

Environmental Impact Assessment

Environmental Impact Assessment Report (E-35, Hassanabdal – Havelian Expressway, Package – I, II & III)

March 2016

PAK: National Trade Corridor Highway Investment
Program (NTCHIP) Tranche – II & III

NOTES

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

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Environmental Impact Assessment

March 2016

PAK: National Trade Corridor Highway Investment Program – Tranche II & III

Revised/ updated March 2016

Prepared by National Highways Authority for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 22 March 2016)

Currency uni	–	Pakistani Rupees (PRs)
PRs1.00	=	\$0.00954
\$1.00	=	PRs104.724

LIST OF ABBREVIATIONS

Abbreviation

Description

ADB	Asian development Bank
APHA	American Public Health Association
APs	Affected Persons
ASRs	Air Sensitive Receivers
ASTM	American Society of Testing Materials
AKM	Avenue Kilometer
BOD	Bio-chemical Oxygen Demand
BDL	Below Detection Limit
BHU	Basic Health Unit
°C	Degree Centigrade
CC	Construction Contractor
CPEC	China-Pakistan Economic Corridor
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
dB (A)	Decibel
DCR	District Census Report
DC	Design Consultant
DD	Deputy Director
DO	Dissolved Oxygen
EA	Environmental Assessment
EALS	Environment, A forestation land and Social
EE	Environmental Engineer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environment Protection Agency
EPD	Environment Protection Department
EPO	Environmental Protection Ordinance
ESR	Environmental Sensitive Receiver
FCC	Forest Conservation Committee
GHG	Green House Gases
GOP	Government of Pakistan
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HSIP	Highway Sector Improvement Programme
IEE	Initial Environmental Examination
Km	kilometer
KKH	Karakoram Highway
LAC	Land Acquisition Collector
MVES	Motor Vehicle Examiners
NEQS	National Environmental Quality Standards

NESPAK	National Engineering Services Pakistan
NHA	National Highways Authority
NO _x	Nitrogen Oxides
NGO	Non Governmental Organization
NOC	No-Objection Certificate
NSR	Noise Sensitive Receiver
NSL	Natural Surface Level
NTC	National Trade Corridor
OSHA	Occupational Safety and Health Administration
PAPs	Project Affected Persons
PEPA	Pakistan Environmental Protection Act
PNCS	Pakistan National Conservation Strategy
PEPC	Pakistan Environmental Protection Council
PM	Particulate Matter
PPC	Pakistan Penal Code
PPAF	Pakistan Poverty Alleviation Fund
REA	Rapid Environmental Assessment
RE	Resident Engineer
ROW	Right of Way
SC	Supervision Consultant
SO _x	Sulfur Oxides
SRSP	Sarhad Rural Support Programme
SSEMP	Site Specific Environmental Management Plan
TA	Technical Assistance
TSS	Total Suspended Solids
UC	Union Council
UCC	Upper Chenab Canal
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

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**Environmental Impact Assessment (EIA) of
Hasanabdal – Havelian Section of E-35**

Table of Contents

List of Abbreviation	i
Table of Contents	ii
 SECTION 1: INTRODUCTION	
1.0 Background	1-1
1.1 Scope of Study	1-2
1.2 Study Objectives	1-3
1.3 Requirement of EIA Study for the Proposed Project	1-3
1.4 The Proponent and Consultant	1-4
1.5 Study Team	1-4
1.6 Study Approach & Methodology	1-5
1.6.1 Study Approach	1-5
1.6.2 Methodology	1-5
1.7 Components of the Report	1-9
 SECTION 2: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS	
2.1 General	2-1
2.2 Government Environmental Policy and Legal Framework	2-1
2.2.1 National Environment Policy, 2005	2-1
2.2.2 Pakistan Environmental Protection Act 1997	2-1
2.2.3 Pakistan Environmental Protection Agency Regulations, 2000	2-2
2.2.4 National Environmental Quality Standards (NEQS), 2000	2-4
2.2.5 Cutting of Trees Act, 1975	2-5
2.2.6 The Antiquities Act, 1975	2-5
2.2.7 Land Acquisition Act 1894	2-5
2.2.8 Pakistan Penal Code, 1860	2-5
2.2.9 Explosives Act, 1884	2-5

2.2.10 Highways Safety Ordinance, 2000	2-5
2.2.11 Motor Vehicle Rules, 1969	2-6
2.2.12 Regulations of Mines and Oil Fields and Mineral Development Act, 1948	2-6
2.3 Environmental Assessment Guidelines	2-6
2.4 Asian Development Bank (ADB)	2-7
2.4.1 ADB's Safeguard Policy Statement, 2009	2-8
2.5 Administrative Framework	2-9
2.5.1 National Highway Authority (NHA)	2-9
2.5.2 Pakistan Environmental Protection Agency (Pak EPA)	2-10
2.5.3 Khyber Pakhtunkhwa Forest Department	2-10
2.5.4 Khyber Pakhtunkhwa Wildlife Department	2-10
2.5.5 Khyber Pakhtunkhwa Revenue Department	2-11
2.5.6 District Environment Offices	2-11
2.5.7 Non-Governmental Organizations (NGOs)	2-12

SECTION 3: DESCRIPTION OF THE PROJECT

3.0 General	3-1
3.1 Objectives of the Proposed Project	3-1
3.2 Location of the Project Area	3-2
3.3 Project Administrative Jurisdiction	3-2
3.4 Project Implementation Schedule	3-2
3.5 Cost of the Project	3-3
3.6 Components of the Project	3-3
3.7 Geometric Design of the Proposed Road Project	3-4
3.8 Civil Works	3-5
3.9 Traffic Forecast	3-6
3.9.1 Traffic Projection for Package-I & II	3-6
3.9.2 Traffic Projections for Package-III	3-8
3.10 Construction Materials	3-9
3.10.1 Barrow Soil for Embankment	3-9
3.10.2 Borrow Material for Sub Base	3-9

3.10.3 Water	3-11
3.10.4 Asphalt, Reinforcement and Cement	3-12

#	Description	
Page		
3.11	Construction Camps	3-12
3.12	Manpower Requirements	3-12
3.13	Construction Equipment	3-13

SECTION 4: DESCRIPTION OF THE ENVIRONMENT

4.0	General	4-1
4.1	Physical Environment	4-1
4.1.1	Topography and Drainage	4-1
4.1.2	Geology and Soil	4-3
4.1.3	Climate	4-4
4.1.4	Air Quality	4-7
4.1.5	Noise	4-8
4.1.6	Surface Water and Groundwater	4-10
4.1.7	Hydrology	4-14
4.1.8	Seismicity	4-14
4.1.9	Agriculture and Crop Pattern	4-14
4.1.10	Landuse	4-16
4.1.11	Industrial and Commercial Activities	4-16
4.2	Biodiversity and Natural Resources	4-16
4.2.1	Flora	4-16
4.2.2	Fauna	4-19
4.2.3	Endangered Fauna	4-22
4.2.4	Critical Habitats	4-22
2.2.5	Modified Habitats	4-23

4.3	Socio-Economic Environment	4-23
4.3.1	Socio-Economic Survey of Project Affectees	4-24
4.3.2	Consultation and Participation Process	4-24
4.3.3	Baseline Information	4-25
4.4	Gender Issues and Analysis	4-31
4.5	Culture and Tradition	4-32
4.6	Public Concerns Regarding the Project Execution	4-32
4.7	Community Health and Safety	4-33
4.8	Physical Cultural Resources	4-33

SECTION 5: ALTERNATIVES

5.0	General	5-1
5.1	Zero Alternative 'No Project Option'	5-1
5.2	Alternative-II 'Other Transport Modes'	5-2
5.3	Alternative-III 'Construction of an Expressway (E-35)'	5-3
5.4	Alternative-IV 'Alignment through Taxila M-1 to Chechian Interchange'	5-3
5.5	Comparison Analysis of Alternatives	5-4
5.6	Overview of Alternative Analysis	5-8

SECTION 6: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.0	General	6-1
6.1	Environmental Sensitivity Map	6-2
6.2	Pre-Construction/Design Phase	6-2
6.2.1	Topography	6-3
6.2.2	Land Acquisition and Resettlement	6-3
6.2.3	Changes in Land Value	6-3
6.2.4	Social Issues	6-3
6.2.5	Physical Cultural Resources	6-5
6.2.6	Biodiversity Conservation and Natural Resource Management	6-6

6.2.7 Air Quality and Noise Level	
6-6	
6.2.8 Solid Waste Management	6-7
6.2.9 Excavation of Earth	6-7
6.2.10 Public Utilities	6-8
6.2.11 Change in Hydrologic Regime	6-8
6.2.12 Loss of Agricultural Land	6-8
6.2.13 Surface and Ground Water	6-9
6.3 Construction Phase	6-9
6.3.1 Topography	6-9
6.3.2 Soil	6-10
6.3.3 Blasting	6-11
6.3.5 Physical Cultural Resources	6-12
6.3.6 Construction Camps/Camp Sites	6-12
6.3.7 Health and Safety	6-15
6.3.8 Borrow/ Open Pits	6-17
6.3.9 Pollution Prevention and Abatement	6-18
6.3.10 Resource Conservation	6-29
6.3.11 Energy Efficiency	6-29
6.3.12 Surface and Groundwater	6-30
6.3.13 Biodiversity Conservation and Natural Resource Management	6-32
6.3.14 Disposal of Mucking Material	6-35
6.3.15 Disruption of Existing Public Utilities/ Infrastructure	6-35
6.3.16 Traffic Management	6-35
6.3.17 Waste Disposal	6-36
6.3.18 Economic Activity	6-36
6.3.19 Lifestyle and Culture	6-37
6.3.20 Wastage of Fertile Plough Layer	6-37
6.3.21 Impacts of Heavy Vehicles on the Existing Road Network	6-38
6.4 Anticipated Impacts during Operational Phase	6-38
6.4.1 Biodiversity Conservation and Natural Resource Management	6-38

6.4.2	Surface and Groundwater	6-41
6.4.3	Pollution Prevention and Abatement	6-41
6.4.4	Road Safety	6-43
6.4.5	Deterioration of Vehicles	6-43
6.4.6	Landscape	6-43
6.4.7	Community Development	6-44

SECTION 7: ECONOMIC ANALYSIS

7.0	General	7-1
7.1	Economic Benefits	7-1
7.2	Environmental Costs	7-1

SECTION 8: ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

8.1	Environmental Management	8-1
8.2	Institutional Responsibilities	8-2
8.2.1	Responsibilities of EALS (NHA)	8-2
8.2.2	Responsibilities of Environmental Engineer of Supervision Consultant	8-2
8.2.3	Responsibilities of Environmental Engineer of Supervision Contractor	8-3
8.2.4	Reporting Mechanism and Feedback	8-4
8.2.5	Non-Compliance of the EMMP	8-4
8.3	Environmental Action Plan	8-5
8.4	Environmental Monitoring Plan (EMP)	8-28
8.5	Environmental Technical Assistance and Training Plan	8-32
8.6	Monitoring Mechanism (MM)	8-33
8.6.1	Monitoring Schedule and Performance Indicator	8-36
8.6.2	Environmental Mitigation and Monitoring Plan	8-37
8.7	Environmental Monitoring, Mitigation and Training Cost	8-45

SECTION 9: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

9.0	General	9-1
9.1	Identification of Main Stakeholder	9-1
9.2	Focus Group Discussions and Scoping Sessions	9-2

9.3	Commonly Raised Concerns of the Stakeholders	9-3
9.4	Proposed Measures for Addressing the Stakeholders' Concerns	9-4
9.5	Village Meetings	9-6
9.6	Future Information Disclosure Plan	9-21
9.7	Grievance Redress Mechanism	9-21
9.7.1	Composition of GRC	9-22
9.7.2	Type of Grievance	9-24

