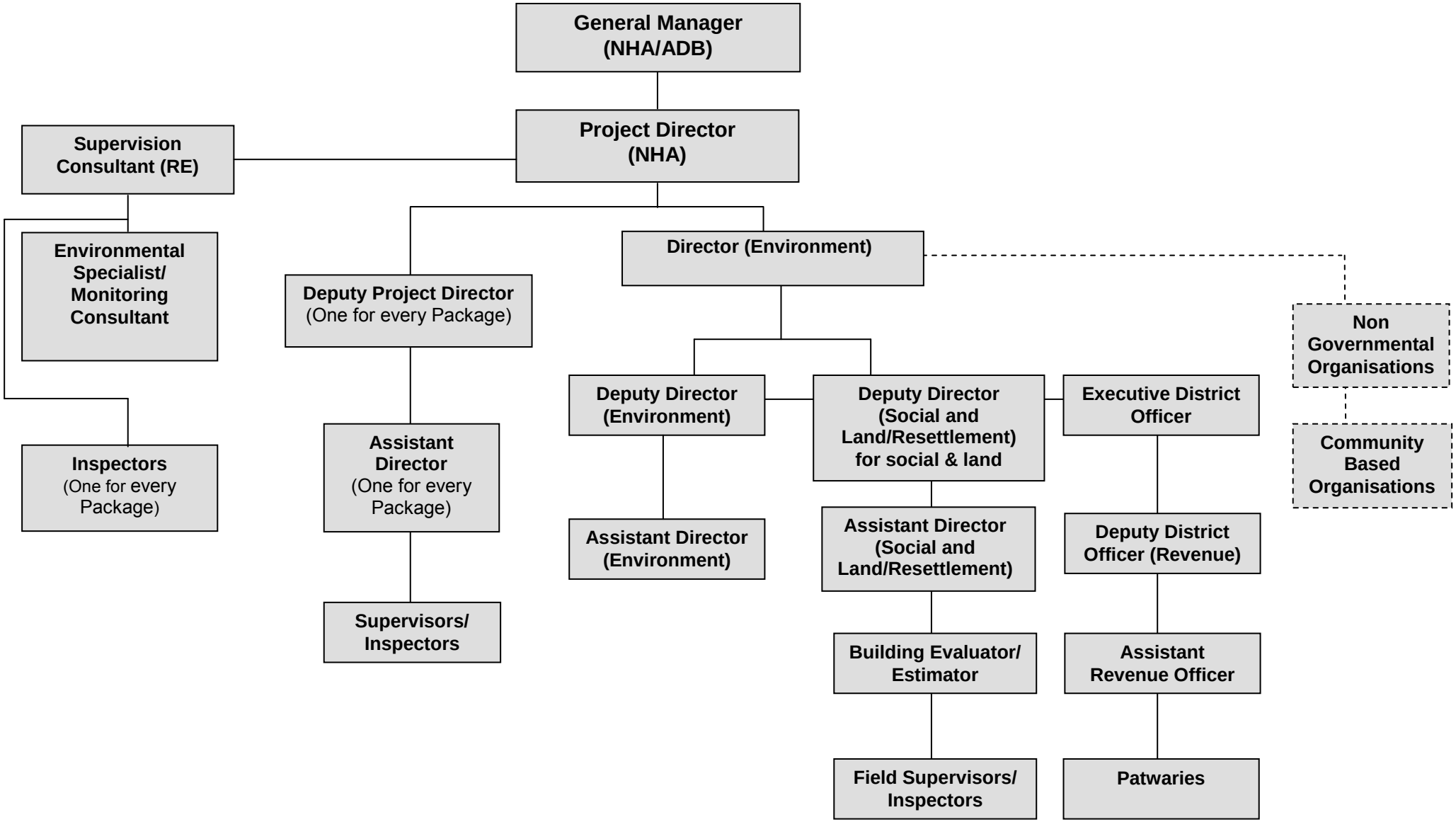


Fig. 8.1: Organisation Chart for Construction, Environmental Management and Resettlement Action Plan

8.3.2 National Highway Authority (NHA)

a) Project Director

274. The Project Director (NHA) will be responsible for the successful implementation of the Project. He will be assisted by the Supervision Consultants. The Project is divided into four Packages. Project Director will have four Deputy Directors; one for every Package.

b) Director (Environment)

275. The Director (Environment) will be the overall In charge for handling the NHA's obligations with respect to the EMP. Preparation of bi-annual environmental monitoring report, quarterly environmental monitoring reports or any corrective action plans required to be submitted by ADB will be the responsibility of Director Environment. The Director (Environment) will depute one Deputy Director (Environment) for the Project, who will be responsible for ensuring that the provisions of the EMP and Site Specific Environmental Management Plan (SSEMP) are implemented. In addition, the Deputy Director (Environment) will also coordinate with the EPA Punjab, provincial Agriculture, Forest and Wildlife departments, NGOs/ CBOs and other public/ private sector organisations.

276. Deputy Director (Environment) will be assisted by Assistant Director (Environment) for the execution of Environmental Management Plan (EMP) for each Package of the Project.

277. Deputy Director (Social and Land/Resettlement) will be responsible for the land acquisition and resettlement related issues.

278. Executive District Officer (E.D.O Revenue) will be assisted by D.D.O (Revenue), Assistant Revenue Officer and Patwaries in assessing the award price for land acquisition to the affectees.

8.3.3 EIA Consultants

279. EIA consultants will prepare a comprehensive EIA and EMP of the Project in compliance with Pak EPA and ADB Guidelines.

8.3.4 Design Consultants

280. The design consultants will ensure that all the mitigation measures committed for the design phase are incorporated in the design and included in the contract documents.

8.3.5 Supervision Consultants

281. Supervision Consultants appointed by the GM (M-4) will be headed by a "Project Manager", who will be an Engineer. He along with his team will supervise the Project contractors to ensure quality of work and fulfilment of contractual obligations. The Supervision Consultants (SC) will provide one Environmental Specialist/ Monitoring Consultant (MC) who will:

1. Ensure that all the environmental and social parameters/provisions comply with the applicable standards;

2. Ensure that day-to-day construction activities are carried out in an environmentally sound and sustainable manner;
3. Organise periodic environmental training programmes and workshops for the Contractors' staff and NHA site staff in consultation with the NHA; and
4. Develop "good practices" construction guidelines to assist the Contractors and NHA staff in implementing the EMP.
5. The Environment Specialist of Supervision Consultant will be required to remain on the project till the completion of the construction of section-II of M-4.

8.3.6 Construction Contractor

282. EMP will be made a part of the contract agreement and the contractor will ensure that all Project activities are in compliance with the EMP, SSEMP and NEQS. It will be the responsibility of construction contractor to prepare SSEMP and got its approval from NHA before mobilization.

8.4 Specific Implementation Responsibilities

283. This section describes the implementation and supervision responsibilities for the different phases of the Project.

8.4.1 Design Phase/ Pre-Construction Phase

284. The Director (Environment), NHA and his staff with the assistance of EIA consultant are responsible for ensuring that the Project design and specifications adequately reflect the EMP. He will ensure the Project's compliance with environmental regulations and donor requirements; and ensure stakeholder participation in the Project design.

285. The responsibilities of Director (Environment) may be briefly described as follows:

1. To coordinate with regulatory agencies including EPAs, EIA consultant, local NGOs, that could assist the NHA in independent reviews of environmental and social compliance;
2. To supervise environmental and social assessment reports, and provide substantial inputs and guidance to the EIA consultant;
3. To get the approval of EIA from the EPA Punjab; and
4. To ensure that the design consultant has incorporated all the mitigation measures proposed for the design phase in the design and included in the contract documents.

286. Specifically, before the start of the Project, the NHA's Deputy Director (Social and Land/Resettlement) will ensure that the following activities are carried out in a transparent manner and according to the acceptable standards:

1. Identifying and verifying Project affected persons (PAPs) on the basis of specified documents;
2. Identifying which public facilities and utilities need to be relocated;
3. Identifying alternative resettlement sites for PAPs outside the RoW;
4. Carrying out a consultation and dissemination campaign with regard to compensation procedures, entitlement packages, and proposed alternative resettlement sites;
5. Preparing individual entitlement files;

6. Preparing and approving compensation budgets;
7. Ensuring that an adequate notice period is given to PAPs before shifting; and
8. Providing shifting assistance to displaced squatters and to assist squatter-owners to salvage their facilities as per ADB Guidelines.

8.4.2 Construction Phase

287. The NHA will appoint Supervision Consultants, who along with the Deputy Director (Environment) will oversee the working of contractor in accordance with the EMP.

- The Supervision Consultant will liaise with the Project staff to monitor environmental compliance during the construction;
- He will supervise the construction and provide technical support to help ensure compliance with the EMP;
- The Supervision Consultants will assess the environmental impact of Motorway construction;
- He will monitor the progress of work and adherence of the contractor to the EMP and Resettlement Action Plan; and
- He will direct the Contractor to work in such a manner that all Project activities are in compliance with the EMP and NEQS.

8.4.3 Operation Phase

288. The Deputy Director (Environment) and his staff will be responsible for the following:

1. Coordinating with the operational staff working under the Regional General Manager to monitor environmental compliance during Motorway operation;
2. Advising on, and monitoring tree plantations along the Motorway;
3. Reporting on the progress of environmental compliance to the federal and EPA Punjab;
4. Assessing the long-term environmental impacts of Motorway operation;
5. Sustaining a working partnership among the NHA, Punjab EPA, Agriculture, Forest and Wildlife departments of Punjab, NGOs and other related public private sector organizations; and
6. Reporting to Director (Environment) about progress of the work.

8.5 Environmental Management Plan

289. The Environmental Management Plan based on the mitigation measures (indicated in Section 5 of this Report) is presented in Table 8.1 below.

Table 8.1 (a): Environmental Management Plan (Design/ Pre-Construction Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
1	Topography	▪ Change in topography due to construction-related structures such as bridges, embankments etc; and ▪ Visual changes to topography.	Provision for plantation in the design	Design Consultants (DC)	NHA	The cost for plantation will be included in the total Project cost.
2.	Soil Erosion	Road stability, increased flood risk (by more rapid and higher levels of runoff), silting up of water bodies, landscape value and in worst cases may reduce the economic productivity of land and biodiversity in the Project Area	Plantation and stone pitching or rip-rap on embankments and around bridges, flyovers etc.	DC	NHA	The cost for plantation and stone pitching will be included in the total Project cost.
3.	Land Acquisition and Resettlement	▪ Loss of 4,794 acres of agricultural land; and ▪ Resettlement of Affected Persons (APs).	▪ Careful alignment and route selection by the designer to minimise resettlement; ▪ Developing proper judicious compensation package for affectees; and ▪ Giving compensation amount before their shifting.	DC,	NHA	The compensation amount estimated for this Project will be made part of the total Project cost.
4.	Flora	Cutting of 27302 trees of different species (fruit and non-fruit trees)	▪ Under tree plantation plan, a total of 93000 (46500 trees will be planted on one side of RoW) sapling trees will be planted ▪ The compact plantation will be done on both sides; ▪ Regular monitoring of plantation will be carried out by the forest department and any failures will be immediately beaten upto 25%; ▪ The indigenous trees most suited to the tract like Shisham, Kikar, Bakain, Dharek, Siris (*Albizzia procera*), Farash, Sukh chain, Jaman, Bohar, Peepal (*Ficus reliogosa*), Gullahr (*Ficus glomerata*), Sohanjana (*Moringa oleifera*), Karir and Wan (*Salvadora oleoides*) will be planted; ▪ If a tree of rare species is growing	CC	NHA	The cost for plantation, grassing etc. will be included in the total Project cost.

			within the ROW and is required to be removed, it will not be felled but uprooted and transplanted in close consultation with the Forest Department; ▪ All old and mature trees falling in the 25 meter wide proposed planting strips will be saved. Effort will be made to save as many trees as possible even if they are young or poll stage. Proper irrigation and maintenance of plants will be done; ▪ An awareness campaign targeted on the neighbourhood farmers will be carried to popularize the planting of trees, and saplings will be provided on subsidized costs; and ▪ Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides.			
5.	Change in Hydrologic Regime	Minor impacts	▪ 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.	DC	NHA	The cost for culverts will be included in the total Project cost.
6.	Water-logging and Salinity	Minor impacts	Drainage culverts at suitable locations will be provided in water logged areas.	DC	NHA	The cost for drainage culverts will be included in the total Project cost.
7.	Restricted Access	Blockade of access across the proposed Motorway because of its being fenced on both sides	Provision of flyovers and underpasses at the existing passages	DC	NHA	The cost for flyovers and underpasses will be included in the total Project cost.
8.	Public Utilities	Inconvenience caused by disruption of public utilities	▪ Provision in the design and budget for the relocation of the existing utility infrastructures wherever required; and ▪ All public utilities (e.g. water pipes, power/ telephone lines likely to be affected by the proposed Motorway will be relocated well ahead of time	DC	NHA	The cost for relocation of the existing utility infrastructures will be included in the total Project cost.

			before the actual commencement of the construction work.			
7.	Noise	Disturbance to neighbouring communities	▪ Provision for excessive tree plantation in the design	DC	NHA	The cost for plantation will be included in the total Project cost.