SECTION 10: CONCLUSIONS

10.0	General	10-1
10.1	Identification of the Main Issues and Concerns	10-1
10.2	Conclusions	10-3

List of Tables

Table 3.1	Main Components of the Project
Table 3.2	Traffic Projection (Package-I & II)
Table 3.3	Total Estimated Diverted Traffic in Base Year 2010
Table 3.4	Projection of Diverted Traffic from Year 2014-2023 at Havellian Interchange
Table 3.5	Manpower Requirement during Construction Phase
Table 3.6	Additional NHA Staff for Operation/ Maintenance of the Project
Table 3.7	Machinery and Equipment Requirement For The Proposed Project
Table 4.1	Meteorological Data Pertaining to Kakul (Climatic Period 1971 – 2000)
Table 4.2	Ambient Air Quality Analysis
Table 4.3	Average Noise Levels at Various Locations
Table 4.4	Groundwater Analysis of The Project Area
Table 4.5	Surface Water Analysis The Project Area
Table 4.6	Estimated Peak Flood Discharge of Major Nullahs/Streams

Table 4.7	Cropping Pattern in Project Area
Table 4.8	Main Crops with their Average Yields in Project Area
Table 4.9	Common Fruit Trees in Project Area
Table 4.10	Common Non-Fruit Trees (Forest Trees) in Project Area
Table 4.11	Important Shrubs and Herbs in Project Area
Table 4.12	Grasses in Project Area
Table 4.13	Mammals in Project Area
Table 4.14	Reptiles in Project Area
Table 4.15	Amphibians in Project Area
Table 4.16	Birds in Project Area
Table 4.17	Demographic Characteristics of Tehsils
Table 4.18	Respondents Gender Ratio
Table 4.19	Respondents Age Group
Table 4.20	Caste of people in respective tehsils.
Table 4.21	Education Status of the Respondents
Table 4.22	Status of Educational Facilities along the Proposed Expressway
Table 4.23	Social Amenities
Table 4.24	Professional Status of Respondents
Table 4.25	Income Level of Respondents
Table 4.26	Monthly Expenses of Respondents
Table 4.27	House Size
Table 4.28	Construction Type of the Houses
Table 4.29	Borrowing Status of Respondents
Table 4.30	Borrowing Source of Respondents
Table 4.31	Social Conditions of Women in the Project Area
Table 4.32	Stakeholders Concerns
Table 5.1	Comparison Analysis of Alternatives
Table 6.1	Characterization of Environmentally Potential Impacts for Construction Phase
Table 6.2	Characterization of Environmentally Potential Impacts for Operational Phase

Table 6.3	Environmental Impacts Evaluation Matrix During the Construction Phase
Table 6.4	Environmental Impacts Evaluation Matrix During the Operational Phase
Table 6.5	Chainage Wise Location of Underpasses
Table 6.6	Summary of Worker Camp Impacts & Mitigation Measures
Table 6.7	Air Sensitive Receivers (ASRs)
Table 6.8	Maximum Limits of Noise Levels
Table 6.9	Damage Risk Criteria for Hearing Loss
Table 6.10	Noise Sensitive Receivers (NSRs)
Table 6.11	Water Sensitive Receivers
Table 6.12	Trees to be Planted in First (Outer) Row
Table 6.13	Trees to be Planted in Second Row
Table 8.1	Environmental Management Plan
Table 8.2	Tentative Cost of Equipment
Table 8.3	Estimated Cost of Plantation of 500 Plants for First Year
Table 8.4	Estimated Cost of Plantation of 20% of First Year (100) Plants and their Maintenance for Second Year
Table 8.5	Estimated Cost of Plantation of 20% (100) Plants and Maintenance for Third Year
Table 8.6	Estimated Cost for Maintaining 500 Plants for Fourth Year
Table 8.7	Personnel Training Programme / TA Services
Table 8.8(a)	Environmental Mitigation and Monitoring Plan
Table 8.8(b)	Budget Estimate for Environmental Monitoring During the Construction and Operation Phases
Table 9.1	Schedule of Scoping Sessions
Table 9.2	Village Meetings and the Concerns (2009)
Table 9.3	Disclosure Meetings and Public Concerns (2012)
Table 10.1	Summary of Environmental Impacts

List of Figures

- Figure 1.1 Location Map of the Proposed Project
- Figure 2.1 Current IEE/EIA Process in Pakistan
- Figure 3.1 Alignment Map of the Proposed Project
- Figure 3.2 Typical Cross Sections of the Proposed Project
- Figure 3.3 Map Showing Locations of Potential Sources of Construction Materials
- Figure 3.4 Location of the Quarry Areas on Peshawar Road near Taxila
- Figure 4.1 General Topography and Seasonal Nullah of the Project Area
- Figure 4.2 Map Showing General Characteristics of Soil
- Figure 4.3 Wind Rose for the Year 2008, Kakul Station
- Figure 4.4 Mean Maximum and Mean Minimum Temperature of the Project Area
- Figure 4.5 Average Rainfall in the Project Area
- Figure 4.6 Relative Humidity in Project Area
- Figure 4.7 Environmental Sampling Location of the Project Area
- Figure 4.8 Ambient Air Quality Monitoring in the Project Area
- Figure 4.9 Noise Level Measurement in the Project Area
- Figure 4.10 General View of Surface and Ground Water Sources in the Project Area
- Figure 4.11 Seismic Seasonal Map of the Project Area
- Figure 4.12 General View of the Crop Pattern of the Project Area
- Figure 4.13 Landuse Pattern of the Project Area
- Figure 4.14 A View of Floral Present in the Project Area
- Figure 4.15 Socio-Economic Interview being Conducted in Village
- Figure 5.1 Alternative Route Alignment for the Proposed Project
- Figure 6.1 Environmental Sensitive Receptors Present in the Project Area
- Figure 9.1 Flow Chart of the Proposed Grievance Redress Mechanism

List of Annexures

- Annexure I Pakistan Environmental Protection Act, 1997
- Annexure II Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000
- Annexure III National Environmental Quality Standards (NEQS), 2000
- Annexure IV Quarry Area Management Guidelines / Plan
- Annexure V Detailed Soil (Sub-grade) Analysis along the Proposed Alignment
- Annexure VI Environmental Monitoring Results (Ground & Surface Water, Air Quality, Noise)
- Annexure VII Borrow Pit Plan
- Annexure VIII Blasting Management Plan
- Annexure IX Chance Find Procedures
- Annexure X Construction Noise Modeling for Different Sensitive Receptors
- Annexure XI E-35 Lab Test 2015
- Annexure XII Public Consultation Pictures

SECTION - 1

INTRODUCTION

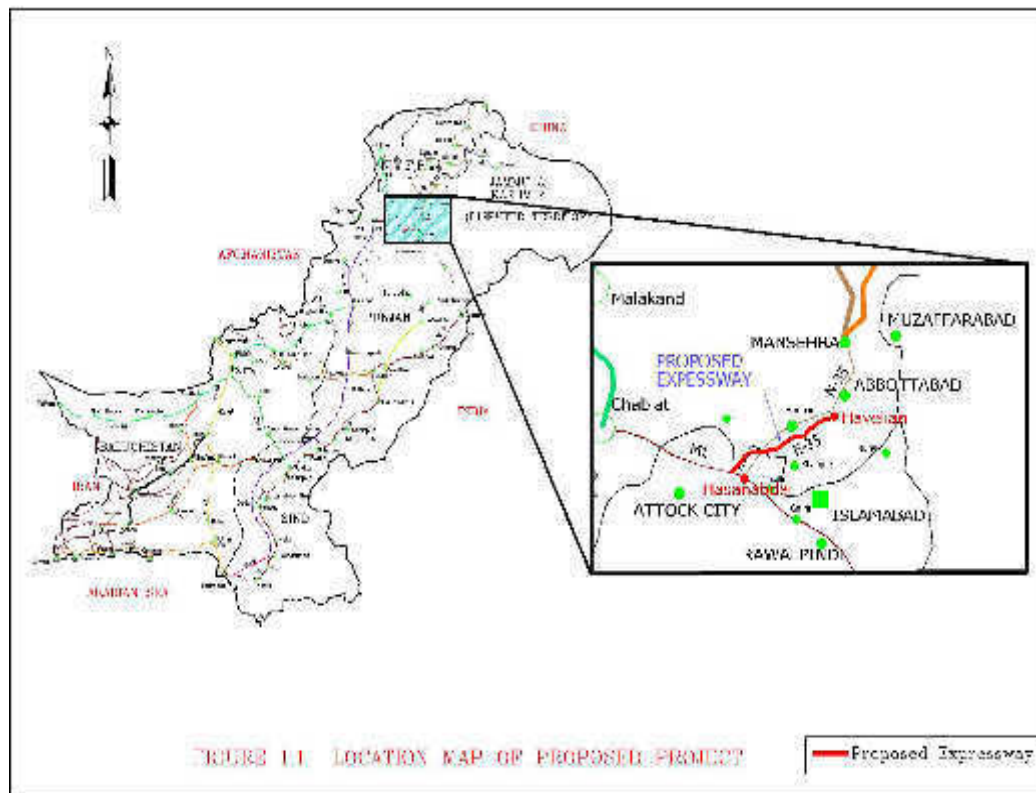
1.0 Background

1. This report presents the findings of EIA study of Hasanabdal – Havelian Section of E-35 Project. To comply with Pakistan Environmental Regulations as per “Pakistan Environmental Protection Act (PEPA)” 1997, “National Highways Authority (NHA)” entrusted NESPAK with the assignment of carrying out an Environmental Impact Assessment (EIA) Study of the proposed section of E-35 Project from Hasanabdal to Havelian.

2. To support sustained growth and increase competitiveness, Government of Pakistan (GOP) is taking a strategic and holistic approach to transportation and has launched a major initiative to improve the trade and transport logistics chain along the north-south “National Trade Corridor (NTC)” linking Pakistan’s major ports in the south and south-west with its main industrial centres and neighbouring countries in the north, north-west and east. The NTC Highway Sector Improvement Programme (HSIP) comprises of three core elements: (a) Construction of a north-south access-controlled expressway system to provide a high-speed, safe and reliable road transport corridor, (b) Development of linkages of the new port of Gwadar with the NTC; and (c) Upgradation of the Karakoram Highway to cater for increased trade/transit traffic from China after opening of the Gwadar Port. “National Highway Authority (NHA)” plans to construct Hasanabdal - Mansehra Expressway (E-35) as a part of “National Trade Corridor (NTC)” Project. The proposed project will be financed by the “Asian Development Bank (ADB)”. The rationale for the Asian Development Bank’s involvement is that it has provided assistance to GOP to develop an overall strategic framework of the proposed National Trade Corridor Improvement programme and now is in a unique position to assist the GOP to implement it by providing long-term finance at competitive interest rates. The implementing Agency of the proposed Project will be NHA.

3. The existing Hasanabdal – Mansehra Road is an important part of the entire communication network of Khyber Pakhtunkhwa and Northern Areas which

links with Azad Jammu & Kashmir, Kaghan Valley and China via “Karakoram Highway (KKH)”. Existing Hasanabdal - Mansehra Road is a two-lane single carriageway road with a width of 7.3 meters. This Road Project entitled as “Hasanabdal – Havelian section of E-35” is a proposed new road alignment, which starts from Burhan Interchange of Islamabad-Peshawar Motorway (M-1). It curves away to northwest of existing N-35 passing near Shin Gali and Jabbar and then curves back passing near Kuldarra, Chhaprian and Kalu Pind and finally crosses existing N-35 at Jari Kas. From here, it again curves away to northeast of existing N-35, crossing Hattar and Khanpur Roads at Kot Najeebullah and Chachian respectively. Finally, the alignment ends at Havelian near Hazara University, Havelian Campus. The location map of the proposed project has been given in **Figure 1.1**. This section of E-35 consists of a three-lane carriageway having width of 3.5 m of each lane with New Jersey barrier in median. The “Right of Way (ROW)” of the proposed Project will be 80 meters including area reserved for plantation on either side of the road.



4. The new expressway is intended to provide a safe, quick and more efficient passage to KKH/ Northern areas and China via KKH. It will be a limited access, four-lane dual carriageway facility. It is located in mostly plain and partly hilly terrain.

5. The main objective of NHA for planning this expressway is to provide a safe, congestion free and high speed facility to commuters of the project area as well as to tourists. This Expressway will improve the communication network between the Province Punjab and Northern Areas of Khyber Pakhtunkhwa Province and also boost the trade with China. Overall, the Project will have a positive impact on the economic development of the country due to trade activities and tourism.

1.1 Scope of Study

6. The scope of the EIA Study includes collection and scrutinizing of data related to physical, biological and socio-economic environment of the project area and to prepare the baseline environmental profile. It also aims at the identification, prediction and evaluation of the possible environmental impacts of the proposed Project on its immediate surroundings on both short and long-term basis. Based on the nature and levels of those impacts, appropriate mitigation measures along with the cost have been incorporated in this EIA Report.

1.2 Study Objectives

7. The overall objective of this EIA is to carry out a detailed environmental assessment of the project area; to assess impacts caused by the different activities of the proposed project and to address measures to mitigate adverse environmental impacts arising from the execution of the proposed project. The specific objectives of the EIA Study are as follows:

- To determine pre-project state of affairs to assess post-project conditions if they have changed for better or worse;
- Documentation of all the resources likely to be affected due to the implementation of the proposed project;
- To provide maximum information to the proponent and other stakeholders about

the existing environmental conditions and the implications of the proposed project;

- Allow the Planners to minimize potential impacts of the proposed project on different environmental conditions such as physical environment, biological environment and socio-economic environment; and
- To facilitate decision makers to take informed decisions.

1.3 Requirement of EIA Study for the Proposed Project

8. EIA is mandatory according to the Pakistan Environmental Protection Act (PEPA-1997) attached as **Annexure - I**. Section 12 (1) of the PEPA-1997 which states that:

9. *“No proponent of a Project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the Project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained approval from the Federal Agency in respect thereof.”*

10. According to Pakistan Environmental protection Agency (Review of IEE and EIA) Regulations 2000, the proposed project falls under category D (Transport) of Schedule II, which requires EIA before commencement of construction. Also, the projects with total cost of 50 million rupees and above qualify for an EIA.

11. An EIA study is also required as per ADB’s “Safeguard Policy Statement”, 2009, which states that:

“ADB will not finance Project that do not comply with its safeguard policy statement, nor it will finance Project that do not comply with host countries social and environmental laws and regulations, including those laws implementing host country obligations under international law.”

12. And as per SPS, 2009, 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.

1.4 The Proponent and Consultant

13. The proponent of the Project is NHA while the Consultant is NESPAK, the addresses are given as under:

a) Proponent Contact Address

General Manager (EALS)
National Highway Authority (NHA)
27 Mauve Area, G-9/1,
Islamabad
Ph: 051-8351506

b) Consultant Contact Address

National Engineering Services Pakistan (NESPAK) Private Limited
EPHE Division, NESPAK House
1-C, Block – N, Model Town Extension
Lahore
Tel: 042-99090000

1.5 Study Team

14. A multidisciplinary team was formulated to conduct the study. The team comprises the following persons:

Muhammad Zubair	:	Project Advisor/ Quality Assurance Expert
Kashif Bashir	:	Team Leader
Hammad Qamar	:	Senior Environmental Engineer
Zia Mustafa	:	Senior Environmental Engineer
Makhdum Ali	:	Ecologist
Sheraz Hussain	:	Senior Sociologist
Saeed Hussain	:	Environmental & Social Expert

Adeel Pervez	:	Environmental Scientist
Arslan Mukhtar	:	Environmental Engineer
M. Faizan Ullah	:	Environmental Engineer

1.6 Study Approach & Methodology

1.6.1 Study Approach

15. The study has been conducted in accordance with “Environmental Protection Agency (EPA)”, “Government of Pakistan (GOP) Guidelines, 2000”, and ADB Safeguard Policy Statement (2009). The study is based on both primary and secondary data and information. The primary data includes data collected from field observations and secondary data includes review of the “District Census Reports (DCRs)” and relevant information from Government Departments. Discussions were held with stakeholders including government officials, community representatives and a wide range of road users and roadside dwellers. The main purpose of this approach was to obtain a fair impression on the people’s perceptions of the project and its environmental impacts.

1.6.2 Methodology

16. The following methodology was adopted for carrying out the EIA study of the proposed Project:

Orientation

17. Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the study.

Data Collection Planning

18. Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the EIA Consulting Team. The plan included identification of specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and other supporting needs for the execution of the data acquisition plan.

Data Collection

19. In this step, primary and secondary data were collected through field observations, environmental monitoring in the field, concerned departments and published materials to establish baseline profile for physical, biological and socio-economic environmental conditions. Following activities were performed for data collection:

Site Reconnaissance

Analysis of Maps and Plans

Literature Review

Desk Research

Public Consultations

Field Observations & Studies

Laboratory Analysis

Physical Environment

20. Information was collected on the existing physical environment, particularly as related to geology, topography, soils, hydrology and drainage, water quality, air quality and noise.

Geology, Topography, Soils

21. Data related to geology, topography and soil was collected to establish the baseline of the project area and further to find out the impacts of the Project during the construction and operational phases.

Hydrology and Drainage

22. Data related to hydrology and drainage was collected to identify the elements of the hydrological cycle that are likely to impact on the project and the possible impacts that the project could have on the hydrological regime. The Field assessments included a determination and verification of all the existing inflows into the drain, assessment of drainage issues, interviews with local community members, and round-table discussions with stakeholders.

Air Quality

23. Ambient air quality measurements are essential to provide a description of the existing conditions, to provide a baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed construction on air quality conditions. Ambient air quality was continuously monitored for Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Particulate Matter (PM₁₀), for 24 hours. CO was analyzed by Testo 317-3 CO Analyzer, While SO₂ and NO₂ were analyzed according to “Standard Operating Procedures (SOP)” based on recognized method ISO 6767 and method ISO 6768 of USEPA respectively.

Noise

24. Noise level measurements were taken at one sampling point for continuously 24 hours and hourly average data was reported. Sound level measurements were taken with the help of Digital sound meter (TES 1350A), a calibrated instrument manufactured by Taiwan.

Water Quality

25. The objective of the water quality monitoring was to determine the water quality situation before construction. It has been observed that the surface water

and air quality are the most important environmental variables to be affected in the road project. The extent of surface water and groundwater contamination in the project area was assessed based on the test results of chemical and microbiological parameters for surface and groundwater. Dissolved Oxygen (DO), pH and conductivity measurements were taken in situ at all sampling stations. Laboratory analyses were performed in SGS laboratory according to SOP based on recognized methods of American Society of Testing Materials (ASTM); “United States Environmental Protection Agency (USEPA)” or “American Public Health Association (APHA) methods”.

Biological Environment

26. The status of the flora and fauna of the study area was determined by an ecological survey, review of literature relevant to the area, and an assessment of terrestrial environment.

Flora

27. The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species, assessment of stage of growth (mature or sapling) and assessment of canopy cover.

Fauna

28. Information on fauna was gathered from existing literature on reported species as well as observations in the field.

Socio-Cultural Environment

29. The Consultants utilized a combination of desk research, field investigations, census data, structured interviews, maps, reports to generate the data required for description of the existing social environment and assessment of the potential impacts due to the construction of the proposed project. Data was collected on the following aspects given below:

Land use and Municipal Status

Traffic, Transportation and Access Roads

Demographics

Livelihoods

Poverty

Education

Health

Social Setup

Community Facilities

Recreational Activities

Archaeological and Cultural Heritage

Identification and Evaluation of Environmental Impacts

30. The impacts of the road project on the physical, biological and socio-economic environment prevalent in the project area are visualized at the design, construction and operational phases.

Mitigation Measures and Implementation Arrangements

31. The adequate mitigation measures and implementation mechanisms are proposed so that the Proponent could incorporate them beforehand in the design phase.

1.7 Components of the Report

32. This EIA Report has been prepared following the Pakistan Environmental Protection Agency (EPA) Guidelines for Environmental Assessment and Asian Development Bank's (ADB) Safeguard Policy Statement 2009. The format of the Report consists of the following sections:

Section 1: Introduction

33. This section represents an introduction of the EIA Report. It contains the scope of study and overview of the project. The section also includes the project

categorization as per Pak-EPA as well as ADB Environmental Assessment criteria.

Section 2: Policy, Legal and Administrative Framework

34. This section comprises policy, guidelines, statutory obligations and roles of institutions concerning EIA study of the proposed project.

Section 3: Description of the Project

35. In this section, salient features of the project are presented. It provides information about the Project location and its benefits to the public. The focus information is as under:

- 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

36. It provides an overview of the present environmental baseline of the project area. It discusses the following:

- a) Physical Environment;
- b) Ecological Environment;
- c) Cultural Environment; and
- d) Socio-Economic Environment.

Section 5: Alternatives

37. This section discusses the possible alternatives of the proposed Project.

Section 6: Anticipated Environmental Impacts and Mitigation Measures

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

- a) Project Corridor;
- b) Pre Construction/Design Phase Impacts and Mitigation Measures;
- c) Construction Phase Impacts and Mitigation Measures; and
- d) Operation Phase Impacts and Mitigation Measures.

Section 7: Economic Assessment

39. This section includes economic analysis of the project consisting of cost and benefits of the environmental impacts; and cost effectiveness of mitigation measures.

Section 8: Environmental Management Plan

40. This section describes the measures suggested for executing the Environmental Management Plan (EMP) at the project site. It elaborates the following in details:

- a) Objectives of EMP;
- b) Key Environmental and Social Components;
- c) Role of Functionaries;
- d) Specific Implementation Responsibilities;
- e) Environmental Monitoring Plan;
- f) Environmental Management Plan (In Matrix);
- g) Environmental Mitigation Cost;
- h) Environmental Technical Assistance and Training Plan; and
- i) Environmental Monitoring, Mitigation and Training Costs.

Section 9: Public Involvement and Disclosure

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

- a) Identification of The Main Stakeholders;
- b) Details of Scoping Sessions;
- c) Stakeholders' Concerns;
- d) Proposed Measures for incorporating the Stakeholders' Concerns;
- e) Village Meetings; and
- f) Future Information Disclosure Plan.

Section 10: Conclusions

42. This section presents the outcomes of the whole study. It explains the following in details:

- a) Identification of the Main Issues and Concerns;
- b) Proposed Mitigation Measures;
- c) Benefits of the Project; and
- d) Surveillance and Monitoring of the Expressway after Construction.

SECTION - 2

POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

2.1 General

43. This section deals with the current environmental policy as well as legal and administrative framework related to carrying out the Environmental Impact Assessment (EIA) of Hasanabdal - Havelian Section of E-35. All the relevant provisions of Environmental policies and Guidelines of ADB and Pak-EPA and legal frameworks have been duly discussed.

2.2 Government Environmental Policy and Legal Framework

44. The Ministry of Environment is the responsible authority for policy making on environmental protection in Pakistan.

2.2.1 National Environment Policy, 2005

45. In March 2005, Government of Pakistan launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It further states in clause (b) of subsection 5.1 that EIA related provisions of Environmental Protection Act, 1997, will be diligently enforced for all developmental Projects. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.

2.2.2 Pakistan Environmental Protection Act, 1997

46. The Act was enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance 1983. It provides the framework for implementation of the Pakistan National Conservation Strategy, 1992, establishment of provincial sustainable development funds, protection and

conservation of species, conservation of renewable resources, establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examination and Environmental Impact Assessment. Section 12 of the Act provides for environmental assessment study: Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) prior to commencement of construction or operation of a Project.