Table 8.1 (b): Environmental Management Plan (Construction Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
1	Topography	Cutting and dismantling of existing infrastructure	Proper landscaping	Construction Contractors (CC)	Supervision Consultants (SC)	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.
2	Borrow/ open pits	▪ Land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments; and ▪ Borrow and open pits are potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife.	▪ Necessary permits will be obtained for any borrow pits from the competent authorities; ▪ No excavations allowed within a distance of 100 metres of the RoW; ▪ In borrow pits, the depth of the pits will be regulated so that the sides of the excavation will have a slope not steeper than 1: 4; ▪ Soil erosion along the borrow pits will be regularly checked to prevent/ mitigate impacts on adjacent lands; ▪ In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites; and ▪ Borrow pits will be used for construction material landfill or fish ponds, but during the excavation, top 20 cm soil cover will be preserved for vegetation after the filling of the pits. This is the best way to restore the flora of that area.	CC	SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.
3	Air Quality	Air quality will be affected by fugitive dust emissions from construction machinery, asphalt plants and vehicular traffic. Emission may be carried over long distances depending upon the wind	▪ Dust control by equipping asphalt hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions; ▪ Sprinkling of water across diversion	CC	SC, EPD Punjab	No additional payment will be made to the contractor for these mitigation measures. The contractor will

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
		speed, direction, the temperature of the surrounding air etc.	tracks. Ensuring that haul trucks carrying asphalt concrete mix and/ or aggregate fill materials are kept covered with tarpaulin to help contain construction material being transported between sites; and ▪ Enforcing the NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery.			include their costs in other items of work in the BOQ.
4	Construction waste disposal (Wastewater, oil and solid waste etc.)	Unhygienic conditions, health risk to work force	▪ Wastewater effluent from contractors workshop and equipment washing yards will be passed through gravel/ sand beds to remove oil/ grease contaminants before discharging it into natural streams; ▪ Training of work force in the storage and handling of materials and chemicals that will potentially cause soil contamination; ▪ Solid waste generated during construction and in camp sites will be properly treated and safely disposed of in demarcated waste disposal sites; and ▪ Debris generated by dismantling of existing pavement structures will be recycled subject to the suitability of the material.	CC	SC, EPA Punjab	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.
5.	Construction Camps and Other Facilities	Loss of plantation and vegetation, permanent physical and visual impact on the area, social disturbance for nearby community	▪ The construction camps and workshops will not be located in sensitive areas and prevented within 500 meters distance from the existing settlements; ▪ Efforts will be made to minimize vegetation loss while making site arrangements for construction camps and other facilities;	CC	NHA & SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			▪ Cutting of trees shall be prohibited by contractor(s) and workers near camp sites ▪ The crushing plants shall not be located in environmentally sensitive areas or existing settlements; ▪ The sites for borrow pits shall be selected on the basis of type of soil strata, depth of water table, ground topography, prevalent vegetation state etc. and shall not be located within 100 meters from RoW of the proposed Project. They shall be prohibited where they might interfere with the existing or designed drainage pattern. The River locations shall be prohibited where there is greater likelihood of damaging the River bank or carrying fine material downstream. The Contractor(s) shall ensure that borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of stagnant water bodies, which are favourable places for mosquito breeding; ▪ The depth of construction materials such as gravel removed from the River bank shall be kept one tenth of the total width of the River and this activity shall not interrupt the River flow or undermine the River banks; ▪ Asphalt hot mix and batching plants will not be located within 1000 meters of the existing settlements and will be preferred to establish 500 meters away the settlement and sufficiently away from			

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			agricultural activities, industrial establishments and sensitive areas including, but not limited to, educational and health facilities; ▪ The construction material for M-4 will be taken from these approved quarries and no any new quarry will be dug by contractor; ▪ The construction material storage areas shall not be located in sensitive areas and shall be sheltered or sited within hoardings; ▪ The Contractor(s) will use the selected routes for transport of construction materials. Any damage caused to these routes by overloading or heavy vehicles will be borne by the Contractor(s); ▪ Landowners shall be compensated according to the terms of lease agreements negotiated with them for constructing camps and other facilities; and ▪ The sites for camps and associated facilities shall be reinstated by the Contractor(s) after decommissioning of the proposed Project.			
6.	Soil Erosion and Contamination	Road stability, increased flood risk (by more rapid and higher levels of runoff), silting up of water bodies, landscape value and in worst cases may reduce the economic productivity of land and biodiversity in the Project Area.	▪ Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands shall be used for borrowing materials; ▪ The excavation of earth fill shall be limited to an approximate depth of 50 to 100 cm; ▪ In case the use of agricultural land is unavoidable, the top 30 cm of the plough layer shall be stripped off and stockpiled. Where deep	CC	SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			ditching is to be carried out, the top 1 meter layer of the ditching area shall be stripped and stockpiled for redressing the land after the required borrow material has been removed; ▪ Drainage interception ditches shall be built around the borrow pits to prevent surface run off causing erosion during the rainy season; ▪ The denuded ground cover will be re-vegetated as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover; ▪ The road embankments and road cuttings will be vegetated with a fast growing crop and a native seed mix immediately after fill placement to prevent scour and to encourage stabilization. Use of stone pitching or riprap will be made at appropriate places especially at overpasses, bridges, culverts; ▪ Discharge zones from drainage structures will be furnished with rip-rap to reduce erosion; ▪ Down drains/chutes shall be lined with rip-rap/masonry or concrete to prevent erosion; ▪ Side slopes shall be adjusted to a gradient necessary to reduce erosion potential or, if steeper, stabilized, covered with riprap or other material to prevent soil erosion; ▪ Construction will be restricted to dry season to avoid soil erosion; ▪ Soil erosion checking measures such as the formation of sediment			

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			basins etc, will be taken; ▪ The proposed Project Site, through which the alignment is proposed, will be investigated for the presence of naturally occurring contaminants such as asbestos, arsenic; likelihood of erodibility of soil; contours, terrain stability, slope gradient; physical and chemical properties of soil such as soil depth, particle size distribution, permeability, dispersibility, pH, salinity; and likelihood of seismic activity. If any contaminated soils are found, they shall be removed and deposited in a sealed pit in an area agreed with the concerned authority. The seismic factor shall also be considered at the design stage; ▪ Soil contamination by bitumen, fuel and chemical storages shall be minimized by siting them on an impervious base within an embanked area and secured by fencing. The base and walls of the embankment shall be impermeable and of sufficient capacity to contain 110 per cent of the total volume of stored fuels and chemicals; and ▪ The disposal of waste asphalt shall be made in approved locations such as borrow pits or natural depressions and shall not be within the RoW. Unless located in areas with impervious soils, encapsulation with pre-laid impervious liners including walls and capping is required with the objective to prevent water			

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			percolating through the waste materials and leaching toxic chemicals into the surrounding soils. On completion of disposal at the site, the area shall be capped with a compacted thickness of at least 0.5 meters of impermeable soil covered with at least 200 mm of top soil and shall be finally landscaped.			
7.	Noise	Physiological and psychological impacts	▪ Selection of latest equipment and plant with reduced noise level ensured by suitable in-built damping techniques and appropriate muffling devices; ▪ Confining excessively noisy work to normal working hours in the day; ▪ No heavy machinery will be used or any disturbance causing work will be done in the late hours i.e. after 9pm in summer and 6pm in winters; ▪ Providing the construction workers with suitable hearing protection like ear cap, ear muffs etc.; ▪ Avoiding heavy machinery like percussion hammers and pneumatic drills, especially during night time; ▪ Locating the rock crushing, concrete mixing and material shipment yards away from residential areas, particularly schools, hospitals and nursing homes; and ▪ Noise quality monitoring will be carried out as per schedule given in Environmental Monitoring Plan. ▪ In section-II of M-4 two locations were found most sensitive during the site survey regarding the effect	CC	SC, EPA Punjab	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			of noise due to the presence of Govt Elementary school for Girls and few community houses in Mouza 7 Ghag, at the pre construction stages noise analysis has been collected as a base line reference, samples results can be viewed in table 4.4 during the construction phase special attention will be paid on these locations;			
8.	Surface and Groundwater	▪ Surface water might get contaminated due to the disposal of construction waste generated due to the Project activity; this contamination will not only endanger the aquatic life but will also result in jeopardizing the health of natives that use this water for meeting domestic requirement; and ▪ In addition to that, construction waste, if left unattended will result in forming leachate which will percolate through the soil strata and will reach underground water table and hence, will end up contaminating it.	▪ The surface and groundwater reserves will be adequately protected from any source of contamination such as the construction and oily waste that will degrade its potable quality; ▪ The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements; ▪ Regular water quality monitoring according to determined sampling schedule; ▪ The contractor will 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 road, like drainage structures in urban areas; ▪ Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in	CC	SC, EPA Punjab	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			sedimentation/retention pond; ▪ Construction work close to the streams or other water bodies will be avoided, especially during monsoon period; ▪ Constructing temporary or permanent devices to prevent water pollution due to increased siltation; and ▪ Wastes will be collected, stored and taken to approved disposal site.			
9.	Flora and Fauna	▪ 1156 acres private land will be acquired, 47 acres land will be acquired for interchanges and 347 acres is the Government owned land. ▪ Cutting of 27302 trees due to Project related construction activities. ▪ Hunting and fishing	▪ Flowering and fruiting shrubs will be planted along the road to beautify the landscape. ▪ Effort will be made to save as many trees as possible even if they are young or poll stage. Proper irrigation and maintenance of plants will be ensured; ▪ An awareness campaign targeted on the neighbourhood farmers will be run to popularize the planting of trees, and saplings will be provided on subsidized costs; and ▪ Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides. ▪ Illegal animal and fish hunting will not be allowed and punishment will enforced in case of violation; ▪ Wildlife department will check and confirm that no hunting is made; ▪ 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 will be no	CC, NHA	SC, Forest Department and Wildlife Department	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			disturbance to local birds and animals; ▪ Contractor will ensure that the no hunting, trapping of animal will be carried during construction; and ▪ Borrow pits will be fenced so that no animal can fell into these.			
10.	Social and Cultural Problems	▪ Exit/entry problems for the residents/ movement of the people to the mosque/shrines may be disturbed; and ▪ Serious law and order situation due to interaction of workforce with the local communities. ▪ Livelihood problem due to loss of agricultural land	▪ Providing alternative ways in order for the local people to perform their routine tasks; ▪ Adding appropriate clauses in the construction contracts to avoid any law and order situation; ▪ Local labour shall be employed with an agreed ratio (>75%) for construction works; and ▪ An agreed minimum unskilled labour employment for women with equal remuneration as men agreed at an early stage.	CC, NHA	SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.
11.	Traffic Management	Traffic jams causing inconvenience to the people	▪ Proper alternative traffic management plan – control of traffic in cooperation with the local traffic police department	CC, NHA, Local Traffic Police Department	SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.
12.	Utilities	Construction activities will result in relocation of various utilities within the RoW, including electrical poles, transmission and telephone lines	▪ Strengthening of utilities, wherever required; ▪ Close coordination with the concerned departments to curtail inconvenience to the residents of the Project area	NHA and Local Concerned Departments.	SC	No additional payment will be made to the contractor for these mitigation measures. The contractor will include their costs in other items of work in the BOQ.

Table 8.1 (c) Environmental Management Plan (Operation Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
1.	Noise	Physiological and psychological	▪ Plantation of indigenous tree species ▪ Enforcing laws and testing vehicles regularly for noise pollution	NHA		The cost for plantation will be included in the total Project cost.
2.	Deterioration of Vehicles	Less wear and tear due to improved road condition	-	-		
3.	Soil Erosion and Contamination	▪ Flood risk by rapid flash of storm-water runoff, undermining of the structures such as bridges, flyovers and slope instability causing damage to the Motorway; and ▪ Soil contamination due to Wastewater arising from Service Areas.	▪ In case soil erosion takes place, proper remedial measures will be undertaken to stop future impacts of loss of soils and the associated impacts caused by soil erosion; ▪ Vegetation for human use will be banned within the proposed RoW; and ▪ Toilets at the service areas will be equipped with septic tanks, and the waste will be disposed at designated sites.	NHA	NHA & NH&MP	The cost for these mitigation measures will be included in the total Project cost.
4.	Road Safety	Road safety issues like accidents	▪ Enforcing speed limits and imposing penalties on the traffic violators; ▪ Rest areas will be provided for those in need for rest during travel; ▪ Traffic signs will be provided to facilitate road users about speed limits, rest areas, eating establishments etc.; ▪ Warning messages such as "*speed thrills but kills*" or "*better late than never*" etc. will also be displayed at appropriate locations to aware drivers about likely accidents due to overspeeding; ▪ All the lanes, median, sharp bends will be reflectorized to facilitate travellers in the night time; and ▪ Proper lighting arrangement on the	NH&MP	NHA	The cost for these mitigation measures will be included in the total Project cost.

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility		Cost
				Implementation	Supervision	
			proposed Motorway will be done at required places.			
5.	Landscaping	Solid waste along the Motorway	▪ Provision of solid waste collection bins/containers at appropriate places ▪ Safe disposal of solid waste	NHA		The cost for these mitigation measures will be included in the total Project cost.
6.	Land Use	Development of commercial establishments (restaurants, petrol and gas filling stations), educational institutes etc., which may affect the land value	Seeking permission from the concerned authority for future development	NHA	Development Authority	The cost for these mitigation measures will be included in the total Project cost.
7.	Air Quality	Change in air quality with the passage of time	▪ Setting up of system to monitor air quality along the Project Area in accordance with acceptable International standards; and ▪ Trees will be planted along the fence of the proposed Motorway, these will work noise barrier. For suitable plantation Forest Department will be consulted.	NHA	EPA Punjab	The cost for these mitigation measures will be included in the total Project cost.
8.	Time Saving	Reduced travel time, which will be permanent moderate positive impact	-	-		
9.	Socio-economic Conditions	▪ Opening up markets to rural economic activities by reducing the production and transportation cost thereby stimulating agricultural production ▪ In-accessibility except from interchanges	▪ Providing interchanges at appropriate locations ▪ Keeping underpasses in operation condition by regular maintenance	NHA		The cost for these mitigation measures will be included in the total Project cost.

Note: DC (Design Consultant), CC (Construction Contractor), SC (Supervision Consultant), NHA (National Highway Authority), NHMP (National Highway & Motorway Police)

8.6 Environmental Monitoring

290. This section provides a monitoring plan that identifies the roles and responsibilities of Project staff involved in environmental and social monitoring, and lists the parameters that will be used in the monitoring process.

8.6.1 Objectives

291. The main objectives of the pre-construction, construction and operation phase monitoring plans will be to:

- Monitor the actual impact of the works on physical, biological and socio-economic receptors within the Project corridor for indicating the adequacy of the EIA;
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds that anticipated in the EIA;
- Ensure compliance with legal and community obligations including safety on construction sites;
- Monitor the rehabilitation of borrow areas and the restoration of construction campsites as described in the EMP; and
- Ensure the safe disposal of excess construction materials.

292. The main objectives of monitoring during the operation phase will be to:

- Appraise the adequacy of the EIA with respect to the Project's predicted long-term impacts on the corridor's physical, biological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, if and when necessary;
- Compile periodic accident data to support analyses that will help minimise future risks; and
- Monitor the survival rate of avenue plantations.

8.6.2 Monitoring Roles, Responsibilities and Schedules

293. The Project staff engaged in social and environmental monitoring is listed below, followed by descriptions of the monitoring responsibilities specific to each post:

- Director (Environment) EALS, NHA
- DD (Environment)
- Supervision Consultants

294. Director (Environment) EALS will have overall responsibility of EMP implementation. Monitoring plan is shown in Table 8.2.

- **Deputy Director (Environment)**

295. The Deputy Director (Environment) will have overall responsibility for the implementation of EMP and Environmental Monitoring and Evaluation (M&E). This includes the following:

1. Ensuring the availability of human and material resources required for environmental monitoring;

2. Preparing periodic monitoring reports as required by the lending Agency and submitting this to ADB and NHA management.

3. Ensuring that the required environmental training is provided to the staff concerned; and

296. The DD (Environment) and his team will also be responsible for:

The DD (Environment) and his team will also be responsible for:

1. Carrying out periodic monitoring visits to construction sites to review the environmental performance of the contractors; and

2. The status of the Project's consultation strategy.

3. Non-compliance management, preparation and monitoring of Corrective Action Plans (CAP)

b) Supervision Consultant

297. Supervision Consultant will involve the Environmental Expert/ Monitoring Consultant and Resident Engineer. The Resident Engineer will overlook the performance of contractor to make sure that the contractor is carrying out the work in accordance with EMP. The Monitoring Consultant (MC) on the other hand will carry out the environmental monitoring and report to DD (Environment) for adequacy of the monitoring program as specified in EMP. The MC will also induct a Technical Training Consultant to educate the Contractor's and NHA's staff.