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

47. These regulations provide lists of the Projects requiring IEE and EIA. They also briefly describe the preparation and review of environmental reports. In accordance with Regulation 4 of these Regulations, an EIA for the proposed project satisfying the requirements of the Section 12 of PEPA Act of 1997 needs to be submitted to concerned EPA, Environmental Protection Department (EPD), for reviewing environmental approval. PEPA regulations for IEE/EIA are given in **Annexure - II**.

48. These Regulations clearly defines the categories of the projects requiring an IEE or EIA, review fees by EPA, filing process of the environmental reports, public participation, decisions by EPA, conditions of approval, compliance reports and monitoring of the environmental parameters etc. **Figure 2.1** shows the current IEE/ EIA process in Pakistan.

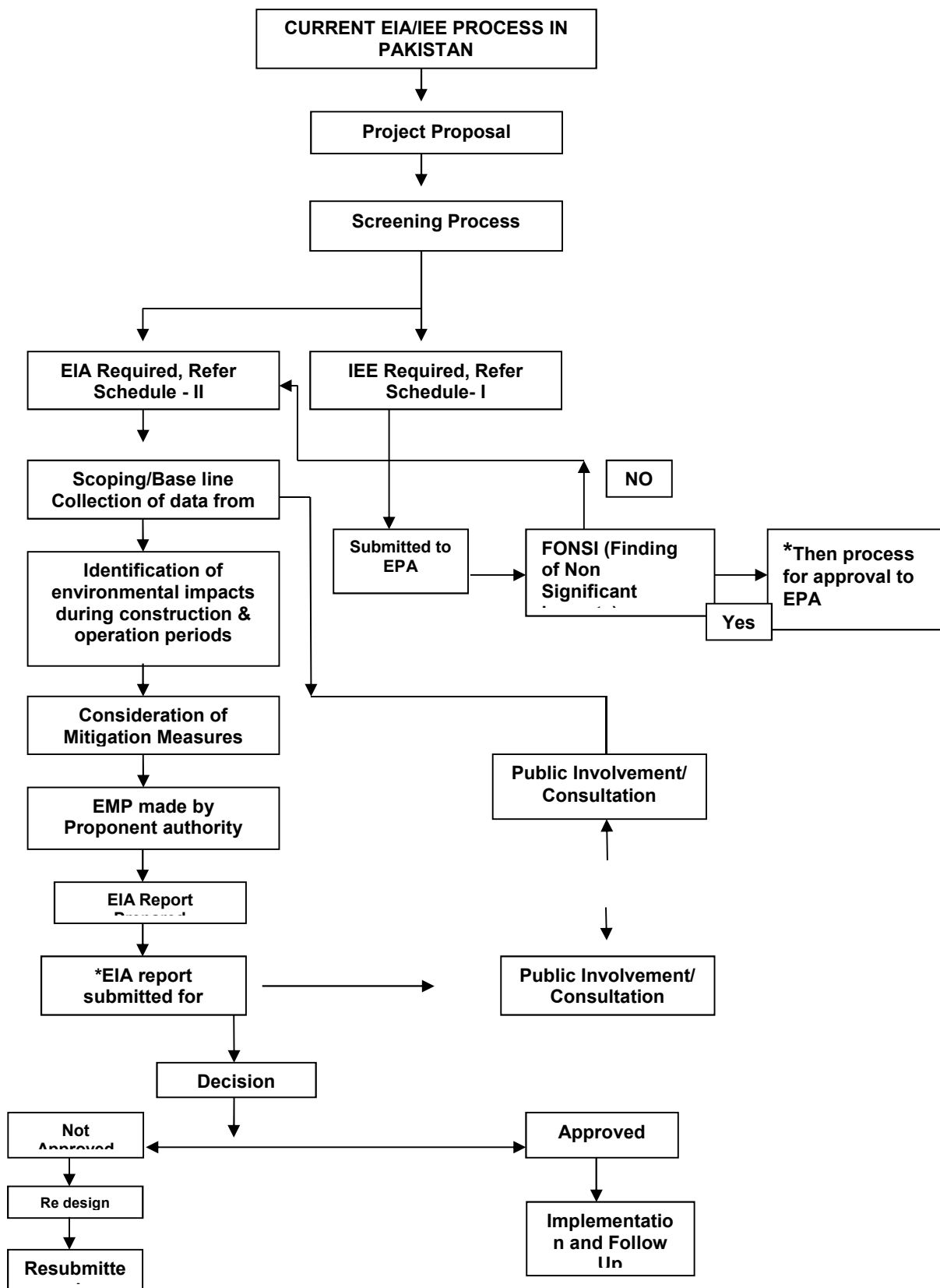


Fig 2.1: Flow Chart of EIA/IEE Process in Pakistan

49. **Figure 2.1** depicts the whole process of the IEE/EIA in Pakistan. According to which the proposal undergoes the screening process to determine whether IEE or EIA required for the proposal. Perspective approach would be employed for screening consisting of Schedule-1 and Schedule-II of IEE/EIA Regulations, 2000. The project falling in the list of Schedule-I would require IEE study while EIA would be carried out for the projects included in the list of Schedule-II.

50. In case of IEE, the IEE Report will be submitted to the concerned EPA. A majority of proposals having less significant impacts or no impacts would be screened out of EIA study; however, only few having significant impacts would go for further EIA. EIA including detailed EMP would be carried out by the project proponent and the report would be submitted to EPA for review and decision for its approval. In case, approval is granted, the implementation of the EIA and conditions of approval would be followed. For the projects which are not approved, the project should be redesigned and EIA should be resubmitted for review and approval. As per IEE/ EIA Regulations, 2000 the review time period required for IEE is 45 days and for EIA is 90 days.

2.2.4 National Environmental Quality Standards (NEQS), 2000

51. The Pakistan Environmental Protection Council first approved these standards in 1993. They were later revised in 1995 and 2000. NEQS is attached as **Annexure - III**. The National Environmental Quality Standards (NEQS), 2000 specify the following standards:

- Maximum allowable concentration of pollutants in municipal and liquid industrial effluents discharged into inland waters, sewage treatment facilities, and the sea
- 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.

2.2.5 Cutting of Trees (Prohibition) Act, 1975

52. This Act prohibits cutting or chopping of trees without permission of the Forest Department. The act presents fine or imprisonment or both, for illegal cutting of tree but has not mentioned any compensatory afforestation. However, it's a common practice to plant 7-10 trees for compensation of 1 tree to be rooted up.

2.2.6 The Antiquities Act, 1975

53. Archaeological sites and monuments are specifically protected under this Act.

2.2.7 Land Acquisition Act, 1894

54. The Land Acquisition Act (1894) deals with the acquisition of private properties for public purposes. The large development projects including road projects are also being considered under this Act. There are 55 sections in this Act mainly dealing with area notifications, surveys, acquisition, compensation, apportionment awards, disputes resolution, penalties and exemptions.

2.2.8 Pakistan Penal Code, 1860

55. This Act defines the penalties for violations concerning pollution of air, water bodies and land.

2.2.9 Explosives Act, 1884

56. Under the Explosives Act, 1884, the Project contractors are bound by regulations on handling, transportation and using explosives during quarrying, blasting, and other purposes.

2.2.10 Highways Safety Ordinance, 2000

57. This ordinance includes provisions for the licensing and registration of vehicles and construction equipment; maintenance of road vehicles; traffic control, offences, penalties and procedures; and the establishment of a police force for motorways and national highways charged with regulating and controlling traffic on the national highways, and keeping the highways clear of encroachments.

2.2.11 Motor Vehicle Rules, 1969

58. Motor Vehicle Rules 1969 (MVR 1969) define powers and responsibilities of Motor Vehicle Examiners (MVEs). The establishment of MVE inspection system is one of the regulatory measures that can be taken to tackle the ambient air quality problems associated with the vehicular emissions during operation phase.

2.2.12 Regulations of Mines and Oil Fields and Mineral Development Act, 1948

59. This legislation provides regulatory procedures for the quarrying and mining of construction material from state-owned as well as private land. All quarries are controlled by the Provincial Mines & Minerals Department (M&MD). Director General of M&MD is the Authority to issue licenses for quarries as per Punjab Mining Concession Rules, 2002". Inspectors of M&MD regularly inspect the work of lessee to prevent overexploitation of mineral property & safety of workers/other people. However, the Quarry Area Management Guidelines are attached as an **Annexure-IV**.

2.3 Environmental Assessment Guidelines

60. Pak-EPA has also published environmental assessment procedures and guidelines in October, 1997, which contains the following sets of information relevant to the proposed project:

- i) Guidelines for Policy and Procedures for Filing, Review and Approval of

Environmental Assessment Reports

61. It describes environmental policy and administrative procedures to be followed for filing of environmental assessment reports by the proponents and its review and approval by the concerned environmental protection agency/department.

ii) Guidelines for the Preparation and Review of Environmental Reports

62. These guidelines are developed to facilitate both the proponents and decision makers to prepare reports (inclusive of all the information contained therein) and carry out their review so as to take informed decisions.

iii) Sectoral Guidelines: Major Roads

63. These guidelines embody issues/impacts commonly arising due to the road projects, the mitigations to reduce/eliminate these impacts and the need for environmental management plan and monitoring plan to protect the environment.

iv) Guidelines for Public Consultation

64. These guidelines deal with possible approaches to public consultation and techniques for designing an effective programme of consultation that involves all major stakeholders and ensures that their concerns are incorporated in any impact assessment study.

2.4 Asian Development Bank (ADB)

65. The ADB is a multilateral development finance institution operating in Asia and Pacific, aiming to improve the quality of people's lives by providing mostly public sector loans and technical assistance for a broad range of development activities. Pakistan being a member country has established a Resident Mission in Pakistan.

66. In pursuit of its commitment to “promoting environmentally sustainable economic development in its developing member countries” the ADB has instituted “environmental assessment requirements and review procedures to ensure that appropriate environmental considerations are properly integrated into and monitored in each stage of project cycle’ of its investment operations, including loans to the private sector. Where an EIA is required, this includes public involvement, to be documented in the report: the process undertaken and recommended measures for continuation, a summary of the major components made by stakeholders and how they were addressed and compliance with relevant regulatory requirements.

2.4.1 ADB’s Safeguard Policy Statement, 2009

67. ADB’s Safeguard Policy Statement consists of three operational policies on the environment, Indigenous People and involuntary resettlement. SPS, 2009 provides information on good practice approaches to implement safeguards. In addition to these three safeguard policies, several sectors i.e. water, energy and forest have environmental safeguard elements. Overall this policy provides to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected marginalized by the development process.

Safeguard Requirements-1: Environment

68. The Safeguard Requirement-1: Environment, of SPS, 2009 states to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. Safeguard environmental requirement principal is to conduct an environmental assessment for each developmental proposal to identify potential impacts and then to mitigate all those negative impacts properly. The proposed mitigation measures, monitoring and reporting requirements, institutional arrangements, schedules, cost estimates and performance indicators are to be documented and reflected in the environmental assessment report.

Categorization of the Environmental Project

69. According to ADB Safeguard Policy Statement (2009), the project is classified as category “A” and therefore an EIA is required for the project. The process of determining a project’s environment category is to prepare a Rapid Environmental Assessment (REA). REA requires the completion of the environmental categorization form prior to the Project initiation. REA uses sector-specific screening checklist, taking into account the type, size, and location of the proposed project; sensitivity and vulnerability of environmental resources in project area; and the potential for the Project to cause significant adverse environmental impacts. A project is classified as one of the four environmental categories (A, B, C, or FI) based on the most environmentally sensitive component. Categories are as follows:

70. **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 larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.

71. **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), including an EMP, is required.

72. **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

73. **Category FI:** A proposed project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary.

74. For Category 'A' projects, the EIA (including EMP), is reviewed by ADB's Operations Department and the executing agency. The operations department ensures that the following safeguard documents are posted on ADB's website: (i) draft EIA report at least 120 days before Board consideration for an environment category A project; (ii) the final or updated EIA or IEE, upon receipt.

2.5 Administrative Framework

2.5.1 National Highway Authority (NHA)

75. The implementing agency of the proposed project is NHA, therefore, NHA is responsible for liaising with line departments to ensure that the Project complies with the laws and regulations controlling the environmental concerns of highway construction and operation, and that all pre-construction requisites, such as permits and clearances are met. The office of Environment, Aforestation, Land and Social (EALS) of NHA will be responsible for ensuring that all the measures proposed in the Environmental Management Plan are effectively implemented by the contractor during construction phase and by Directorate of Operation & Maintenance of NHA during operation phase of the proposed Project.

2.5.2 Pakistan Environmental Protection Agency (Pak EPA)

76. Pakistan Environmental Protection Council (PEPC) is the apex inter-ministerial and multi-stakeholders decision making body, which is headed by the Prime Minister. The Pakistan Environmental Protection Agency (Pak-EPA) is the regulatory body responsible for enforcement of Pakistan Environmental Protection Act, 1997. For implementation of PEPA, 1997, the powers have been delegated to provincial environmental protection agencies for review, approval and monitoring of environmental assessment of projects. For this proposed project, the Pak-EPA will be responsible for reviewing the EIA report, issuing environmental approval and post approval monitoring of the proposed project activities to ensure compliance with the Environmental Management Plan (EMP) and any other condition of the environmental approval.

2.5.3 Khyber Pakhtunkhwa Forest Department

77. The Project implementation will involve clearing of vegetation and trees within the Right of Way (ROW). The Project contractors will be responsible for acquiring a “No-Objection Certificate (NOC)” from the Khyber Pakhtunkhwa Forest Department on the basis of the approved EIA. The application for an NOC will need to be endorsed by the NHA. Tree avenue plantation will be carried out by the NHA itself or through work awarded to Khyber Pakhtunkhwa Forest Department. NHA will also be responsible for liaising with Khyber Pakhtunkhwa Forest Department on the types of trees to be planted and other matters concerning plantation layout as an environmental mitigation measure.

2.5.4 Khyber Pakhtunkhwa Wildlife Department

78. Khyber-Pakhtunkhwa Wildlife Department controls the district wildlife through District Officers Wildlife DO (W). According to wildlife department setup, this project comes under the jurisdiction of DO (W) of Peshawar.

79. There is no wildlife sanctuary/ Game Reserve present in the project area. Wildlife related issues if arised during any stage of the Project, the contractor/ proponent will resolve it with the consultation of respective nearest wildlife office.

2.5.5 Khyber Pakhtunkhwa Revenue Department

80. Under the national law, matters relating to land use and ownership are Provincial subjects, and the revenue department of the Province is empowered to carry out the acquisition of private land or built-up property for public purposes, including on behalf of another Provincial or Federal Agency. For this purpose, the lead department must lodge an application with the Khyber Pakhtunkhwa Government to depute a Land Acquisition Collector (LAC) and other revenue staff who will be responsible for handling matters related to land acquisition and the disbursement of compensation.

81. NHA will provide logistical support and assist in preparing the documents necessary for notification. It will also require to liaison with the Departments of Agriculture, Forestry and Horticulture Development Board in order to evaluate affected fruit and vegetation resources, such as trees, crops and orchids, etc., for compensation purposes. Where public buildings/infrastructure is concerned, NHA will approach those departments that own the building or infrastructure before removing or relocating the facilities.

2.5.6 District Environment Offices

82. Environment Protection Department in Khyber-Pakhtunkhuwa has been developed with the promulgation of Khyber Pakhtunkhwa Local Government Ordinance, 2001. Under this ordinance, District Environment Offices have also been established to perform the following functions:

- To regulate motor vehicles subject to the provisions of the Pakistan Environmental Protection Act, 1997 and the rules and regulations made there-under;
- To ensure, guidance and assistance to the proponents of new Projects in submission of Initial Environmental Examination (IEE)/ Environmental Impact Assessment (EIA) to the Director General, EPA for approval;
- To ensure implementation of environmental protection and preservation measures in all development Projects at the district level and to sensitize government agencies on environmental issues;
- To identify the needs for legislation in various sectors of the environmental matters;
- To provide information and guidance to the public on environment;
- To encourage the formation and working of Non-Governmental Organizations (NGOs), to prevent and combat pollution and promote sustainable development; and
- To undertake regular monitoring of Projects and to submit progress reports to the DG, EPA for publication in the Annual Report.

2.5.7 Non-Governmental Organizations (NGOs)

83. NGOs play pivotal role in mobilizing and enlisting public participation in development projects. The local/Society Based Organizations namely “Sarhad Rural Support Programme (SRSP)”, “Pakistan Poverty Alleviation Fund (PPAF)”, “Forest Conservation Committee (FCC)”, etc., are already working in Hasanabdal-Havelian-Mansehra Region in different sectors. These organizations can be instrumental in advocating the proposed project, organizing the community, negotiating the compensation packages, imparting skills training etc., at different stages of the proposed Project.

SECTION - 3

DESCRIPTION OF THE PROJECT

3.0 General

84 The proposed Hassanabdal – Havelian Road Project is a phase-I of Hasanabdal – Mansehra Motorway Project. The Phase-I is divided into three packages. The existing Hasanabdal - Mansehra (Hasanabdal - Havelian Section) Road is a 2-Lane single carriageway road with a width of 7.3 meters. Due to the increase in traffic load on the existing road (N-35) and its strategic importance, it's up gradation and other alternatives were considered to overcome the traffic congestions and provide smooth traffic flow. After evaluation of all the considered alternatives, a new Motorway from Hasanabdal to Havelian has been proposed. The main objective of this Motorway is to provide a safe and high speed facility to commuters of the project area as well as to tourists. The construction of this Motorway will provide strategic link, and will also boost the economic activities and trade with China.

3.1 Objectives of the Proposed Project

85 The proposed Project will greatly benefit the road users by reduction in the vehicle operating cost due to less traffic congestion, better pavement surface and improved geometry. Time delays and accidents will also be reduced. Besides vehicle operating cost, there are numerous unquantifiable benefits such as improved environment, better communication, enhanced economic activities and less driving stress etc. The implementation of the Project is envisaged to have the following objectives:

- To provide a safe, congestion free and high speed facility to the commuters of the project area and tourists;
- To provide a trade link between Pakistan and China;
- To provide a safe and more efficient passage to Karakorum Highway, Northern Areas and China;
- To reduce the traffic loads on KKH;

- It will also contribute towards the promotion of industry and other infrastructure;
- To provide job opportunities to locals; and
- To improve linkages of Khyber Pakhtunkhwa to the Provincial and National Highways.

3.2 Location of the Project Area

86 The proposed alignment of E-35 Project (Hasanabdal - Havelian Section) starts from M-1 Motorway (Peshawar-Islamabad) 2~3 Km after Burhan Interchange. It curves away to North-West of existing N-35 passing near Shin Gali and then curves back passing near Kuldarra, Chhaprian and Kalu Pind. It crosses existing N-35 at Jari Kas. From here, it curves away to North-East of existing N-35 crossing Hattar and Khanpur Roads at Kot Najeebullah and Chachian respectively. The alignment ends at the Havelian near the Dor River Bridge at existing highway N-35. The Length of the proposed E-35 alignment (Hasanabdal - Havelian Section) is 59.1 Kms. **Figure 3.1** shows the alignment of the proposed Project. The main access roads to the project area are KKH, Hattar Road, Ghazi Road and Khan Pur dam Road.

87 Cities, towns and major settlements falling in the vicinity of the project area are Shin Gali, Jabbar, Kuldarra, Chhaprian, Padra Moria, Kalu Pind, Jari Kas, Hattar, Kot Najibullah, Chachian, Rehana, Sarai Saleh, Noshera, Changi Bhandi and Havelian.

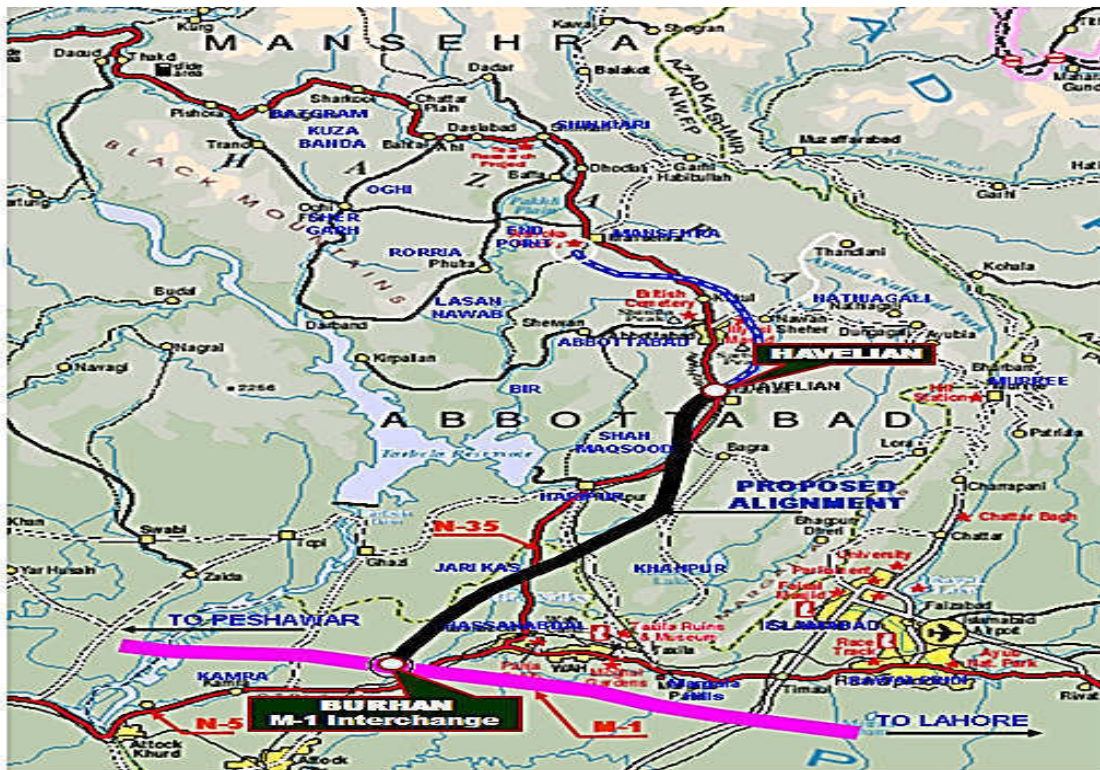


Fig 3.1

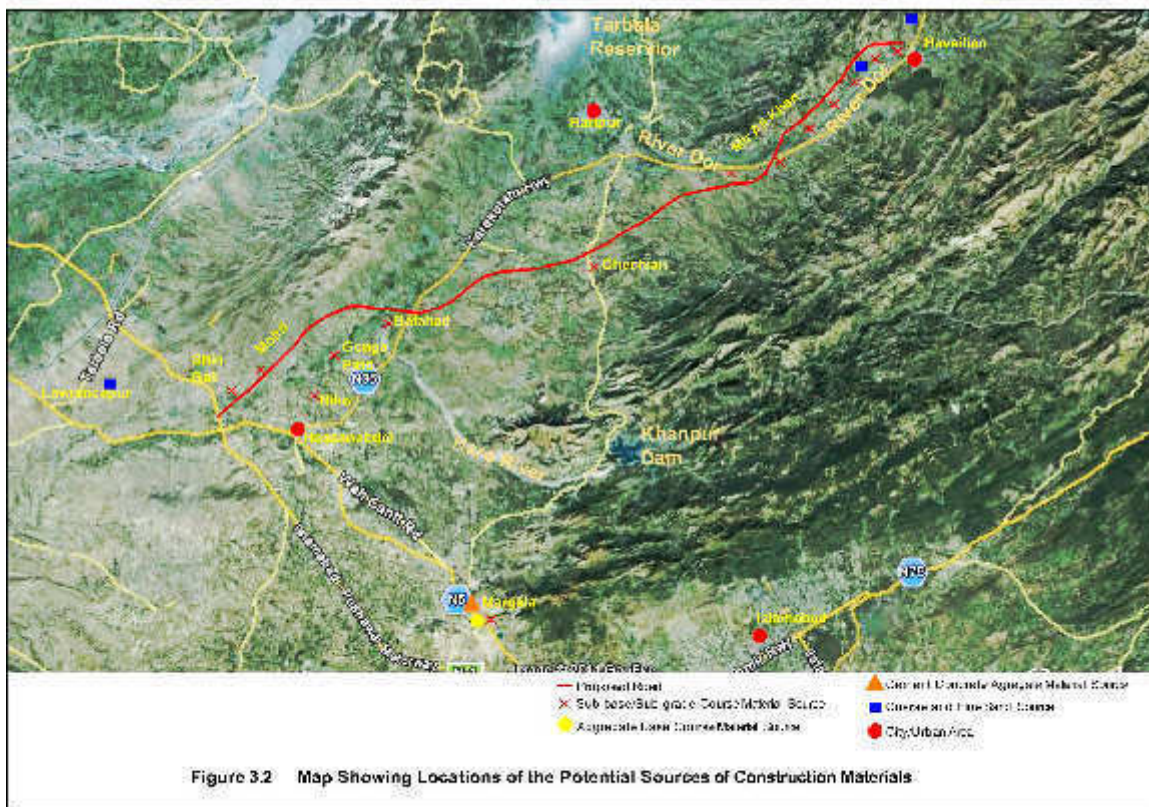


Figure 3.2 Map Showing Locations of the Potential Sources of Construction Materials