8.6.3 Monitoring Parameters

a) Environmental Monitoring Parameters

298. The following environmental parameters will be monitored at locations identified during the construction phase (e.g. location of asphalt plants, construction camps. etc.).

- Ambient Air Quality (NO_x, SO_x, CO, PM_{10}, Hydrocarbons, Smoke)
- Water Quality
  Groundwater Quality (Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium)
  Wastewater Quality (pH, DO, TSS, Alkalinity, BOD_5, COD, Turbidity)
- Noise Levels

b) Social Monitoring Parameters

299. Social monitoring will be carried out based on the following indicators:

- Number of PAPs to be resettled/ relocated/ provided livelihood assistance where required;
- Availability and adequacy of alternative resettlement sites for PAPs (by number and type);
- Inventory and valuation of PAPs' affected assets;
- Pre- and post-resettlement incomes of PAPs;
- Notice period given to PAPs before shifting them from their original locations within the RoW;
- Number of vulnerable PAPs compensated under the EMP;

- Verification of shifting assistance provided to displaced squatters and to squatter-owners allowed to salvage their facilities;
- Number and nature of consultations carried out, as well as targeted stakeholders;
- PAPs' perspectives on compensation procedures, entitlement packages, and proposed alternative resettlement sites;
- Record of any problems due to restricted access to the Motorway during construction and whether ramps/ diversions have been provided where required;
- Number of grievances recorded and redressed;
- Number of public facilities and utilities to be relocated;
- Number of mosques/ shrines/ graves to be relocated (if any) and corresponding contribution of affected communities and NHA; and
- Verification of relocation of mosques/ shrines/ graves.

8.6.4 Reporting Structure and Outcomes

300. Progress reporting will be the overall responsibility of the Project Director who will provide inputs to the Supervision Consultants for submission to GM (M-4). The Supervision Consultants will be responsible for submitting a monthly environmental/ social report for the Project to GM (M-4)and GM (NHA/ADB). In addition, the DD (Environment) will prepare a quarterly report encompassing environmental concerns, and following review by the Director (Environment) he will submit the report to the EPA Punjab. A bi-annual environmental monitoring report will be prepared on ADB prescribed template and submitted to ADB.

Table 8.2 Environmental Monitoring Plan

Project Stage	Parameters	Details of Location	*Standards/ Guidelines	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
Pre-Construction Stage								
	|Ambient Air Quality (CO, NO_x, SO_x, PM_{10})	7.5 metres from the edge of pavement downwind at four selected locations	PAK NEQS	4	Once @ Rs.50,000/ location	NHA	Once in 24 hours	200,000/-
	Surface water and Ground water Quality (Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Entercocci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium) Surface Water Quality (pH, DO, TSS, Alkalinity, BOD_5, COD, Turbidity)	Community ground water and surface water sources near the edge of the RoW at 4 selected locations along the proposed section-II of M-4	▪ WHO Drinking Water Quality Guidelines (2004) ▪ NEQS	2 for groundwater and 2 for surface water	Once @ Rs. 15,000 /-per sample	NHA		60,000/-
	Noise Levels on dB(A) Scale	Four locations: In Chak No. 305/JB at RD 59+200, Chak No. 396 JB at RD 86+700 near GGES, at RD 119+500 at Rakh Kotla and at RD 120+200 in Mouza 7 Ghag area locations shown on map no Riaz.	PAK NEQS	4	Once @ Rs. 1,500/- per point	NHA	Once in 24 hours	6,000/-
							TOTAL	**266,000/- (US$ 2660)**
Construction Stage								
	Air Quality (PM_{10}, Hydrocarbons) All relevant stack emissions (CO, NO_x, SO_x, Smoke)	40 metres from hot mix plants	Pak-NEQS	4	Bi-annually @ Rs. 50,000/- for two years	Contractor	Continuous for 24 hours or one full working day	800,000/-
	PM_{10}	In active construction area	Pak-NEQS	4	Monthly @ Rs. 10,000 for two years	Contractor	Continuous for 24 hours or over one full	960,000/-

Project Stage	Parameters	Details of Location	*Standards/ Guidelines	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
							working day	
	Water Quality Groundwater Quality (Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium) Wastewater Quality (pH, DO, TSS, Alkalinity, BOD_5, COD, Turbidity)	Four locations - near edge of the RoW and community groundwater source All project-related wastewater discharge locations including camp sites, asphalt plants and workshops (four locations)	WHO Drinking Water Quality Guidelines (2004) NEQS	2 for groundwater and 4 for wastewater 2 for surface water	Bi-annually @ Rs. 15,000	Contractor		480,000/-
	Noise Levels on dB (A) Scale	At equipment yard and construction site and during pile driving 7 meters from noise source	PAK NEQS	4	Monthly @ Rs. 1,500 per point for two years	Contractor	24 hours @ 15 seconds interval over 15 min every hour, then averaged	6,000/-
		Not less than one location 15 meters from the edge of pavement and at locations of all potentially affected sensitive receptors		4				6,000/-
							TOTAL	**2,252,000/-** **US $ 22,520/-**
Operation Stage								
	Ambient Air Quality (CO, NO_x, SO_x, PM_{10})	7.5 metres from the edge of pavement downwind at four selected locations	PAK-NEQS	4	Once @ Rs.50,000/ location	NHA	Once in 24 hours	200,000/-
	Groundwater Quality (Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Entercocci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium)	Community ground water and surface water sources near RoW at four selected locations along the proposed section-II of M-4	▪ WHO Drinking Water Quality Guidelines ▪ NEQS	2 for groundwater and 2 for surface water	Once @ Rs. 15,000 per sample	NHA		60,000/-

Project Stage	Parameters	Details of Location	*Standards/ Guidelines	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
	Surface Water Quality (pH, DO, TSS, Alkalinity, BOD_5, COD, Turbidity)	Motorway						
	Noise Levels on dB(A) Scale	Four locations: In Chak No. 305/JB at RD 59+200, Chak No. 396 JB at RD 86+700 near GGES, at RD 119+500 at Rakh Kotla and at RD 120+200 in Mouza 7 Ghag area locations shown on map no Riaz	PAK NEQS	4	Once @ Rs.1,500/- point	NHA	Once in 24 hours	6000
							TOTAL	**266,000/-** **US $ 2660/-**
							Total Monitoring Cost	**5,178,000/-** **US $ 51,780 /-**

8.7 Environmental Mitigation Cost (Replantation)

301. Three rows of plants will be raised along the M-4 Section-II road on one side of the road. Distance between two plants will be kept as 4 meters, thus on one side 46500 numbers of plants are to be raised (93000 on both sides of the road).

Plantation Cost

The cost of plantation includes the cost of equipment and initial planting and maintenance for two years and given in detail in table 8.3 and 8.4.

Table 8.3: Estimated Cost of Raising of Plantation Over 1 km (250 plants in one row, 750 plants for three rows in 1 km)

Sr. No	Particulars of Work	Quantity (No.)	Rate (Rs.)	Amount (Rs.)
1	Clearance of Site	750 plants (8 MD, 5 labour)	400/MD	16,000
2	Layout	750 plants (2 MD, 4 labour)	400/MD	3,200
3	Digging of Pits 2.65 x 250 = 662.50cft. (232.537m^3)	750 pits (10 MD, 8 labour)	400/MD	32,000
4	Average cost of plants	750 plants	30/plant	22,500
5	Carriage of plants 750 Nos. from Nursery to Site including loading/unloading	750 plants	5/plant	3,750
6	Planting of plants with ball of earth	750 plant (5 MD, 8 labour)	400/MD	16,000
7	Miscellaneous (weeding for 4 times a year, pesticides and maintenance, replacement of dead plants)			200,000
Sub-Total				**293,450/-**

**MD: Man Days*

Note: For the remaining period of contractor's contract with NHA, maintenance of plants (Weeding for 4 times a year, pesticides, replacement of dead plants and watering 40 times a year) will be the responsibility of contractor

293,450 Pak Rs. is a cost of plantation in 1 km while the cost for plantation in 62 km of length is 18,193,900 Pak Rs.

Cost of Equipment

302. The tentative cost of equipment is given in Table 8.4 given below:

Table 8.4: Tentative Cost of Equipment for 2 years

Sr. No	Name of Equipment	No.	Price (Rs.)
1.	Tractor	2	600,000
2.	Water Tanker/Bowzer	2	500,000`
3.	Kassies (Local Earth Digging Tool)	200	40,000
4.	Vaholas (Local Earth Digging Tool)	200	40,000

5.	Lift Pump for filling Water Tanker/Bowzers	2	200,000
6.	Cost of Diesel for 2 years		1500,000
Sub-Total			**2,880,000 Pak Rs.**
			28800 US$

Total Cost of Plantation

i. Cost of Plantation in 62 km is 18,193,900/-
ii. Cost of equipment is 2,880,000/-
iii. Total cost in Pak Rs. 21,073,900/-
iv. Total cost in US $ 210739

8.8 Environmental Technical Assistance and Training Plan

303. An environmental and social training and Technical Assistance (TA) programme will be carried out to build the NHA's capacity to effectively implement this EMP, as well as to facilitate the improved environmental management of future Motorway Projects by increasing the environmental and social awareness of NHA staff in general. The NHA with the collaboration of Monitoring Consultants (MC) will arrange the environmental training sessions for their staff. The objective of these sessions will be to help/establish appropriate systems, and to train senior NHA staff responsible for managing environment, operations, and planning, who can then impart training at a broader level within and outside the NHA (i.e., the training of trainers). The Consultants will organize training courses for NHA staff, in specialized areas such as air and noise pollution monitoring; develop environment operation manuals in consultation with the NHA's Environment section. The details of this training program are presented in Table 8.5

Table 8.5
Personnel Training Programme/ TA Services

Provided by	Contents	Trainees/ Events	Duration
Monitoring consultants/ organizations specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations daily monitoring and supervision	Three seminars for NHA Project staff	2 days
Monitoring3 consultants/ organizations specializing in social management and monitoring	Short seminars and courses on: Social awareness	Three seminars for Project staff dealing in Social/lands matters	2 days
Monitoring consultants/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	Two seminars for contractor's staff	2 days

a) Cost of Environmental Technical Training

The cost provision of Rs. 700,000 (US$ 7000) is estimated on lump sum basis for providing technical training to the staff.

8.9 Environmental Monitoring, Mitigation and Training Costs

304. For an effective implementation of environmental mitigation measures, it is very important to provide sufficient funds for the implementation of environmental mitigation measures, monitoring, and training. National Highways Authority (NHA) is committed to implement all mitigation measures given in this report and will provide required funds in this regard. The summary of total environmental costs is given in Table 8.6, which amounts out to be Rs. 26951900 million (US $ 269519).

Table 8.6
Summary of Environmental Costs

#	Description	Cost (Millions)	
		Pak Rs.	US $ *100Pak Rs
1.	Environmental Mitigation Cost (Plantation)	21,073,900	24234.5
2.	Environmental Monitoring Cost	5178000	51780
3.	Environmental Training Cost	700,000	7000
	TOTAL	**26951900**	**269519**

SECTION 9

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

9.0 General

305. This section deals with the information disclosure to the public and consultation sessions held with the different stakeholder groups that are likely to be affected by the implementation/construction of section-II of M-4 Project. The consultation process was carried out as per the guidelines of ADB and EPA.

306. This consultation process had the following objectives:

1. Share information with stakeholders on proposed improvement works and expected impacts on the physical, biological and socio-economic environment of the Project corridor;
2. Understand stakeholders' concerns regarding various aspects of the Project, including the existing condition of the Motorway, upgrading requirements, and the likely impact of construction related activities and operation of the improved Motorway;
3. Provide an opportunity to the public to influence Project design in a positive manner;
4. Obtain local and traditional knowledge, before decision making;
5. Increase public confidence about the proponent, reviewers and decision makers;
6. Reduce conflict through the early identification of controversial issues, and work through them to find acceptable solutions;
7. Create a sense of ownership of the proposal in the mind of the stakeholders; and
8. Develop the proposal which is truly sustainable.

9.1 Identification of Main Stakeholder

307. During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. During the field survey different stakeholders identified were the villagers, local residents, government officials, shop owners, public representative, NGO's and general public. All those stakeholders had different types of stakes according to their interests and professions.

308. General public, elected representatives, local councillors and informal community leaders including members of non-government organizations (NGOs) were asked to state their current perceptions of priorities for improvements to the urban environmental infrastructure in their areas and about the likely impacts of the Project during construction and operation phases. women groups were also contacted. The main objectives of the public information campaign and public consultation were as follows:

- To share the information about the proposed project, its components and activities with affected people;
- To obtain cooperation and participation of the general public in Project

planning and implementation processes;
- To establish accessible and effective grievance redress procedures; and
- Create a sense of ownership among the stake holders regarding the Project.

9.2 Approach for Public Consultation

309 The approach adopted towards public participation was to disseminate information, solicited inputs and getting consensus on issues and propose mitigation measures. This approach was put into practice through consultation in public meetings, meetings with influential people of the districts, workshops and roadside consultations with pedestrians, vehicle drivers, roadside vendors etc were held. The first consultation process was held in 2006-2007 during the preparation of environmental assessment report. Subsequently, further consultations were held in June 2014 and October 2014 during the updation of the Environmental Impact Assessment Report for section-II of M-4. A fresh public consultation was conducted on 24-25 June 2014 and 13-15 October 2014 by the team of Environment Cell and the Land Staff (NHA). The main focus of the consultation was to get a view/idea of the public about the construction of proposed section-II of M-4 and their grievances if any. As the construction of the first section i.e. Faisalabad-Gojra section-I of M-4 is near the completion stage therefore public was well aware of the benefit of the construction which they will obtain during the construction and at the operational stage of the second section of the project. Village meetings were conducted both with the male and female residents of the communities, and public was aware for the provision of jobs during the construction period. On the whole residents appreciate the proposed project and were happy for the development of the area.

9.3 Meetings with Stakeholders

310. During the first round of consultations meetings were held with the local communities NGO's Government officials and all possible stakeholders in 2007. During discussions with residents and site visits, it has been revealed that local people were generally aware of the Project and were in favor of its construction

311. In the second round of consultation for the updation of EIA report for Section-II Director Environment and Monitoring from Environmental Protection Agency (EPA) Punjab was contacted for validation of NOC which was earlier issued in 2007. In June and October 2014 Public Consultations were also arranged with community members of different villages along the road alignment, the Project is generally accepted and people want this Project to be taken up. The consultation sessions were carried out according to the schedule indicated in Table 9.1.