3.3 Project Administrative Jurisdiction

88 The starting point of the project alignment lies in Punjab Province but majority of the portion passes in Khyber Pakhtunkhwa Province. However, the proposed Hasanabdal-Havelian Section falls under the administrative jurisdiction of Attock, Haripur and Abbottabad Districts.

3.4 Project Implementation Schedule

89 The implementation on the project is already under progress since March 2015 for first two packages and third package has just started in December 2015. This 06 lane facility will be completed in a period of 30 months.

3.5 Cost of the Project

90 The total cost of the proposed Project is estimated to be Rs. 34,365 Million (Package I, II & III) for the construction of six lane Motorway (Four lane Expressway is converted into Six lane Motorway) from Hasanabdal to Havelian 3-Lane Dual Carriageway.

3.6 Components of the Project

91 The proposed Project (Hasanabdal - Havelian Section) of E-35 is Phase-I of Hasanabdal - Mansehra Project. The proposed Project is designed for 120 km/hr speed facility. The civil works will involve construction of six lanes, fence, grade-separated interchanges, under passes, toll plazas, rest/service areas, flyovers etc.

92 The proposed Project (59.1 km) is envisaged to be implemented in three packages presented in **Table 3.1** as follows:

Table 3.1: Main Components of the Project

Sr. No.	Packages	Start Point (km)	End Point (km)	Length (km)
1	Package-I	Burhan Interchange (00+00)	Kot Najibullah (20+300)	20.3
2	Package-II	Kot Najibullah (20+300)	Rehana Road near Sarai Saleh (40+000)	19.7
3	Package-III	Sarai Saleh (40+000)	Havelian (59+100)	19.1
Total Length (km)				59.1

93 The details of three packages of the project area is described as under;

a) Package - I

94 New road alignment under package – I with total length of 20.3 Km, starts from Burhan Interchange and after crossing the existing N-35 road near Jari Kas (18+000km); it ends near Kot Najibullah at 20+300 km. The road passes mainly through the agricultural land in the rolling terrain. Following are the numbers of structures proposed in this package:

No. of Interchanges : 2
 No. of Culverts : 60
 No. of Bridges : 11
 No. of Underpasses : 15
 No. of Flyover : 5

b) Package – II

95 New road alignment under package – II with total length of 19.1 Km, starts from Kot Najibullah and after crossing Hattar Road (24+400 km) and Haripur – Khanpur Road (29+200 km), finally ends at Rehana Road near Sarai

Saleh at 40+000 km. Following are the numbers of structures proposed in this package:

No. of Culverts	:	37
No. of Bridges	:	7
No. of Underpasses	:	8
No. of Flyovers	:	6

c) Package - III

96 This package of the proposed road alignment starts from the end point of package – II near Sarai Saleh. It crosses Dor River near Shah Maqsood Village (42+000 km). Rest of the stretch of the road runs along the Dor River and finally ends near Havelian at 59+100 km.

No. of Culverts	:	57
No. of Bridges	:	13
No. of Underpasses	:	8
No. of Flyovers	:	2

3.7 Geometric Design of the Proposed Road Project

97 The geometric design of the proposed road Project is governed by AASHTO Criteria. E-35 Motorway (Hasanabdal - Havelian Section) shall be a limited access facility and shall conform to the following specifications:

Design speed	:	120 Km/hr.
Road width (Travel Lanes)	:	Six Lanes (Each lane of 3.5 m width).
Shoulders (treated)		
Inner shoulder width	:	1.0 meters
Outer shoulder width	:	2.5 meters
Double face median barrier	:	0.6 meters
Minimum radius of horizontal		

Curve	:	755 meters
Maximum super elevation	:	6 %
Maximum gradient	:	6 %
Embankment side slopes	:	1:2
Cross slopes travelled way	:	2 %
Proposed right of way	:	80 m

3.8 Civil Works

98 Details of the civil works and their scope are given below:

a) Pavement Design:

Design Life	:	10 Years
Cumulative Equivalent Standard Axle Load (ESAL):		38 million

(The above calculations are based on the assumption that maximum individual axle load shall be limited to 12 ton (maximum) by means of monitoring and enforcement.)

b) Pavement Thickness:

99 The recommended pavement thickness for the Motorway is given below:

Main Road

- Asphaltic Wearing Course: 50 mm
- Asphaltic Base Course: 160 /140 mm
- Aggregate Base Course: 150 mm
- Aggregate Sub-base: 100 mm

Shoulder (both Sides)

- Aggregate Base Course 150 mm
- Sub-base Course 300 mm

Service Road (both Sides) Earthen

100 Typical cross sections of the road are given below as Fig 3.2a , 3.2b & 3.3c for cut and fill locations:

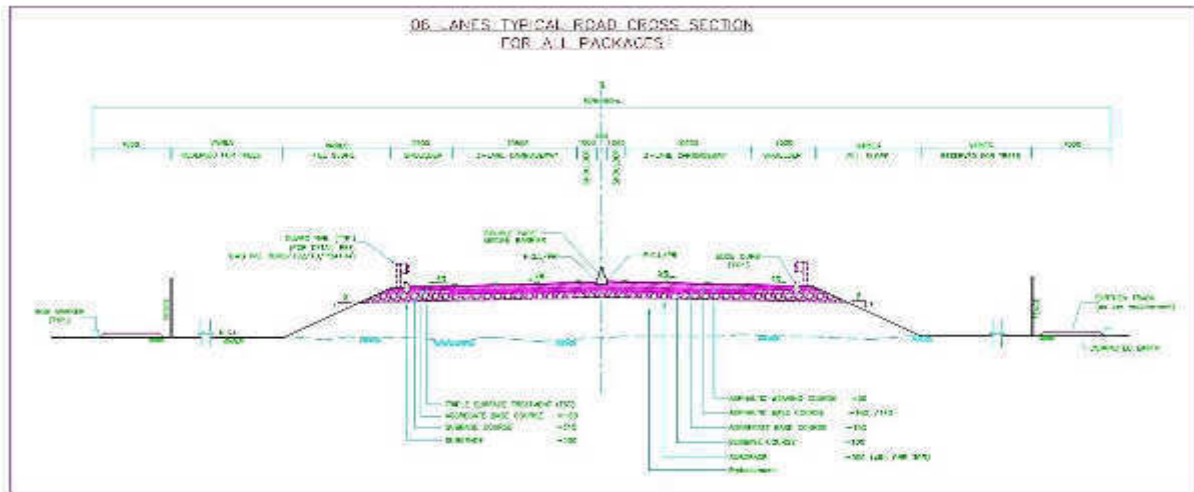


Fig 3.2a

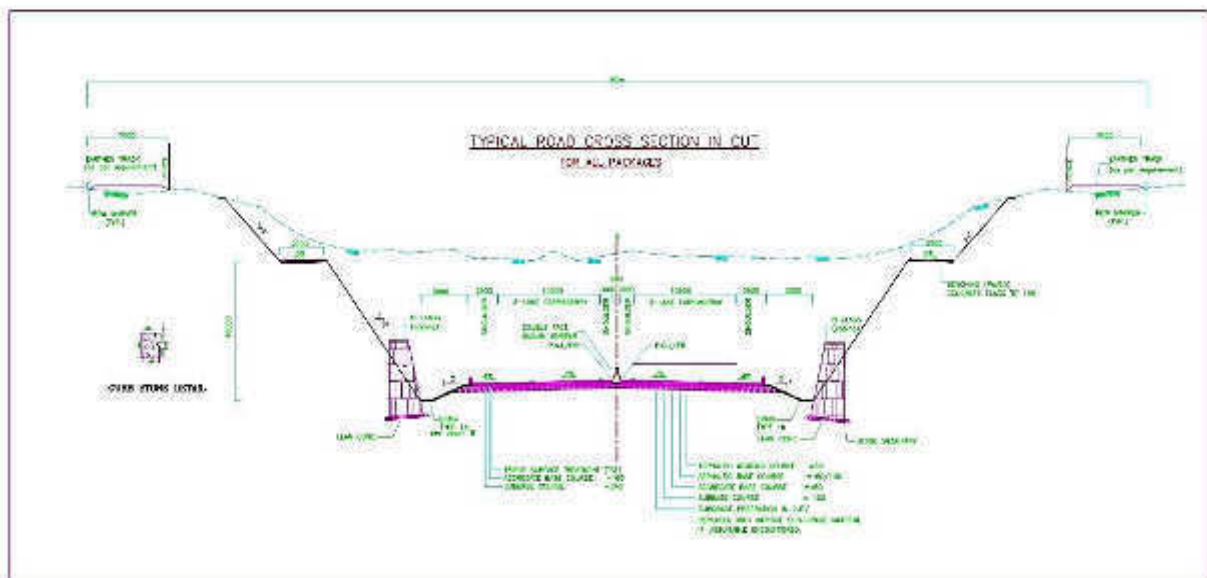
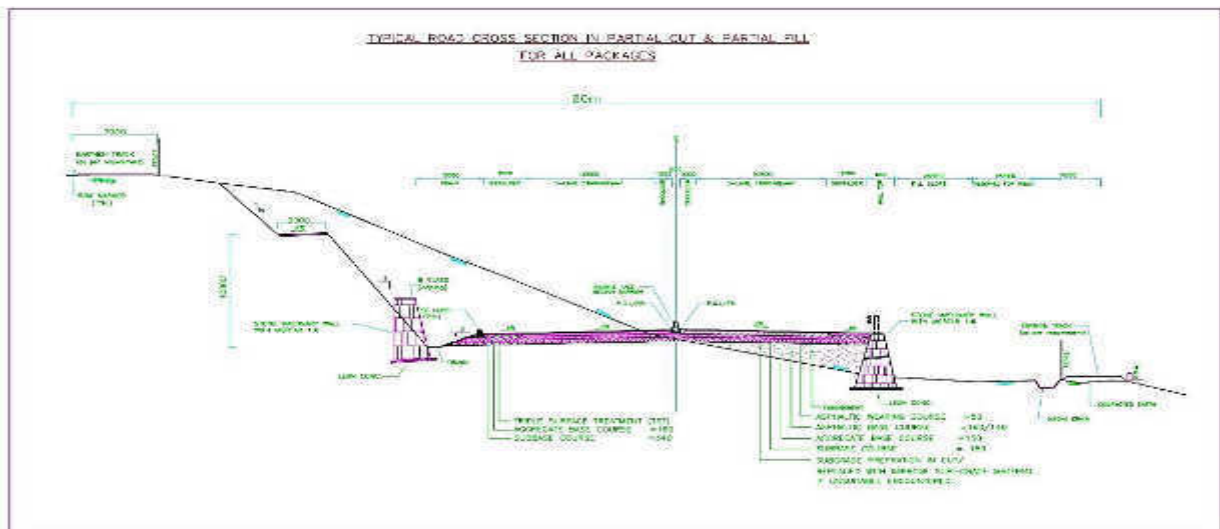


Fig 3.2b**Fig 3.2c**

3.9 Traffic Forecast

101 Traffic forecast has been carried out by NESPAK for the three packages. The details of the traffic projections for all the packages are given as under:

3.9.1 Traffic Projection for Package- I, II& III

102 The traffic projection for the three packages is carried out on the following basis and summarized as under:

- i. 24-hours Manual Classified Counts (MCC) at four locations
- ii. Origin and Destination Survey (OD) at Five Locations
- iii. Determination of Average Daily Traffic based on the following:
 - a) Averaging of the four day traffic counts.
 - b) Adoption of the Weekday Multiplying Factors from four day traffic count.
- iv. Determination of diverted traffic from Origin and Destination Survey.
- v. Adoption of traffic growth rates from NWFP Development Statistics.
- vi. Traffic forecasts have been made for 24 years' (2009-2033) period by using the growth rates based on the following macro as well as regional level factors affecting traffic growth:

- a. Growth of registered vehicles in Pakistan, NWFP, Punjab Province, Haripur, Abbottabad, and Attock District. It also includes China Pakistan Economic corridor traffic being part of CPEC.
- b. Rate of increase in fuel consumption by the transport sector in Pakistan.
- c. Trend in growth in GDP.

The traffic projection for three sections of Northern Motorway is summarized as under:

**Average Annual Daily Traffic on Section-1
(M-1 Interchange-Jari Kas Interchange)**

Year	Cars / Jeeps	Pajero / Suzuki Pick-ups	Wagons	Mini Buses / Coasters	Buses	Loader/Pickups	Trucks 2-Axle	Truck 3-Axle	Truck 4-axle	Truck 5-Axle & Above	AADT
2013	10719	2921	2526	814	690	1709	2245	740	256	84	22,704
2018	12004	3271	2892	932	790	1919	2552	832	287	94	25,544
2023	13233	3606	3251	1048	889	2129	2803	924	319	104	28,307
2028	14418	3929	3607	1163	986	2339	3087	1018	352	115	31,014
2032	15571	4244	3959	1276	1082	2545	3375	1113	384	126	33,675

**Average Annual Daily Traffic on Section-2
(Jari Kas Interchange-Hattar Rd Interchange)**

Year	Cars / Jeeps	Pajero / Suzuki Pick-ups	Wagons	Mini Buses / Coasters	Buses	Loader/Pickups	Trucks 2-Axle	Truck 3-Axle	Truck 4-axle	Truck 5-Axle & Above	AADT
2013	10628	2922	2448	789	659	1715	2319	771	265	85	22,600
2018	11901	3272	2802	903	755	1927	2606	866	297	96	25,425
2023	13121	3607	3150	1015	849	2137	2896	963	330	106	28,174
2028	14296	3930	3495	1126	942	2348	3189	1060	364	117	30,868
2032	15439	4244	3837	1236	1034	2555	3487	1159	398	128	33,515

**Average Annual Daily Traffic on Section-3
(Hattar Rd Interchange-Khanpur Rd Interchange)**

Year	Cars / Jeeps	Pajero / Suzuki Pick-ups	Wagons	Mini Buses / Coasters	Buses	Loader/Pickups	Trucks 2-Axle	Truck 3-Axle	Truck 4-axle	Truck5-Axle&Above	AADT
2013	11249	3171	2613	888	738	1794	2344	768	266	87	24,099
2018	12799	3552	2991	1016	845	2015	2634	863	299	98	271,112
2023	14111	3915	3362	1142	950	2236	2927	959	332	109	30,043
2028	15374	4266	3731	1267	1054	2457	3223	1057	365	120	32,914
2032	16603	4607	4095	1391	1156	2673	3524	1155	399	131	35,736

**Average Annual Daily Traffic on Section-4
(Khanpur Rd Interchange-Endpoint)**

Year	Cars / Jeeps	Pajero / Suzuki Pick-ups	Wagons	Mini Buses / Coasters	Buses	Loader/Pickups	Trucks 2-Axle	Truck 3-Axle	Truck 4-axle	Truck5-Axle&Above	AADT
2013	12050	3445	2702	907	750	1873	2433	797	275	90	25,323
2018	13495	3858	3093	1038	858	2104	2734	895	309	102	28,487
2023	14877	4254	3478	1167	965	2335	3038	995	344	113	31,564
2028	16209	4634	3859	1295	1071	2565	3346	1096	378	124	34,577
2032	17505	5005	4235	1421	1175	2791	3658	1198	414	136	37,538

NATIONAL HIGHWAY AUTHORITY**Hasanabdal-Havelian Expressway****Traffic Likely to Divert to Hasanabdal-Havelian Section****Table - 3**

Vehicles	Diverted Traffic on each Section (Through + Sectional Traffic)			
	Section-1	Section-2	Section-3	Section-4
Animal Drawn	0	0	0	0
Bicycle	0	0	0	0
Motorcycles	0	0	0	0
Rickshaws	0	0	0	0
Cars / Jeep / Taxi	8742	8668	9322	9828
Pajero / Suzuki Pick-up	2383	2383	2587	2810
Hiace Wagon	2029	1967	2099	2171
Mini Bus	654	634	713	729
Bus	555	530	593	602
Loader Pick-up	1363	1368	1431	1494
Tractor / Trolley	0	0	0	0
Truck 2-XL	1839	1900	1921	1994
Truck 3-XL	607	632	630	653
Truck 4-XL	210	217	218	226
Truck 5-XL & Above	68	70	71	74
Total	18150	18367	19584	20580

NATIONAL HIGHWAY AUTHORITY**Hasanabdal-Havelian Expressway****PERCENTAGE****Traffic Likely to Divert From Different Counts****Table - 1**

Road	N-35	N-35	HATTAR ROAD	KHANPUR ROAD
Location	JARI KAS	SARAI SALEH	HATTAR CHOWK	JAIL CHOWK
Serial No	1	2	3	4
Motorized				
Animal Drawn	0%	0%	0%	0%
Bicycle	0%	0%	0%	0%
Motorcycles	0%	0%	0%	0%
Rickshaws	0%	0%	0%	0%
Cars / Jeep / Taxi	47%	52%	43%	35%
Pajero / Suzuki Pick-up	47%	52%	43%	35%
Hiace Wagon	65%	43%	51%	17%
Mini Bus	73%	54%	51%	19%
Bus	73%	54%	59%	19%
Loader Pick-up	57%	40%	55%	45%
Tractor / Trolley	0%	0%	0%	0%
Truck 2-XL	67%	43%	55%	45%
Truck 3-XL	67%	43%	55%	45%
Truck 4-XL	67%	43%	55%	45%
Truck 5-XL & Above	67%	43%	55%	45%

NATIONAL HIGHWAY AUTHORITY**Hasanabdal-Havelian Expressway****Generated Traffic Hasanabdal-Havelian Section****Table - 4**

Vehicles	Generated Traffic on each Section			
	Section-1	Section-2	Section-3	Section-4
Animal Drawn	0	0	0	0
Bicycle	0	0	0	0
Motorcycles	0	0	0	0
Rickshaws	0	0	0	0
Cars / Jeep / Taxi	874	867	932	983
Pajero / Suzuki Pick-up	238	238	259	281
Hiace Wagon	203	197	210	217
Mini Bus	65	63	71	73
Bus	55	53	59	60
Loader Pick-up	186	137	143	149
Tractor / Trolley	0	0	0	0
Truck 2-XL	184	190	192	199
Truck 3-XL	61	63	63	65
Truck 4-XL	21	22	22	23
Truck 5-XL & Above	7	7	7	7
Total	1845	1837	1958	2058

NATIONAL HIGHWAY AUTHORITY**Hasanabdal-Havelian Expressway****Total Traffic (Diverted+Generated) Hasanabdal-Havelian Section****Table - 5**

Vehicles	Total Traffic on each Section (Through + Sectional Traffic)			
	Section-1	Section-2	Section-3	Section-4
Animal Drawn	0	0	0	0
Bicycle	0	0	0	0
Motorcycles	0	0	0	0
Rickshaws	0	0	0	0
Cars / Jeep / Taxi	9617	9535	10254	10811
Pajero / Suzuki Pick-up	2621	2621	2845	3091
Hiace Wagon	2232	2163	2309	2388
Mini Bus	720	697	784	801
Bus	610	583	652	663
Loader Pick-up	1499	1505	1574	1643
Tractor / Trolley	0	0	0	0
Truck 2-XL	2023	2090	2113	2193
Truck 3-XL	667	695	693	718
Truck 4-XL	231	239	239	248
Truck 5-XL & Above	75	77	79	82
Total	20295	20204	21542	22638

103 Average Annual Daily Traffic of all interchanges clearly indicate that number of vehicles will increase every year and will result in more road density. The fuel consumption due to reduced traffic speed, traffic jams and accidents will result in the absence of the proposed road project. Therefore, it is imperative to construct the proposed Motorway Project so that the future traffic and road safety problems could be resolved.

3.10 Construction Materials

104 The materials used in construction of this 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 area. The construction material for proposed section of E-35 will be procured from approved quarries and no new quarry will be required by the contractor. The details of the construction material for the proposed Motorway is given as under;

3.10.1 Borrow Soil for Embankment

105 Topography of the project area is plain and hilly Pothowar type which requires cutting and filling. In this area, cutting material can be used for filling purposes where required. However, in soft areas of valleys, borrow soil for road embankment is available.

3.10.2 Borrow Material for Sub Base

106 Suitable Materials for sub base are locally available and hence are economical. Available material may consist of pit run or bed run gravels, sand-gravels mix or soil aggregates. The project is mostly in a rolling terrain and hilly areas. Many seasonal nullahs cross the road alignment. Gravels/Boulders mixed with sandy soil are available from the river bed. This material can be used as sub base after removing the material coarser than 2" size. Also samples were collected from storm water Nullahs (07 in numbers) across the alignment and

then tested in laboratory. Material from storm water nullahs/water ways at Burhan-Jarrikus road taken from 07 points from the depth of 0.00 to 2.0 meter and tested according to the parameters given by NHA1998 edition to use in embankment and sub-grade. The material found suitable to use as sub-base except sieve analysis which is out of limit but Mixture of material from nullahs (80%) and stone dust from Margalla in any economical proportion preferred for use as sub-base because material's deficiency at sieve No.200 improved by adding stone dust from Margalla (20% to 25%) and found that passing NO.200 help for easier compaction at site. Nullahs bed in various villages along the alignment has potential to provide adequate quantity for sub-base.

(i) Crushed Aggregate

107 Proposed road alignment crosses Dor River near Shah Maqsud village. River bed has large boulders/Gravels which can be locally crushed to yield aggregate for road pavement and structures. The crushers are functioning near this river and near Havelian. Crushed stones were tested by the Design Consultant and suggested that this material is suitable for use in road construction, after crushing to the specified size and gradation. Aggregate available from the crusher was also used for "Karakorum Highway (KKH)". A well developed source of crushed aggregate is also available at Sang Jani near Taxila. Several medium size crushers are exploiting these quarries. The quantities available are quite large and mining leases have already been obtained by various parties. **Figure 3.3 (a)** is showing a map of the area from where the construction material may be extracted and **Figure 3.3 (b)** is showing a pictorial view of the area from where the crushed aggregate for the construction of the road will be utilized.

108 It will be ensured that the contractor have or will obtain quarry licenses for supplying all kind of material from nullah bed and quarry areas.