Table 9.1

Schedule of Scoping Sessions

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
1	24 June 2014	Tehsil & District	10:00 am	Chak 383 JB	11	M. Akram S/O Shah	Compensation package for

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
		Toba Taksingh				Muhammad M. Adeel S/O Abdul Rasheed M. Ajmal Hussain S/O M. Hussain Qamar Ajaz S/O Khushi Muhammad M. Naeem Babar S/O liaquat Ali Ghulam Rasoul S/O M. Ismail Muraba Falak Sher S/O M. Shafi Imran Ali S/O Ashiq Auraim t Adil Husain S/O M. Hassan Abdul Ghafar S/O Ismail Javaid Ahmar S/O Abdul Hameed Manzoor Hussain S/O Ismail	affected persons Land acquisition related matters Under passes and culverts Designs Formation of a village level committee Briefing about the Environmental Issues arise during the construction activities
2	24 June 2014	Tehsil & District Toba Taksingh	10:45 am	RD 80+100	3	Kareem Bibi W/O Khadim Hasan Sughra Iqbal-Anwer Ali Kinza Fatima D/O Farman Ali	Discussion on Compensation Package with the Affectees Resettlement issues were discussed Jobs to the local residents Briefing about the Environmental Issues arise during the construction activities
3	24 June 2014	District T.T.Singh)	11:30 am	Chak 397 JB RD 84+700	4	Mohammad Adil S/o M.Anyat Ummar Hayat S/O M.Adil Samena bibi W/O Ummar Hayat Rasheed S/O M.Adil	Suggestions regarding Road Safety Resettlement issues were discussed Compensation package with the Affectees Briefing about the

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
							Environmental Issues arise during the construction activities
4	25th June 2014	Tehsil Shorkot (District Jhang)	12:15 pm	RD 86+637	13	Mahmood S/O Ramzan Abdulstar S/O Abdul Latif Umair Hayat S/O Ahmed Bux Nazeer Ahmed S/O Wariam Haq Nawaz S/O Deen Mohammad Mohammad Asif S/O Mohammad Zulfiqar Mohammad Muzafar S/O Alladita Shaukat S/O Mohammad Ramzan Alamgheer S/O Saad Ali Mohammad Asghar S/O Nazeer Ahmad Nazar Bibi W/O Muhammad Bux Sakina Bibi W/O Tahir Abbas Janta Bibi W/O Mohammad Nawaz Shahnaz Bibi W/O Zafar Iqbal	Discussion on Compensation Package with the Affectees Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities
5	25th June 2014	Tehsil Shorkot (District Jhang)	2:00 pm	RD 87+100	3	Ghazala Bibi W/O Mazhar Mounda Bibi W/O Sultan Suneera W/O Saleem	Land Compensation issues were discussed Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities
6	25 June	Tehsil	13:30	Mouza	11	Mohammad	Discussion on

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
	2014	Shorkot District Jhung	pm	Sat Ghag RD 120 End Point of Section-II M-4		Sadiq S/O Badhur Khan Mohammad Yasheen S/O Ghulam Baqir Ghulam Murtaza S/O Abdul Kareem Abdul Rasheed S/O Jafar Hussain Amir Nadeem S/O Mohammad Ayub Mohammad Ramzan S/O Mohammad Nadir Ejaz Hussain S/O Tariq Hussain Sajjad Hussain S/O Talib Hussain Umar Daraz S/O Talib Hussain Sarfaraz S/O Talib Hussain Sadabahar S/O Talib Hussain	Compensation Package with the Affectees Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities
7	14 October 2014		11:00 am	Chak 487	25	Maqsood Ahmed S/o Haji Nabi Bhaksh, M. Nawaz S/o Haji Nabi Bhaksh, Abdul Rasheed S/o Kamal Din, Mukhtar Ali S/o Barkat Ali, M. Ashraf S/o Talib Din, Asghar Ali S/o Mukhtair Ali, Asghar Ali S/o Nabi Baksh, Abdul Sattar S/o Kamal Din, Sardar S/o Kamal Din, Ghulam Bari S/o Barkat Ali, Faqeer Muhammad S/o Moula Bhaksh (other names of	Compensation package for affected persons Land acquisition related matters Under passes and culverts Designs Formation of a village level committee Briefing about the Environmental Issues arise during the construction activities

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
						participants are attached in Annexure-IV for reference	
8	14October 2014			Chak 396 JB	17	Mazhar Abbas S/o M. Nawaz, M Ameen S/o Ghulam Naveed, Rub Nawaz S/o Bhadur Khan, M. Sadiq S/o Chiragh Din, Nazir Ahmed S/o M. Daraya, M. Iqbal S/o Lal Khan, Raja Ali Shan S/o Malik Dad, M. Riaz S/o Rahim Dad, Raja Liaquat Ali S/o Aslam Khan, Haq Nawaz S/o Murad, M. Tariq S/o Tariq Aslam, M. Imran S/o Taj Muhammad, Faqeer Muhammad Nambar Dar, M. Riaz S/o Khan,	Compensation package for affected persons Land acquisition related matters Under passes and culverts Designs Formation of a village level committee Briefing about the Environmental Issues arise during the construction activities
9	15 October 2014			Chak 310	27	Farzand Ali S/o M. Sadiq, Akbar Ali S/o Maqbool Ahmed, M. Akram S/o Allah Ditta, Ali Raza S/o M. Hanif, Saif Ullah S/o Anayat Ullah, Zafar Iqbal S/o M. Iqbal, Mateen Ullah S/o Anayat ullah, M. Ijaz S/o M. Sarwar, Arshed Ali S/o Rehmat Ali, Munir Ahmed S/o Ghulam Ali, Nazir Ahmed S/o M. Din (other names of participants are attached in Annexure-IV for	Land Compensation issues were discussed Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
						reference	
10	16 October 2014			Chak 383 JB	23	Shahida Parveen W/o Farman Ali, Nasreen W/o Dilbar Hussain, Shameem Wo Muhammd Ramzan, Dilbar Hussain S/o M. Tufail, Farooq-e-Azam S/o M. Irshad, Shahzad Ahmed S/o Munawar Hussain, M. Shahid Shaheen S/o M. Yaqoob, (other names of participants are attached in Annexure-IV for reference	Land Compensation issues were discussed Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities
11	15 October 2014			Chak 396	16		Discussion on Compensation Package with the Affectees Under passes and culverts designs Briefing about the Environmental Issues arise during the construction activities Formation of a village level committee
12	15 October 2014			Chak 7 Gagh	24	M. Ikram Shah S/o Mian Shab, Aman Ullah S/o M. Ramzan, Zia Ullah S/o M. Sharif, Sarfraz S/o Mian Fazil, Jumma Din S/o M. Khan, Allah Ditta S/o Khuda Baksh, M. Ramzan S/o M. Fazil, Adil S/o	Compensation package for affected persons Land acquisition related matters Under passes and culverts Designs Formation of a village level committee

S. No.	Date	District /Tehsil	Time	Village	No. of Participants	Name of Participants	Topic
						Bhadur Khan (other names of participants are attached in Annexure-IV for reference	Briefing about the Environmental Issues arise during the construction activities

The details of these meetings (scanned copies of attendance sheets and the pictorial profile) are attached as Annexure-IV.

9.4 Stake Holders Concern

312. The most common concerns noticed during the fresh public meeting are listed as under:

Motorway Design

- The design of road should be least disturbing the local agriculture and economic activity.
- Sufficient cross drainage structures should be provided to avoid flooding of the area.
- The Motorway alignment should minimum effect the local settings and to avoid the severance of the area while passing through the populated area.
- The respectful local customs should be taken in account in a design and should be maintained during construction.

Motorway Construction

- Avoid undue delays in construction to limit the inconvenience to the public cause by the road construction.
- Adopt measures to minimize dust, smoke and noise pollution during construction.
- Avoid dumping of the construction materials during the construction and to carry out proper site clearance after completion of the construction activities.
- Provision of properly formed and maintained diversions during construction.
- Inclusion of local labour and workforce up to the maximum possible extent in project construction activities.

Motorway Operations

- Erection of informatory regulatory and cautionary signs to eliminate operational hazards
- Control over speeding and the use of loud pressure horns near populated area.
- Specify speed limits where required.
- Proper maintenance of cross drainage structure to avoid flooding of road and adjacent area.

313. These concerns will be addressed through the proper implementation of the EMP. The list of consulted persons during consultations held in June and October 2014 and the pictorial profile of public consultation is attached as Annexure-IV. Public consultation was held in accordance with the guidelines of ADB and Pakistan Environmental Protection Act 1997. On different locations at different Chaks public meetings were organized and the team travelled along

the project alignment and gathered all data about the sensitive receptors as well.

9.5 Future Information Disclosure Plan

314. After suggesting the possible solutions of the stakeholders' concerns, the solutions (final EIA report) will be accessible to interested parties on request and the version of final report will be available in the project offices and its summary will be available to stakeholders in national language.

SECTION 10

GRIEVANCE REDRESS MECHANISM

10.1 General

315. In order to receive and facilitate the resolution of affected people's (AP) concerns, complaints and grievances about the Project's environmental performance, a Grievance Redress Mechanism (GRM) will be established at the Project. The GRM will address the APs' concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the APs at no costs and without retribution. The mechanism will not impede access to the country's judicial or administrative remedies.

316. The APs will be fully informed of their rights and of the procedures for addressing complaints verbally and in writing during consultations. A mechanism will be established to address/resolve the project related issues including the APs concerns or grievances including those related to the environment.

317. A Grievance Redress Committee (GRC) at the project level will be notified. Although the GRC will be the focal unit for grievance redress at the sub-project (local) level, an informal mechanism will also be instituted to facilitate the APs to resolve their issues at the local level.

10.2 Grievance Redress Committee, Focal Points, Complaints Reporting, Recording and Monitoring

318. NHA will assist the project affected communities/villages to identify local representatives to act as Grievance Focal Persons (GFPs). The GFPs will be responsible for i) acting as community representatives in formal meetings between the project team and the local community he/she represents; ii) communicating the community members' grievances and concerns to the contractor during project implementation.

319. A pre-mobilization public consultation meeting will be convened by NHA's EALS Unit and attended by the GFPs, Supervision Consultant, contractor, Project representative and other interested parties (e.g. district level representatives, NGOs). The objectives of the meeting will be as follows:

- Introduction of key personnel of each stakeholder including roles and responsibilities;
- Presentation of project information of immediate concern to the communities by the contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
- Establishment and clarification of the GRM to be implemented during project implementation including proactive public relations activities proposed by the project team, Supervision Consultant and contractor to ensure that communities are continually advised of project progress and associated constraints throughout project implementation period; and

- Elicit and address the immediate concerns of the community based on the information provided above.

320. Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below:

- Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.
- The GFP will bring the individual's complaint to the attention of the contractor.
- The contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the GFP.
- The GFP will discuss the complaint with the contractor and have it resolved.
- If the contractor does not resolve the complaint within one week, then the GFP will bring the complaint to the attention of the Supervision Consultant's Environmental Specialist. The SC's Environment Specialist will then be responsible for coordinating with the contractor in solving the issue.
- If the complaint is not resolved within two weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).

321. The GRC will be headed by the Project Director M4 with NHA's DD/AD (land) or DD/AD (environment) – depending upon the nature of the complaint - as member and focal person. Besides, the GRC will include the environment staff of the Project Management Unit/Supervision Consultants, environment staff of the contractor and representative of the local community (preferably the relevant GFP).

322. The GRC will have a period of two weeks to resolve the complaint and communicate this back to the community. The contractor will then record the complaint as resolved and closed in the ECR. This represents the first level of the GRM.

323. If the complaint is not satisfactorily resolved at this level, it will be referred by the GRC to the second level of GRM i.e. to the Environment, Afforestation, Land and Social (EALS) at NHA Headquarters, within seven days after communicating its decision to the complainant. The EALS will communicate to the complainant immediately regarding the receipt of his complaint, will scrutinize the record of the GRC, investigate the remedies available and request the complainant to produce any record in favour of his claim. After thorough review and scrutiny of the available record on the complaint, EALS staff shall visit the field to meet the complainant, and collect additional information and evidence if required. Once the investigations are completed EALS shall get its recommendations approved by Member Aided Projects and forward them to the Project Director and the complainant accordingly within 30 days of receipt of the complaint. Should the complaint not be resolved through the GRM, the issue will be adjudicated through local legal processes.

324. In parallel to the ECR placed with the contractor, each GFP will maintain a record of the complaints received and will follow up on their resolution.

325. NHA's project office will also keep track of the status of all complaints through the Monthly Environmental Monitoring Reports submitted by the contractor to the SC and will ensure that they are resolved in a timely manner.

SECTION 11

CONCLUSIONS

326. This section presents conclusions of the EIA study of Section-II of M-4 Motorway. The overall objective of the project is that it will provide accessibility to South North connection across the country leading to the development of National Trade Corridor. The construction of M-4 Motorway will link major cities of the country like Peshawar, Islamabad, Lahore and Faisalabad with Multan and southern areas. At national level this facility will trigger boost to mobility, economic development. Locally the segment of society from where the motorway will traverse will get developed having improved opportunities for catering better standard of life. The main objective of NHA for planning this Motorway is to provide a safe, congestion free and high speed facility to cope with ever increasing transportation demand for freight and passengers across the country and an augmented facility to commuters of the project area as well as to tourists.

327. The proposed section of motorway project components include construction of four lanes dual carriageway from Gojra to Shorkot which connects under construction Faisalabad-Gojra section-I of motorway and construction of three Interchanges at different local road crossings. Bridges and culverts will be constructed on Spill Channel drains and canal crossings. The total width of both carriage ways 31.5 (6 lane) and land reserved for plantation will be 30 meters both side (15 meters on one side) within the RoW width of 100 meters.The carriageway will include paved shoulders at inner and outer side. The outer shoulder of each carriageway will be 3 meters wide with 0.5 meter rounding and the inner side will be 0.6 meter. The Right of Way (RoW) of the proposed Motorway Project is 100 meters wide, while it will be 40 meters at the locations where interchanges will be constructed. Major construction work will generally remain confined within the RoW. About 1156 acres private land will acquired, 47 acres land will be acquired for interchanges and 347 acres is the Government owned land appox. The implementation of the Project is expected to commence in the beginning of the year 2015 and the estimated completion date will be the end of 2017.

328. The conclusions mentioned below are based on the findings of detailed Environmental Impact Assessment which has been carried out as per requirement of the Punjab- EPA Pakistan and Asian Development Bank Social Safe Guard Policy Statement (2009).

Identification of the Main Issues and Concerns

329. During the field surveys, significant efforts were made to identify the main social, cultural and environmental issues related to the construction and operation of the proposed Motorway. Various government departments and agencies were also contacted for obtaining salient information in this regard along with that from area residents and stakeholders. Following is the list of main issues and concerns:

- Cutting of trees/bushes falling within the proposed ROW;
- Disturbance to the public movement during construction;

- Reduction in the daily routine activities of local residents during construction;
- Noise and air pollution due to the working of construction machinery during construction and traffic operation phases of the Project;
- Solid waste generation during construction;
- Oil spillages from construction machinery, resulting in soil and groundwater contamination;
- Surface water bodies contamination due to soil erosion and construction activities.

Conclusions

330. After the construction of the proposed section-II of motorway, people living in the project area and the road users / travellers will get the following benefits:
    - Less time will be required for travelling and reaching the destination;
    - To accelerate the economic activity by providing smooth access to nation wide markets;
    - During the construction phase, local labour will be accommodated in the construction activities leading to poverty alleviation;
    - To provide sustainable delivery of a productive and efficient national highway system contributing to decreasing transportation cost;
    - To provide the livelihood and to educate the poor people of the project area;
    - Traffic load on N-5 will get reduced;
    - It will also act as a vertiberal part of National Trade Corridor and major linking limb between Pakistan ,Central Asia and China;
    - Trade among Middle Eastern countries, Pakistan and those of the land locked countries in the vicinity of Pakistan can be envisioned with the availability of this facility.

331. Project is socio-economically viable and environment friendly if EMP is implemented in true letter and spirit. Results of the EIA Study have shown that the impacts of the project activity on the physical environment will be negligible. However, there will be significant impacts on the biological and social environment. These impacts could be reduced by proper and judicious compensation to the affectees and well planned meticulous design of the facility and by implementing an appropriate tree plantation plan. The plantation in the will enhance the aesthetics; improve the landscape as well as the environmental conditions along the project area. In fact in times of diminishing economic and natural resources, using sustainable approaches in transportation infrastructure will help us to enhance quality of life and serve the transportation needs of the present leaving provision for future generations to meet their needs.

Annexure-I

Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations 2000

PAKISTAN ENVIRONMENTAL PROTECTION AGENCY (REVIEW OF IEE AND EIA) REGULATIONS, 2000

S.R.O. 339 (1)/2001. - In exercise of the powers referred by section 33 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), Pakistan Environmental Protection Agency, with the approval of the Federal Government is pleased to make the following Rules, namely : -

1. Short title and commencement

(1) These regulations may be called the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

(2) They shall come into force at once.

2. Definitions

(1) In these regulations, unless there is anything repugnant in the subject or context –

(a) "Act" means the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997);

(b) "Director-General" means the Director-General of the Federal Agency;

(c) "EIA" means an environmental impact assessment as defined in section 2(xi);

(d) "IEE" means an initial environmental examination as defined in section 2(xxiv); and

(e) "section" means a section of the Act.

(2) All other words and expressions used in these regulations but not defined shall have the same meanings as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any category listed in Schedule I shall file an IEE with the Federal Agency, and the provisions of section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule II shall file an EIA with the Federal Agency, and the provisions of section 12 shall apply to such project.

5. Projects not requiring an IEE or EIA

(1) A proponent of a project not falling in any category listed in Schedules I and II shall not be required to file an IEE or EIA:

Provided that the proponent shall file –

(a) an EIA, if the project is likely to cause an adverse environmental effect;

(b) for projects not listed in Schedules I and II in respect of which the Federal Agency has issued guidelines for construction and operation, an application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be

fully complied with.
(2) Notwithstanding anything contained in sub-regulation (1), the Federal Agency may direct the proponent of a project, whether or not listed in Schedule I or II, to file an IEE or EIA, for reasons to be recorded in such direction:
Provided that no such direction shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under Regulation 23.
(3) The provisions of section 12 shall apply to a project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

6. Preparation of IEE and EIA

(1) The Federal Agency may issue guidelines for preparation of an IEE or an EIA, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.
(2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA any departure therefrom.

7. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA, a nonrefundable Review Fee to the Federal Agency, as per rates shown in Schedule III.

8. Filing of IEE and EIA

(1) Ten paper copies and two electronic copies of an IEE or EIA shall be filed with the Federal Agency.
PAKISTAN ENVIRONMENTAL PROTECTION AGEN3CY (REVIEW OF IEE AND EIA) REGULATIONS, 2000
3
(2) Every IEE and EIA shall be accompanied by –
(a) an application, in the form prescribed in Schedule IV; and
(b) copy of receipt showing payment of the Review Fee.

9. Preliminary scrutiny

(1) Within 10 working days of filing of the IEE or EIA, the Federal Agency shall –
(a) confirm that the IEE or EIA is complete for purposes of initiation of the review process; or
(b) require the proponent to submit such additional information as may be specified; or
(c) return the IEE or EIA to the proponent for revision, clearly listing the points requiring further study and discussion.
(2) Nothing in sub-regulation (1) shall prohibit the Federal Agency from requiring the proponent to submit additional information at any stage during the review process.

10. Public participation

(1) In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at

which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.
(2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.
(3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.
(4) The Federal Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.
(5) All comments received by the Federal Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.
PAKISTAN ENVIRONMENTAL PROTECTION AGEN4CY (REVIEW OF IEE AND EIA) REGULATIONS, 2000
4
(6) The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

(1) The Federal Agency shall make every effort to carry out its review of the IEE within 45 days, and of the EIA within 90 days, of issue of confirmation of completeness under Regulation 9.
(2) In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit views of the sectoral Advisory Committee, if any, constituted by the Federal Government under subsection (6) of section 5.
(3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.
(4) The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

12. Decision

On completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form prescribed in Schedule V in the case of an IEE, and in the form prescribed in Schedule VI in the case of an EIA.

13. Conditions of approval

(1) Every approval of an IEE or EIA shall, in addition to such conditions as may be imposed by the Federal Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE/EIA, unless any variation thereto have been specified in the approval by the Federal Agency.
(2) Where the Federal Agency accords its approval subject to certain conditions, the proponent shall –
(a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an

undertaking in the form prescribed in Schedule VII;

(b) before commencing operation of the project, obtain from the Federal Agency written confirmation that the conditions of approval, and the requirements in the IEE/EIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

14. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of subregulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Federal Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit: Provided that every effort shall be made by the Federal Agency to provide the requisite confirmation or otherwise within 15 days of receipt of the request, with complete information, from the proponent.

(3) The Federal Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

15. Deemed approval

The four-month period for communication of decision stipulated in sub-section (4) of section 12 shall commence from the date of filing of an IEE or EIA in respect of which confirmation of completeness is issued by the Federal Agency under clause (a) of sub-regulation (1) of Regulation 9.

16. Extension in review period

Where the Federal Government in a particular case extends the four-month period for communication of approval prescribed in sub-section (5) of section 12, it shall, in consultation with the Federal Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

17. Validity period of approval

(1) The approval accorded by a Federal Agency under section 12 read with Regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) If construction is commenced during the initial three year validity period, the validity of the approval shall stand extended for a further period of three years from the date of issue.

(3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.

(4) The proponent may apply to the Federal Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by

the Federal Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:
Provided that the Federal Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

18. Entry and inspection

(1) For purposes of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA prior to, during or after commencement of construction or operation of a project, duly authorized staff of the Federal Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.
(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Federal Agency for this purpose and pursuant thereto.

19. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Federal Agency on completion of construction of the project.
(2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.
(3) To enable the Federal Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Federal Agency may require.

20. Cancellation of approval

(1) Notwithstanding anything contained in these Regulations, if, at any time, on the basis of information or report received or inspection carried out, the Federal Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA is incorrect, it

shall issue notice to the proponent to show cause, within two weeks of receipt thereof, why the approval should not be cancelled.
(2) If no reply is received or if the reply is considered unsatisfactory, the Federal Agency may, after giving the proponent an opportunity of being heard:
(i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or
(ii) cancel the approval.
(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.
(4) Action taken under this Regulation shall be without prejudice to any other action that may be taken against the proponent und er the Act or rules or regulations or any other law for the time being in force.

21. Registers of IEE and EIA projects

Separate Registers to be maintained by the Federal Agency for IEE and EIA projects under sub-section (7) of section 12 shall be in the form prescribed in Schedule VIII.

22. Environmentally sensitive areas

(1) The Federal Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.
(2) Notwithstanding anything contained in Regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Federal Agency.
(3) The Federal Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessme nt process to plan and prepare projects located in environmentally sensitive areas.
(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

23. Environmental Assessment Advisory Committee

For purposes of rendering advice on all aspects of environmental assessment, including guidelines, procedures and categorization of projects, the Director-General shall constitute an Environmental Assessment Advisory Committee comprising –
(a) Director EIA, Federal Agency … Chairman

(b) One representative each of the Provincial Agencies … Members
(c) One representative each of the Federal Planning Commission and the Provincial Planning and Development Departments … Members
(d) Representatives of industry and non-Governmental organizations, and legal and other experts … Members

24. Other approvals

Issue of an approval under section 12 read with Regulation 12 shall not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.

SCHEDULE I

(*See* Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms with total cost more than Rs.10 million
2. Projects involving repacking, formulation or warehousing of agricultural products

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 200 KW
3. Transmission lines less than 11 KV, and large distribution projects
4. Oil and gas transmission systems
5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
6. Waste-to-energy generation projects

C. Manufacturing and processing

1. Ceramics and glass units with total cost more than Rs.50 million
2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than Rs.100 million
3. Man- made fibers and resin projects with total cost less than Rs.100 million
4. Manufacturing of apparel, including dyeing and printing, with total cost more than Rs.25 million
5. Wood products with total cost more than Rs.25 million

D. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million
2. Crushing, grinding and separation processes

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C0Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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3. Smelting plants with total cost less than Rs.50 million

E. Transport

1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metalled roads) with total cost less than Rs.50 million
2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs.50 million

G. Water supply and treatment

Water supply schemes and treatment plants with total cost less than Rs.25 million

H. Waste disposal

Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

I. Urban development and tourism

1. Housing schemes
2. Public facilities with significant off-site impacts (e.g. hospital wastes)
3. Urban development projects

J. Other projects

Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of Regulation 5

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C1Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE II

(*See* Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 200 MW
3. Transmission lines (11 KV and above) and grid stations
4. Nuclear power plans
5. Petroleum refineries

B. Manufacturing and processing

1. Cement plants
2. Chemicals projects
3. Fertilizer plants
4. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of Rs.100 million and above
5. Industrial estates (including export processing zones)
6. Man-made fibers and resin projects with total cost of Rs.100 M and above
7. Pesticides (manufacture or formulation)
8. Petrochemicals complex
9. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.10 million
10. Tanning and leather finishing projects

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non- ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs.50 million and above

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C2Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000

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D. Transport

1. Airports
2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruc tion of existing roads) with total cost of Rs.50 million and above
3. Ports and harbor development for ships of 500 gross tons and above
4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment

Water supply schemes and treatment plants with total cost of Rs.25 million and above

G. Waste Disposal

1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism

1. Land use studies and urban plans (large cities)
2. Large-scale tourism development projects with total cost more than Rs.50 million

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

1. Any other project for which filing of an EIA is required by the Federal

Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect
PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C3Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE III
(See Regulation 7)
IEE/EIA Review Fees
Total Project Cost IEE EIA
Upto Rs.5,000,000 NIL NIL
Rs.5,000,001 to 10,000,000 Rs.10,000 Rs.15,000
Greater than Rs.10,000,000 Rs.15,000 Rs.30,000
PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C4Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE IV
[*See* Regulation 8(2)(a)]
Application Form
1. Name and address of
proponent
Phone:
Fax:
Telex:
2. Description of project
3. Location of project
4. Objectives of project
5. IEE/EIA attached? IEE/EIA : Yes/No
6. Have alternative sites been considered and
reported in IEE/EIA?
Yes/No
7. Existing land use Land
requirement
8. Is basic site data
available, or has it
been measured?
(only tick yes if the
data is reported in the
IEE/EIA)
Meterology (including
rainfall)
Ambient air quality
Ambient water quality
Ground water quality
Available
Yes/No
Yes/No
Yes/No
Yes/No
Measured
Yes/No

Yes/No
Yes/No
Yes/No
9. Have estimates of the following been reported?
Water balance
Solid waste disposal
Liquid waste treatment
Estimated
Yes/No
Yes/No
Yes/No
Reported
Yes/No
Yes/No
Yes/No
10. Source of power Power requirement
11. Labour force (number)
Construction:
Operation:
Verification. I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.
Date _____ Signature, name and _____ designation of proponent
(with official stamp/seal)

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C5Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE V

[*See* Regulation 12]

Decision on IEE

1. Name and address of proponent _____
_____
2. Description of project _____
3. Location of project _____
4. Date of filing of IEE _____
5. After careful review of the IEE, the Federation Agency has decided –
(a) to accord its approval, subject to the following conditions:
_____
_____
or (b) that the proponent should submit an EIA of the project, for the following reasons –
_____
_____
[Delete (a) or (b), whichever is inapplicable]

Dated _____
Tracking no.___
Director-General
Federal Agency
(with official stamp/seal)

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C6Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE VI

[*See* Regulation 12]

Decision on EIA

1. Name and address of proponent _____
_____
2. Description of project _____
3. Location of project _____
4. Date of filing of EIA _____
5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –

(a) to accord its approval, subject to the following conditions:
_____
_____

or (b) that the proponent should submit an EIA with the following modifications-
_____
_____

or (c) to reject the project, being contrary to environmental objectives, for the following reasons:
_____
_____

[Delete (a)/(b)/(c), whichever is inapplicable]

Dated _____
Tracking no.___
Director-General
Federal Agency
(with official stamp/seal)

PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C7Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE VII

[*See* Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Federal Agency bearing tracking no._____ dated _____, and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA.

Date _____ Signature, name and _____
designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

(1) _____
(2) _____
PAKISTAN ENVIRONMENTAL PROTECTION AGEN1C8Y (REVIEW OF IEE AND EIA) REGULATIONS, 2000
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SCHEDULE VIII

(*See* Regulation 21)

Form of Registers for IEE and EIA projects

S. No. Description Relevant Provisions

1 2 3

1. Tracking number
2. Category type (as per Schedules I and II)
3. Name of proponent
4. Name and designation of contact person
5. Name of consultant
6. Description of project
7. Location of project
8. Project capital cost
9. Date of receipt of IEE/EIA
10. Date of confirmation of comp leteness
11. Approval granted (Yes/No)
12. Date of approval granted or refused
13. Conditions of approval/reasons for refusal
14. Date of Undertaking
15. Date of extension of approval validity
16. Period of extension
17. Date of commencement of construction
18. Date of issue of confirmation of compliance
19. Date of commencement of operations
20. Dates of filing of monitoring reports
21. Date of cancellation, if applicable

Annexure-II

Environmental Quality Monitoring Test Results (Air, Noise, Water)

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

SURFACE WATER ANALYSIS REPORT

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Adjacent to Water Course in Chak No. 305/JB (Pre-Construction Phase) RD#59+200
Sampling Point:	Water Channel	**Nature of Sample:**	Surface Water
Sampling Date:	15-07-2014	**Date of Completion of Analysis:**	20-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/002 SW

Results:

Sr. No.	Parameter	Unit	Result	WHO maximum allowable guideline value
1	Temperature	°C	24	----
2	pH	--	8.25	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	390	1000
4	Conductivity	uS/cm	564	--
5	Total Suspended Solids (TSS)	mg/l	16	---
6	Chloride	mg/l	34	250
7	Fluoride	mg/l	0.27	1.5
8	Taste	Object./unobj.	Unobject.	Unobject
9	Odour	Object./unobj.	Unobject.	Unobject.
10	Colour	TCU	0	15
11	Iron	mg/l	0.05	0.3
12	Sodium	mg/l	130	200
13	Nitrate (as NO_3^-)	mg/l	11	50
14	Nitrite (as NO_2^-)	mg/l	0.08	3
15	Chromium	mg/l	BDL	0.050
16	Potassium	mg/l	0.02	--
17	Sulphate	mg/l	54	250
18	Total Alaklinty	mg/l	126	---
19	Total Hardness as $CaCO_3$	mg/l	82.58	500
20	Ca Hardness	mg/l	62	--
21	Turbidity	NTU	0	5
22	Total Coliform	Number/100ml	0	0/100 ml
23	E.Coli	Number/100ml	0	0/100 ml
24	Chemical Oxygen Demand (COD)	mg/l	118	150
25	Biochemical Oxygen Demand (BOD_5)	mg/l	54	80

BDL (Below Detection Limit)

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Adjacent to Water Course in Chak No. 305/JB (Pre-Construction Phase) RD#59+200
Sampling Point:	Water Channel	**Nature of Sample:**	Surface Water
Sampling Date:	15-07-2014	**Reporting Date:**	20-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/002 SW

Note:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The report is not valid for any negotiation.
- The client is responsible lawful usage of reported data in future.

Sample Analyzed By: Tariq Ibrahim

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 20-07-2014

Solution Environmental & Analytical Laboratory LAHORE.

Page 2 of 2

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

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SURFACE WATER ANALYSIS REPORT

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Near end point of Section-II (Mouza 7-Ghag)(Pre-Construction Phase) RD#119+500
Sampling Point:	Water Channel	**Nature of Sample:**	Surface Water
Sampling Date:	14-07-2014	**Date of Completion of Analysis:**	20-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 SW

Results:

Sr. No.	Parameter	Unit	Result	WHO maximum allowable guideline value
1	Temperature	^0C	24	----
2	pH	--	8.25	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	89	1000
4	Conductivity	uS/cm	620	--
5	Total Suspended Solids (TSS)	mg/l	311	---
6	Chloride	mg/l	14	250
7	Fluoride	mg/l	0.17	1.5
8	Taste	Object./unobj.	Unobject.	Unobject
9	Odour	Object./unobj.	Unobject.	Unobject.
10	Colour	TCU	0	15
11	Iron	mg/l	0.02	0.3
12	Sodium	mg/l	30	200
13	Nitrate (as NO_3^-)	mg/l	8	50
14	Nitrite (as NO_2^-)	mg/l	0.06	3
15	Chromium	mg/l	BDL	0.050
16	Potassium	mg/l	0.02	--
17	Sulphate	mg/l	12	250
18	Total Alaklinty	mg/l	112	---
19	Total Hardness as $CaCO_3$	mg/l	15.33	500
20	Ca Hardness	mg/l	10	--
21	Turbidity	NTU	0	5
22	Total Coliform	Number/100ml	0	0/100 ml
23	E.Coli	Number/100ml	0	0/100 ml
24	Chemical Oxygen Demand (COD)	mg/l	132	150
	Biochemical Oxygen Demand (BOD_5)	mg/l	58	80

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Near end point of Section-II (Mouza 7-Ghag)(Pre-Construction Phase) RD# 119+500
Sampling Point:	Water Channel	**Nature of Sample:**	Surface Water
Sampling Date:	14-07-2014	**Reporting Date:**	20-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 SW

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Sample Analyzed By: Tariq Ibrahim

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 20-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

NOISE LEVEL MONITORING

Client Name:	NHA (National Highway Authority)	**Project Location:**	Near end point of Section-II (Mouza 7-Ghag)(Pre-Construction Phase)
Monitoring Point:	RD:120+200	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	14-07-2014	**Time of Monitoring:**	11:30 AM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 NL

Results:

1.	Left side of RD	41.7	55.3	48.5
2.	Extreme Left side of RD	35.2	58.6	46.9
3	Right side of RD	38.8	53.2	46.0
4	Extreme Right side of RD	36.2	48.2	42.2
5	Left side of the road	38.6	59.8	49.2
6	Right side of the road	39.7	54.3	47.0
NEQS				**Commercial Area Day Time: 65 dB A**

Note:

- All the readings were taken in day time and when the construction was going on
- The average noise levels describe the overall ambient noise levels of the proposed site.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report in not valid for any negotiations.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA (National Highway Authority)	**Site Location :**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB (Pre-Construction Phase)
Monitoring Point:	Near RD:86+700	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	15-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/002
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

Solution Environmental & Analytical Laboratory LAHORE.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name:	NHA (National Highway Authority)	**Site Location :**	At Water Course in Mouza Rakh Kotla (Pre-Construction Phase)
Monitoring Point:	Near RD:86+700	**Time Duration of Monitoring:**	1 Hours
Monitoring Date:	14-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/003
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Results:

1	PM_{10}	(µg/m3)	Integrated Method	58	150
2	CO	mg/m^3	Gas Phase Chemiluminescence	1.2	10
3	NO_X	(µg/m3)	Gas Phase Chemiluminescence	34	80
4	SO_X	(µg/m3)	Ultraviolet Fluorescence Method	25	120

NEQS: National Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiations.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name:	NHA (National Highway Authority)	**Site Location :**	Near end point of Section-II (Mouza 7-Ghag) (Pre-Construction Phase)
Monitoring Point:	Near RD:120+200	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	14-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/004
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Results:

1	PM_{10}	(µg/m3)	Integrated Method	64	150
2	CO	mg/m^3	Gas Phase Chemiluminescence	1.2	10
3	NO_X	(µg/m3)	Gas Phase Chemiluminescence	32	80
4	SO_X	(µg/m3)	Ultraviolet Fluorescence Method	28	120

NEQS: National Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiations.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA(National Highway Authority)	**Site Location :**	Adjacent to Water Course in Chak No. 305/JB (Pre-Construction Phase)
Monitoring Point:	Near RD:59+200	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	15-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/001
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

Solution Environmental & Analytical Laboratory LAHORE.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

NOISE LEVEL MONITORING

Client Name:	NHA (National Highway Authority)	**Project Location:**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB(Pre-Construction Phase)
Monitoring Point:	RD:86+700	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	15-07-2014	**Time of Monitoring:**	01:00 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/002 NL

Results:

1.	Left side of RD	38.7	51.3	45.0
2.	Extreme Left side of RD	42.2	45.2	43.7
3	Right side of RD	36.8	44.6	40.7
4	Extreme Right side of RD	39.3	48.9	44.1
5	Left side of road	36.4	50.8	43.6
6	Right side of road	38.4	49.3	43.8
NEQS				**Commercial Area Day Time: 65 dB A**

Note:

- All the readings were taken in day time and when the construction was going on
- The average noise levels describe the overall ambient noise levels of the proposed site.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

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Client Name:	NHA (National Highway Authority)	**Project Location:**	Near end point of Section-II (Mouza 7-Ghag)(Pre-Construction Phase)
Monitoring Point:	RD:120+200	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	14-07-2014	**Time of Monitoring:**	11:30 AM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 NL

Monitoring Supervisor: Muhammad Mohsin

Signature:

TAHIR SHAH
Chief Chemist

Name of Chief Analyst with Seal:

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

Solution Environmental & Analytical Laboratory LAHORE.

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

Client Name:	NHA (National Highway Authority)	**Project Location:**	Adjacent to Water Course in Chak No. 305/JB(Pre-Construction Phase)
Monitoring Point:	RD:59+200	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	15-07-2014	**Time of Monitoring:**	12:30 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/001 NL

Monitoring Supervisor: Muhammad Mohsin

Signature: Mohsin

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Solution Environmental & Analytical Laboratory LAHORE.

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Near end point of Section-ll (Mouza 7-Ghag)(Pre-Construction Phase)
Sampling Point:	Water Channel	**Nature of Sample:**	Drinking Water
Sampling Date:	14-07-2014	**Reporting Date:**	19-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 DW

Note:

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- The report is not valid for any negotiation.
- **The client is responsible lawful usage of reported data in future.**

Sample Analyzed By: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH

Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

GROUND WATER ANALYSIS REPORT

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Near end point of Section-II (Mouza 7-Ghag)(Pre-Construction Phase)
Sampling Point:	Water Channel	**Nature of Sample:**	Drinking Water
Sampling Date:	14-07-2014	**Date of Completion of Analysis:**	19-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/004 DW

Results:

1	Temperature	^0C	24	---
2	pH	--	8.25	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	89	1000
4	Conductivity	uS/cm	620	--
5	Total Suspended Solids (TSS)	mg/l	311	---
6	Chloride	mg/l	14	250
7	Fluoride	mg/l	0.17	1.5
8	Taste	Object./unobj.	Unobject.	Unobject
9	Odour	Object./unobj.	Unobject.	Unobject.
10	Colour	TCU	0	15
11	Iron	mg/l	0.02	0.3
12	Sodium	mg/l	30	200
13	Nitrate (as NO_3^-)	mg/l	8	50
14	Nitrite (as NO_2^-)	mg/l	0.06	3
15	Chromium	mg/l	BDL	0.050
16	Potassium	mg/l	0.02	--
17	Sulphate	mg/l	12	250
18	Free Chlorine	mg/l	BDL	---
19	Total Hardness as $CaCO_3$	mg/l	15.33	500
20	Ca Hardness	mg/l	10	--
21	Turbidity	NTU	0	5
22	Total Coliform	Number/100ml	0	0/100 ml
23	E.Coli	Number/100ml	0	0/100 ml

BDL (Below Detection Limit)

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Client Name:	NHA (National Highway Authority)	**Sample Location:**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB(Pre-Construction Phase)
Sampling Point:	House	**Nature of Sample:**	Drinking Water
Sampling Date:	15-07-2014	**Reporting Date:**	19-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/001 DW

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Sample Analyzed By: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

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GROUND WATER ANALYSIS REPORT

Client Name:	NHA (National Highway Authority)	**Sample Location:**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB(Pre-Construction Phase)
Sampling Point:	House	**Nature of Sample:**	Drinking Water
Sampling Date:	15-07-2014	**Date of Completion of Analysis:**	19-07-2014
Sampling By:	SEAL	**Reference No.:**	SEAL/NHA/14/001 DW

Results:

1	Temperature	°C	26	----
2	pH	--	9.91	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	1201	1000
4	Conductivity	uS/cm	648	--
5	Total Suspended Solids (TSS)	mg/l	03	---
6	Chloride	mg/l	68	250
7	Fluoride	mg/l	0.27	1.5
8	Taste	Object./unobj.	Unobject.	Unobject
9	Odour	Object./unobj.	Unobject.	Unobject.
10	Colour	TCU	0	15
11	Iron	mg/l	0.05	0.3
12	Sodium	mg/l	130	200
13	Nitrate (as NO_3^-)	mg/l	11	50
14	Nitrite (as NO_2^-)	mg/l	0.08	3
15	Chromium	mg/l	BDL	0.050
16	Potassium	mg/l	1.4	--
17	Sulphate	mg/l	240	250
18	Free Chlorine	mg/l	BDL	----
19	Total Hardness as $CaCO_3$	mg/l	468	500
20	Ca Hardness	mg/l	279.2	--
21	Turbidity	NTU	0	5
22	Total Coliform	Number/100ml	0	0/100 ml
23	E.Coli	Number/100ml	0	0/100 ml

BDL (Below Detection Limit)

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name:	NHA (National Highway Authority)	**Site Location :**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB (Pre-Construction Phase)
Monitoring Point:	Near RD:86+700	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	15-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/002
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Results:

1	PM_{10}	(µg/m3)	Integrated Method	48	150
2	CO	mg/m^3	Gas Phase Chemiluminescence	1.2	10
3	NO_X	(µg/m3)	Gas Phase Chemiluminescence	18	80
4	SO_X	(µg/m3)	Ultraviolet Fluorescence Method	34	120

NEQS: National Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
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Client Name:	NHA (National Highway Authority)	**Site Location :**	Near end point of Section-ll (Mouza 7-Ghag) (Pre-Construction Phase)
Monitoring Point:	Near RD:120+200	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	14-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/004
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Solution Environmental & Analytical Laboratory LAHORE.

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name:	NHA (National Highway Authority)	**Site Location :**	Adjacent to Water Course in Chak No. 305/JB (Pre-Construction Phase)
Monitoring Point:	Near RD:59+200	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	15-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/001

Instrument Used: **CO, NO_x and SO_x, PM_{10} Analyzers**

Results:

1	PM_{10}	(µg/m3)	Integrated Method	51	150
2	CO	mg/m^3	Gas Phase Chemiluminescence	1.2	10
3	NO_X	(µg/m3)	Gas Phase Chemiluminescence	14	80
4	SO_X	(µg/m3)	Ultraviolet Fluorescence Method	30	120

NEQS: National Environmental Quality Standards

Note:

- **Quality was assured through self calibration of the instrument.**
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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

NOISE LEVEL MONITORING

Client Name:	NHA (National Highway Authority)	**Project Location:**	Adjacent to Water Course in Chak No. 305/JB(Pre-Construction Phase)
Monitoring Point:	RD:59+200	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	15-07-2014	**Time of Monitoring:**	12:30 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/001 NL

Results:

Note:

1.	Left side of RD	[illegible]	47.1	41.4
2.	Extreme Left side of RD	34.9	47.4	41.2
3	Right side of RD	33.3	39.7	36.5
4	Extreme Right side of RD	35.2	42.2	38.7
5	Left side of road	36.4	44.0	40.2
6	Right side of road	34.8	40.2	37.5
	NEQS			Commercial Area Day Time: 65 dB A

- All the readings were taken in day time and when the construction was going on.
- The average noise levels describe the overall ambient noise levels of the proposed site.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
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Client Name:	NHA (National Highway Authority)	**Project Location:**	Adjacent to Govt. Elementary School for girls in Chak No. 396 JB(Pre-Construction Phase)
Monitoring Point:	RD:86+700	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	15-07-2014	**Time of Monitoring:**	01:00 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/002 NL

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Solution Environmental & Analytical Laboratory LAHORE.

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

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Client Name:	NHA (National Highway Authority)	**Project Location:**	At Water Course in Mouza Rakh Kotla(Pre-Construction Phase)
Monitoring Point:	RD:119+500	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	14-07-2014	**Time of Monitoring:**	12:30 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/003 NL

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH
Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

NOISE LEVEL MONITORING

Client Name:	NHA (National Highway Authority)	**Project Location:**	At Water Course in Mouza Rakh Kotla(Pre-Construction Phase)
Monitoring Point:	RD:119+500	**Instrument Used**	Digital Sound Level Meter Model No. TM-102
Monitoring Date:	14-07-2014	**Time of Monitoring:**	12:30 PM
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/003 NL

Results:

1.	Left side of RD	36.1	41.9	39.0
2.	Extreme Left side of RD	39.7	51.6	45.6
3	Right side of RD	40.2	50.9	45.6
4	Extreme Right side of RD	39.2	42.6	40.9
5	Left side of the road	37.8	52.6	45.2
6	Right side of the road	36.2	46.4	41.3
NEQS				Commercial Area Day Time: 65 dB A

Note:

- All the readings were taken in day time and when the construction was going on
- The average noise levels describe the overall ambient noise levels of the proposed site.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report in not valid for any negotiations.

Page 1 of 2

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HEAD OFFICE :
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Phone : 92-213-2014331 Fax : 92-213-
Email : karachi@seal.com.pk

EPA CERTIFIED

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name:	NHA (National Highway Authority)	**Site Location :**	At Water Course in Mouza Rakh Kotla (Pre-Construction Phase)
Monitoring Point:	Near RD:59+200	**Time Duration of Monitoring:**	1 Hour
Monitoring Date:	14-07-2014	**Date of Completion of Analysis:**	19-07-2014
Monitoring By:	SEAL	**Reference No.:**	SEAL/NHA/14/003
Instrument Used:	CO, NO_x and SO_x, PM_{10} Analyzers		

Monitoring Supervisor: Muhammad Mohsin

Signature:

Name of Chief Analyst with Seal: TAHIR SHAH

Chief Chemist

Signature of Chief Analyst:

Signature of Incharge Environmental Laboratory:

Name: Aleem Butt

Designation: Chief Environmentalist

Date: 19-07-2014

Solution Environmental & Analytical Laboratory LAHORE.

Page 2 of 2

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Phone : 92-213-2014331 Fax : 92-213-2014331
Email : karachi@seal.com.pk

NATIONAL HIGHWAY AUTHORITY

Office of the Project Director (M-4) Section- II
House No.144, Housing Colony No. 2, Jhang Road,
Toba Tek Singh. Tel & Fax 046-2511561

No: 1(1) PD (M-4)/Sec-II/NHA/2014/ 126- Dated July 22, 2014.

Director (Environment)
National Highway Authority
Islamabad.

SUBJECT: **ENVIRNOMENTAL TESTING REPORTS AT SELECTED LOCATIONS OF GOJRA – SHORKOT SECTION (PACKAGE-II) MOTORWAY M-4 (PRE CONSTRUCTION PHASE).**

Ref: (i) Director (Environment) NHA HQ Islamabad site visit M-4 (Package-II) dated June 24 & 25, 2014.

(ii) This office letter Nos. 1(1) PD (M-4)/Sec-II/NHA/2014/96 &116 dated June 26 and July 11, 2014 respectively.

No. 499 Div (Env) Dated:- 24-07-2014

1. Enclosed please find herewith environmental test reports (24 pages) in original prepared and submitted by M/s Solution Environmental and Analytical Laboratory Lahore after field testing as per following detail;

S.No	Location	Environmental Tests Conducted	Remarks
1	59+200	Air, Noise & Water	Adjacent to water course in Chak No. 305/JB
2	86+700	" " "	Adjacent to Govt. Elementary School for girls in Chak No.396 JB
3	119+500	" " "	At water course in Mouza Rakh Kotla.
4	120+200	" " "	Near end Point of Section-II (Mouza 7-Ghag)

2. Above is forwarded for information record and further necessary action for preparation of revised EIA report to be submitted to ADB.

Encl. Test Reports (24 pages)

22-07-14

(MUHAMMAD ANEES CHAUDHRY)
Project Director (M-4) Section-II

CC:

- General Manager (M-4), NHA Lahore
- Project Director (M-4) Sec-I NHA Faisalabad
- M/s Solution Environmental and Analytical Laboratory Lahore

Annexure-III

Departments Visited

List of Departments

1 Revenue Office Department

2 Punjab Highway Department

3 Building Department

4 NHA Maintenance Department

5 Environmental Protection Agency (EPA) Punjab,

6 Forest Department

7 Wild Life Department

Annexure-IV

Stakeholders Concerns Regarding Environmental and Social Issues

Annexure-IV

Faisalabad – Khanewal Motorway Project (M-4)

Summary of Public Disclosure Meetings

Public meetings were held with the view to disseminate information about the Resettlement and Environment issues mitigated in the EIA process and solicit APs viewpoints. This section contains the scanned copies of the attendance sheets as well. After dissemination of Environmental Management Plan, the following common issues were discussed in the form of question and answer session (including comments, suggestions of the Pas) in all the affected villages.

Question-1 Is there any arrangement of tree plantation on replacement of cut off trees?

Answer 18,000 trees will be cut off for the construction of M-4 and 80,000 new trees will be implant on the both side of the motorway.

Question-2 Is there any change in water table due to motorway construction?

Answer There will be no change in water table due to motorway construction

Question-3 What measure will be adopted to mitigate borrows pits?

Answer Soil will be borrowed only from selected places and it will never be dig out in the radius of 100 meter from M-4. Top soil layer will be preserved for plantation.

Question-4 What measures will be taken to control the noise problem in the surrounding localities of the RoW?

Answer Tree plantation will control the noise problem and sound barriers will be constructed along the residential areas.

Question-5 What measures will be taken to control air pollution during construction stage?

Answer Fabric filters and wet scrubbers will be used on asphalt hot mix and Beaching plant.

Question-6 What measures contractor will adopt to dispose off construction waste?

Answer Places will be selected and all used water, oil, and wastages will be dumped on these selected places.

Question-7 Will there be any accessibility to our cultural places (graveyard, shrine etc.)?

Answer The culturally important sites will be provided access and this factor has been well considered in the design.

Question-8 What will be the limit of construction work?

Answer All the construction work will be confined within the proposed Right of Way (RoW).

Question-9 What will be the time for payment of compensation?

Answer Al the payment will be made prior to commencement of construction work.

Question-10 What will be the compensation for loss of trees?

Answer The compensation for fruit trees will be made on scientific basis considering a number of factors such as type, age, production per year etc. For non-fruit trees, compensation will be made according to market value based on volume of wood produced by these trees.

Question-11 What will be the compensation for the land left within the interchanges?

Answer If the remaining land become useless and inaccessible then it will be compensated as per market value plus 15 percent for compulsory land acquisition.

Question-12 When will the proposed project be implemented?

Answer The commencement date for construction of the proposed project is the beginning of the year 2015 after payment of compensation has been made. The proposed project will be completed by the end of the year 2017.

Question-13 The proposed motorway will be fenced on both sides, which will hamper movement across it. What alternatives have you proposed to deal with this issue?

Answer The interchanges will be provided at required places such as populated centres. Underpasses will also be provided at the routes providing common access to a number of villages.

Question-14 What will be the source of borrow materials for construction?

Answer Borrow materials will be taken from such areas where there is an agreement with the land owners for the purchase or lease of such lands. Final locations will be decided by the contractors in consultation with the Construction Supervision Consultant. However, these areas will be located away from the features such as roads, watercourses etc. Necessary mitigation measures will be taken to reduce air, noise pollution.

Question-15 Who to contact to get further details about the proposed project?

Answer NHA office near Sayyanwala Interchange, (Faisalabad) can be approached for further queries about the proposed project. It is expected to establish a help line to provide information for telephonic enquiries.

Question-16 Interchanges will be located at a distance. Is there any other alternative to approach the proposed Motorway?

Answer The service road will be provided all along the proposed Motorway, with flyovers/underpasses at appropriate locations.

Suggestion APs suggested that underpasses should be spacious enough to facilitate easy movement of agriculture related machinery across the proposed Motorway. Specially, the sugarcane loaded tractor trolleys measuring 15 ft. x 15 ft will be desirable.

Question-17 What will be done for infrastructures like tracks, water courses, canals etc.?

Answer All the important infrastructures will be restored by providing culverts, bridges, flyovers & underpasses.

Question-18 Will the farmers be compensated for all their assets?

Answer Farmers will be paid compensation for all their assets including trees, houses, tube wells, hand pumps etc.

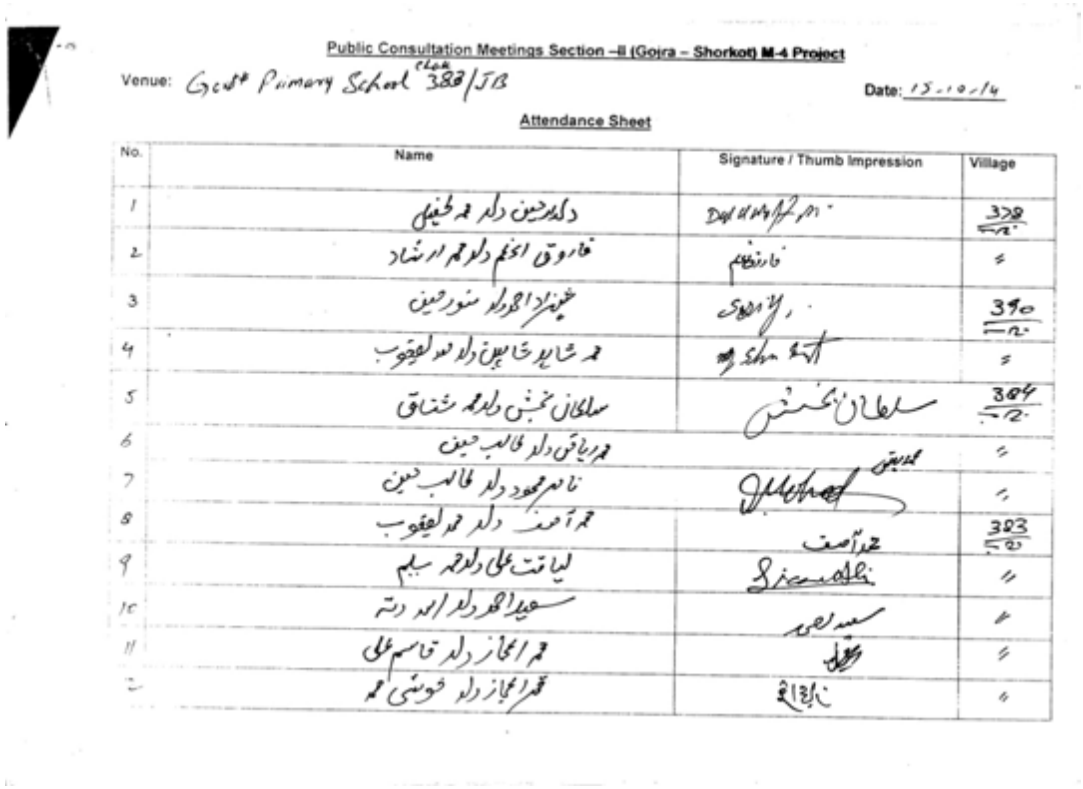
Question-19 Will the service road be provided along the motorway?

Answer Yes, service road will be provided on both sides of the road

Question-20 Will the existing routes be above or under the proposed motorway?

Answer The existing routes will be both at grade and elevated in the form of underpasses & flyovers.

Scanned Copies of attendance sheets recorded in October 2014 Public consultation.

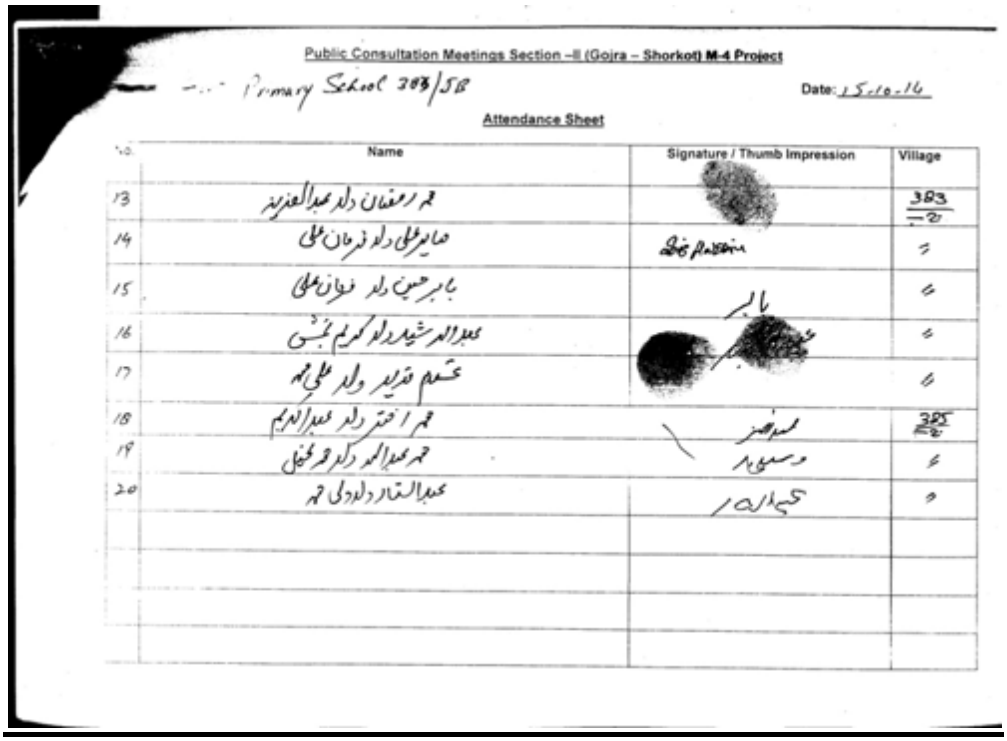


Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak 388/JB Date: 15-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
1	دلاور حسین ولد محمد خلیل		378
2	فاروق اعظم ولد محمد ارشاد		〃
3	شہزاد احمد ولد منور حسین		390
4	محمد شاہد شاہین ولد محمد یعقوب		〃
5	سلطان بخش ولد محمد شفاق		384
6	محمد یاسین ولد طالب حسین		〃
7	ناصر محمود ولد طالب حسین		〃
8	محمد آصف ولد محمد یعقوب		383
9	لیاقت علی ولد محمد سلیم		〃
10	سعید احمد ولد احمد دتہ		〃
11	محمد اعجاز ولد قاسم علی		〃
12	محمد اعجاز ولد خوشی محمد		〃



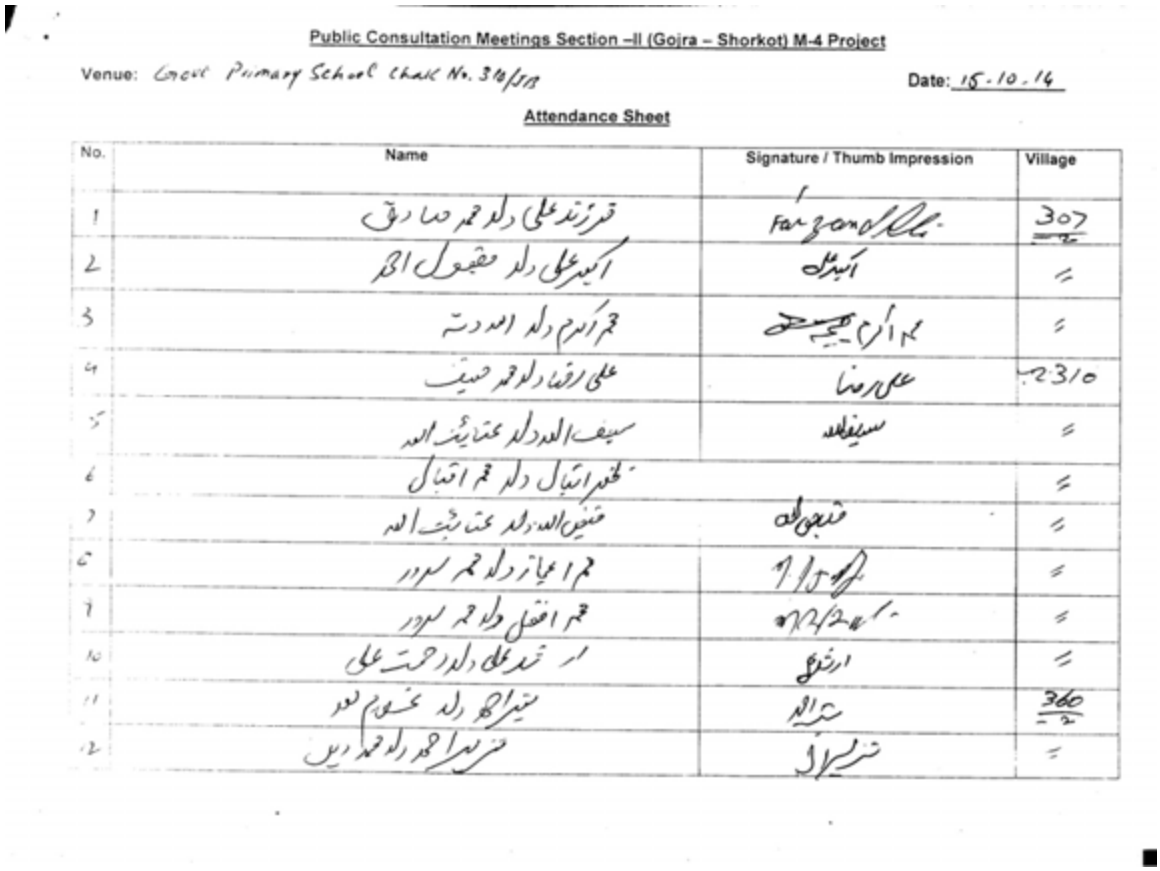
Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

... Primary School 308/SB

Date: 15.10.16

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
13	محمد رمضان ولد عبدالعزیز		303
14	صابر علی ولد فرمان علی		"
15	بابر حسین ولد فرمان علی		"
16	عبدالرشید ولد کریم بخش		"
17	عثمان وحید ولد علی محمد		"
18	محمد اختر ولد عبدالرحیم		305
19	محمد عبدالله ولد محمد بخش		"
20	عبدالستار ولد ولی محمد		"



Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak No. 310/GB

Date: 15-10-16

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
1	فرزند علی ولد محمد صادق		307
2	اکبر علی ولد مقبول احمد		"
3	محمد اکرم ولد احمد دتہ		"
4	علی رضا ولد محمد حنیف		2310
5	سیف اللہ ولد عنایت اللہ		"
6	مختار اقبال ولد محمد اقبال		"
7	منیر اللہ ولد عنایت اللہ		"
8	محمد اعجاز ولد محمد سرور		"
9	محمد افضل ولد محمد سرور		"
10	ارشد علی ولد رحمت علی		"
11	شیراز ولد محمد یعقوب		360
12	شہزاد ولد محمد دین		"

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak No. 310/JB Date: 15-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
13	بشیر احمد ولد محمد دین	بشیر احمد	360
14	عشیم رسول ولد محمد علی		438
15	طالب حسین ولد محمد علی		〃
16	محمت عباس ولد غلام عباس	Asmat Abbas	305
17	محمد نواز ولد عشیم الحق	محمد نواز	〃
18	الطاف حسین ولد محمد شفیع		〃
19	محمد یونس ولد اکبر علی		〃
20	محمد کریم ولد محمد حسین		304
21	محمد افضل ولد محمد حسین		〃
22	محمد مصطفیٰ ولد محمد یاسین		〃
23	محمد لقمان ولد محمد مصطفیٰ		〃
24	عشیم مصطفیٰ ولد الدتہ		311

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak No. 310/JB Date: 15-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
25	محمد وقاص ولد روشن دین	محمد وقاص	311
26	محمد آصف ولد محمد مخزن	محمد آصف	317
27	ظہر اقبال ولد محمد نواز		307

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak No. 310/JB Date: 15.10.14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
13	بشیر احمد ولد محمد دین	بشیر احمد	360
14	غلام رسول ولد محمد علی		438
15	طالب حسین ولد محمد علی		〃
16	محمد عباس ولد غلام عباس	Mumtaz Alam	305
17	محمد نواز ولد غلام اکبر	محمد نواز	〃
18	الطاف حسین ولد محمد شفیع		〃
19	محمد یونس ولد اکبر علی		〃
20	محمد کریم ولد محمد حسین	محمد کریم	304
21	محمد افضل ولد محمد حسین	محمد افضل	〃
22	محمد مصطفیٰ ولد محمد یاسین		〃
23	محمد لقمان ولد محمد مصطفیٰ		〃
24	غلام مصطفیٰ ولد الہ دتہ		311

(1)

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Primary School Chak No. 487/JB Date 14-10-14

Attendance Sheet

	Name	Signature / Thumb Impression	Village
1	مقصود احمد ولد حاجی بنی بخش		
2	محمد نواز ولد حاجی بنی بخش		487
3	عبدالرشید ولد کمال دین		〃
4	مختار علی ولد برکت علی		〃
5	محمد اشرف ولد طالب حسین		〃
6	اصغر علی ولد مختار علی		〃
7	اصغر علی ولد بنی بخش		〃
8	عبدالستار ولد کمال دین		〃
9	سردار علی ولد کمال دین		〃
10	غلام باری ولد برکت علی		〃
11	فقیر محمد ولد حوالہ بخش		〃
12	محمد اسماعیل ولد حوالہ بخش		〃
13	بشیر احمد ولد محمد اسماعیل		〃
14	عبدالستار ولد کمال		〃

(2)

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak # 487/JB

Date: 14-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
15	محمد جمیل ولد طالب حسین	M. Jamal	487
16	بابر علی ولد مشتاق علی	[illegible]	498
17	طارق جاوید ولد اکبر علی	Tariq Javed	489
18	اشفاق احمد ولد محمد عبداللہ	اشفاق احمد	"
19	محمد اسلم ولد حاجی محمد یوسف	اشفاق احمد	"
20	اللہ بخش ولد امیر خان		490
21	[illegible] ولد امیر خان		"
22	محمد اشفاق ولد منظور احمد	محمد اشفاق	"
23	محمد اسحاق ولد محمد حنیف	محمد اسحاق	"
24	محمد افضل ولد محمد علی	[illegible]	"
25	محمد مراد ولد امیر خان		"
26	غلام حسین ولد امیر خان		"

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak 396/JB

Date: 15.10.14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
1	مظہر عباس ولد محمد نواز	مظہر عباس	469
2	محمد امین ولد غلام فرید	محمد امین	"
3	رب نواز ولد بہادر خان	Rab Nawaz	"
4	عمر دراز ولد اللہ دتہ	Umar Daraz	400
5	محمد صادق ولد چراغ دین		"
6	محمد عمران ولد محمد اسماعیل	[illegible]	396
7	نذیر احمد ولد محمد دریام	نذیر احمد [illegible]	"
8	محمد اقبال ولد لال خان		"
9	راجہ علی شان ولد خداداد	[illegible]	"
10	محمد رفیق ولد رحیم داد		"
11	راجہ لیاقت علی ولد اسلم خان	راجہ لیاقت علی	"
12	حق نواز ولد مراد	حق نواز	"

Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Govt Primary School Chak No 396/JB

Date: 15-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
13	محمد طارق ولد محمد اسلم	محمد طارق	401
14	محمد عمران ولد تاج محمد	M. Imran	〃
15	فقیر محمد ولد [illegible]	فقیر محمد	398
16	محمد ریاض ولد کالا خان	[illegible]	396

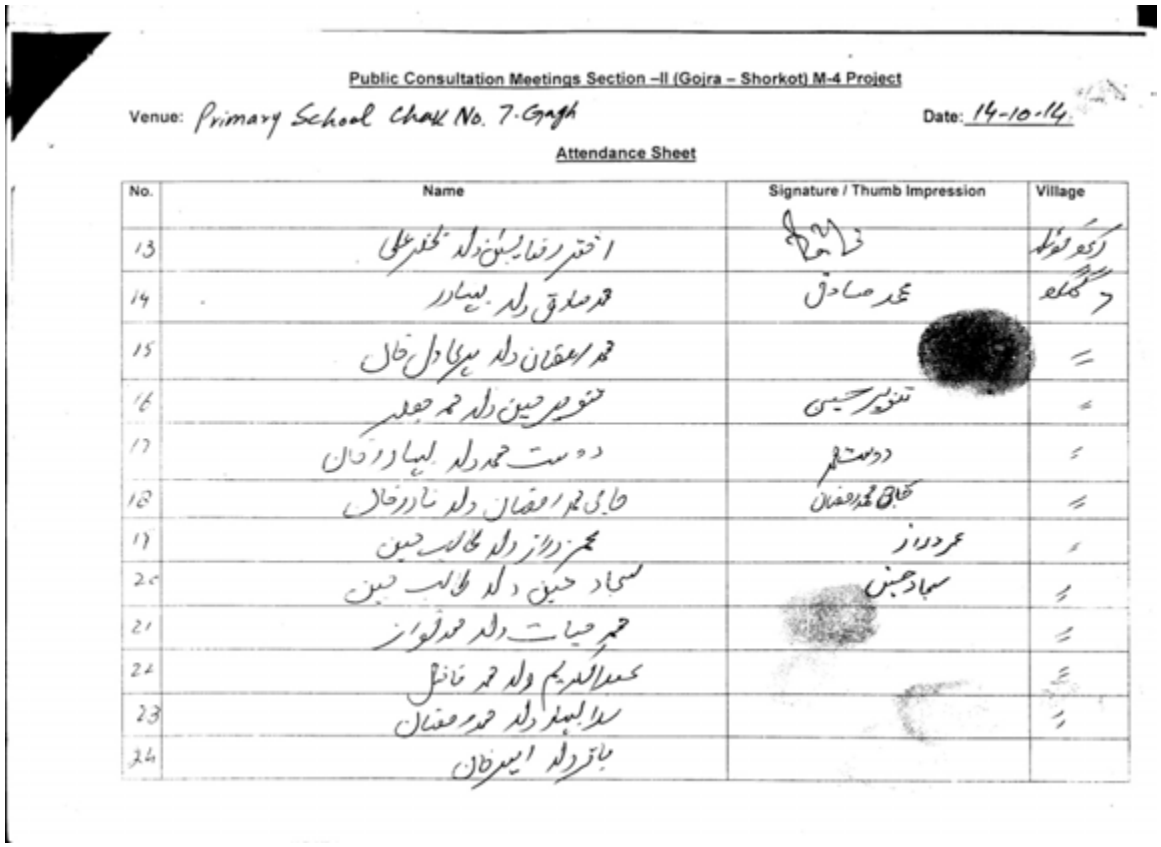
Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Primary School 7 [illegible]

Date: 14.10.14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
1	محمد اکرم شاہ ولد میاں صاحب شاہ قریشی ہاشمی	[illegible]	[illegible]
2	امان اللہ ولد محمد رمضان	امان اللہ	〃
3	ضیاء اللہ ولد محمد شریف	ضیاء اللہ	〃
4	سرفراز ولد میاں فاضل	سرفراز	〃
5	جمعہ دین ولد محمد رمضان	جمعہ دین	〃
6	اللہ دتہ ولد [illegible]		〃
7	محمد رمضان ولد فاضل	محمد رمضان	[illegible]
8	میر عادل ولد بہادر خان	عادل	〃
9	جعفر حسین ولد محمد صادق	محمد جعفر	〃
10	اعجاز حسین ولد طالب حسین	اعجاز حسین	〃
11	سرفراز ولد طالب حسین	سرفراز خان	〃
12	خالد علی ولد میاں [illegible]	[illegible]	〃



Public Consultation Meetings Section –II (Gojra – Shorkot) M-4 Project

Venue: Primary School Chak No. 7-Gagh Date: 14-10-14

Attendance Sheet

No.	Name	Signature / Thumb Impression	Village
13	اختر رضا پسر ولد مختر علی		
14	محمد صادق ولد بہادر	محمد صادق	
15	محمد رمضان ولد بہادر خاں		=
16	منور حسین ولد محمد جعفر	منور حسین	=
17	دوست محمد ولد بہادر خاں	دوست محمد	=
18	حاجی محمد رمضان ولد نادر خاں	حاجی محمد رمضان	=
19	محمد رزاز ولد طالب حسین	عمر دراز	=
20	سجاد حسین ولد طالب حسین	سجاد حسین	=
21	محمد حیات ولد محمد نواز		=
22	عبدالکریم ولد محمد عاقل		=
23	سلابہند ولد محمد رمضان		=
24	باقر ولد امیر خان		

As the public was well aware of the proposed project therefore they were only anxious about the start of taken during the public consultation along section-II ROW as mention below;

Fig-2 starting point of section-II near Gojra interchange

Fig-3 Chakri 383 JB Tehsil & District Toba Tak Singh

Fig-4 Chakri 383 JB Tehsil & District Toba Tak Singh

Fig-5 Chak 397 JB Tehsil & District Toba Tak Singh

Fig-6 Chak 383 JB Tehsil & District Toba Tak Singh

Fig-7 Chak 383 JB Tehsil & District Toba Tak Singh

Fig-8 Chak 383 JB Tehsil & District Toba Tak Singh

Fig-9 Chak 383 JB Tehsil & District Toba Tak Singh

Fig-10 Government Boys High School Chak 383 JB Tehsil & District Toba Tak Singh

Fig-11 Government Boys High School Chak 383 JB Tehsil & District Toba Tak Singh

Fig-12 RD 80+100 Tehsil & District Toba Tak Singh

Fig-13 RD 80+100 Tehsil & District Toba Tak Singh

Fig-14 Public Consultation RD 80+100 Tehsil & District Toba Tak Singh

Fig-15 Public Consultation RD 80+100 Tehsil & District Toba Tak Singh

Fig-16 Trees of Punjab Government at RD 80+100 Tehsil & District Toba Tak Singh

Fig-17 Trees of Punjab Government at RD 80+100 Tehsil & District Toba Tak Singh

Fig-18 Dead Trees of Punjab Government at RD 80+100 Tehsil & District Toba Tak Singh

Fig-19 RD 80+100 Tehsil & District Toba Tak Singh

Fig-20 Boundary wall of Govt. High School is 200 Meters away from RD 84+637

Fig-21 Boundary wall of graveyard away from ROW at 84+637

Fig-22 Graveyard away from ROW at RD 84+637

Fig-23 Public House away from ROW at RD 84+637

Fig-23 Watercourse at RD 86+700

Fig-24 RD 86+700

Fig-25 Chak 377 JB RD 86+637

Fig-26 Govt. Primary School for Boys is 21 meters away from RD 86+637 which is considered as a sensitive reciptor

Fig-26 Public Consultant RD 86+637

Fig-26 Public Consultant and illegal encroacher RD 86+637

Fig-27 Public Consultant and RD 86+637

Fig-28 Illegal encroacher RD 86+637

Fig-29 Public Property away from RD 87+100

Fig-30 Public Consultation RD 120+100

Fig-31 Public Consultation RD 120+100