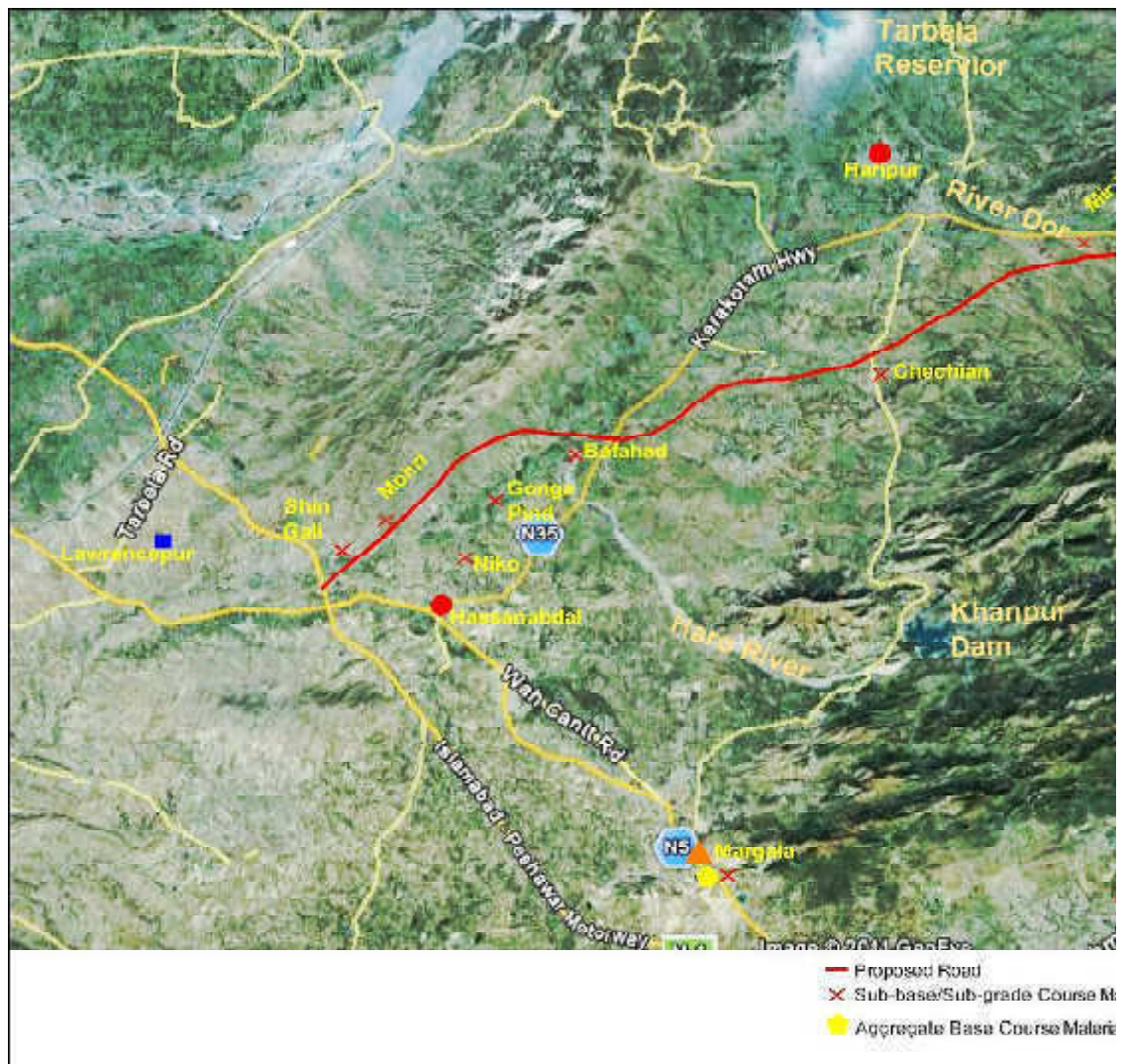


Figure 3.3: Map Showing Locations of Potential Sources of Construction Material



Fig 3.3 b: Location of the Quarry Areas on Peshawar Road near Taxila

(ii) Fine Aggregate (sand) and Sub-grade Material

109 Samples of sand available from Dor River bed were tested by the design consultant for their gradation after removing coarse fraction. Results indicate that it is a medium to coarse sand and meets the gradation requirements of ASTM for concrete. For initial portion of the road, Lawrencepur sand has been recommended. Large quantity of sub-grade (soil) is abundantly available at various locations along the Project alignment. Borrow pits of suitable material at a reasonable reach will be selected.

3.10.3 Water

110 Groundwater is available in the project area. Surface water present in the vicinity is generally of good quality. The laboratory results show that water is suitable for all construction requirements.

3.10.4 Asphalt, Reinforcement and Cement

111 Asphalt, reinforcement and cement will be transported from Khoshab, Rawalpindi, and Islamabad etc. for road construction.

3.11 Construction Camps

112 Camp sites are selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations are selected by the contractor after approval from NHA. Two contractor camps are established in package –I at KM 5+000 and 14+000, while in Package –II established contractor camp is at KM 29+000. In Package-III, Contractor camp is located at Shah Maqsooda at KM 43+000. The area requirement for construction camps is dependent on the deployed manpower and the type and quantity of machinery mobilized. In view of the area required, it is not possible to locate camp sites within the ROW and the contractors have arranged required land on lease from private landowners.

3.12 Manpower Requirements

113 The contractor has mobilized the staff of about 1000 people in all three packages. The manpower required during the construction and operation of the proposed road is presented below:

Manpower Requirement of NHA (for Construction)

Designation	No. of Posts	BPS	Months
Member (Engineer)	1	BS-20/21	39
General Manager (Engineer)	1	BS-20	39
Project Director (Engineer)	1	BS-19	39
Project Coordinator (Engineer)	1	BS-19	39
Deputy Director (Engineer)	1	BS-18	39
Assistant Director (Engineer)	3	BS-17	39

Designation	No. of Posts	BPS	Months
Assistant Director (Environment)	1	BS-17	39
PS	1	BS-17	39
Assist. Computer Programmer	1	BS-16	39
Inspector/ Supervisor Surveyor	4	BS-16	39
PA	1	BS-16	39
Accountant	1	BS-16	39
Superintendent (Admin)	1	BS-16	39
Stenographer	3	BS-15	39
Account Assistant	2	BS-14	39
Computer Operator	3	BS-14	39
Office Assistant	4	BS-14	39
Stenotypist	2	BS-12	39
Qanoongo	2	BS-09	39
UDC	5	BS-09	39
LDC	10	BS-07	39
Patwari	3	BS-05	39
Driver	10	BS-04	39
Naib Qasid	12	BS-01	39
Helper	12	BS-01	39
Chowkidar	8	BS-01	39
Sweeper	3	BS-01	39

114

Manpower Requirement of NHA (Operation/Maintenance of the Motorway)

Sr. No.	Description	BPS	No. of Posts
1.	General Manager (Engineer)	20	1
2.	Director (Engineer)	19	1
3.	Dy. Director (Engr)	18	2
4.	Asst. Director (Engr)	17	3
5.	PA	16	2
6.	Computer Operator	14	3
7.	LDC	9	3
8.	Drivers	4	3
9.	Naib Qasids	5	3
10.	Chowkidars	1	3
Total			24

3.13 Construction Equipment

115 The list of the machinery and the equipment required for the proposed project is provided in **Table 3.7**.

Table 3.7: Machinery and Equipment Requirement for the Proposed Project

Sr. No.	Type of Machinery and Equipment	Sr. No.	Type of Machinery and Equipment
1	Dump Truck	12	Self Propelled Pneumatic Roller
2	Front End Loader	13	Asphalt Distributor
3	Dozer	14	Batching Plant
4	Grader	15	Concrete Transit Truck
5	Vibratory Roller	16	Concrete Pump
6	Water Tankers	17	Excavator
7	Agg. Spreader	18	Water Pumps
8	Three Wheel Rollers	19	Cranes
9	Tandem Roller	20	Vibrators
10	Asphalt Plant	21	Generators
11	Paver		

SECTION - 4

DESCRIPTION OF THE ENVIRONMENT

4.0 General

117. An environmental baseline study is intended to establish a data base against which potential impacts can be predicted and managed later. The EIA of the proposed project (Hasanabdal to Havelian Expressway) covers a comprehensive description of the project area, including regional resources which are expected to be affected by the project, as well as those which are not expected to be directly affected by the construction and operation of the project. The existing environmental conditions around the proposed project have been considered with respect to physical, biological and socio-economic aspects. A site visit was conducted to survey the field area and to collect environmental data on physical, biological and socio-economic parameters. Further, interviews were held with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed project. Various Governmental and “Non-Governmental Organizations (NGOs)” were also visited for the collection of relevant data and recording their views on the proposed project.

4.1 Physical Environment

The areas covered under physical resources are; climate, water resources, topography, seismology, geology and soil conditions. The objective of the study was to establish:

- Baseline conditions of surface and groundwater resources;
- Assess the surface and groundwater quality;
- Soil and geology baseline of the area;
- Impact assessment of the project activities on the physical environment.

The detailed description of physical resources is discussed as under:

4.1.1 Topography and Drainage

The topography of the project area is predominately sub mountainous, eroded by intervening flat valleys, which are fertile and partially irrigated by canals or by lifting groundwater through tube wells. The project area lies in three districts namely Attock, Haripur and Abbottabad. At the start, project area lies in District Attock which is divided into two portions i.e. one to the north and North West of the Kala Chitta range and the other to the south and east of it. The former includes Attock and Hasanabdal tehsils and the latter Fatehjang, Pindigheb and part of Jand Tehsil. The whole District is drained by the Indus, paradoxically; the Indus has no value to the District for irrigation purposes. Two well washed drainage areas exist in the project area. First is Haro drainage system. This watershed starts at Makhad then runs north-east across Pindigheb and Jand tehsils and extends to Fatehjang. The second area, Dor drainage system which is west of Fatehjang and south of the Kala Chitta, drains directly into the Indus. In the middle, project area lies in District Haripur, which is geographically divisible into four regions. The first is Maidan-e-Hazara which consists of plain area of Haripur district surrounded by mountains of Tanawal. The second region Tanawal, which is mainly mountainous, is sub-divided into upper Tanawal and lower Tanawal which lies in the north of Maidan-e-Hazara. The third region is Khanpur Punjkahta which is a well watered plain lying in the south-eastern corner of the Haripur District where the Haro emerges from the Khanpur Hills. The last and fourth region is Chhachh in the west of Haripur city. This entire tract is submerged under the reservoir of Tarbela Dam. The important rivers of the District are Indus, Sirin, Dor and Haro. River Indus enters the District Haripur at Darband in the north-west taking its course along the western boundary of Haripur, makes its exit from the District at Ghazi. Indus River is main source of Terbela Lake. Sirin River being a tributary to Indus River enters the District at Bir and it merges with Tarbela lake in the vicinity of Bir. The Dor River contains much less water and has a shorter and more rapid course than the Sirin River. It originates at the northern end of Daunga Gali range, flows through the plains of District and joins the Sirin near the north-eastern of Gandger range eight (8)

kilometers above Tarbela. It irrigates a large area in District Haripur. The Haro River emanates from the southern end of Daunga Gali range where it has two branches. The eastern known as Dhund and the western is known as Karral Haro. The two streams unite at the head of Khanpur tract and the river after flowing for some distance debauches on the Khanpur Panjkatha. Near Kalu Pind, the Haro River enters in the project area and flows along the Right-of-Way (ROW).

At the end (Havelian), project area lies in District Abbottabad which is dominated by mountains and hills. The mountains of Abbottabad are part of lesser Himalayas. Along the northern boundary of the District, a series of low lying hills form barrier to the Mangal tract in District Mansehra. To the south of these hills, Orash or Resh plains lie with an area of about six (6) square kilometers. Another such tract is Dhan which is an elevated basin enclosed by Nara hills. The important streams of the District are Haro, Dor and Siran. The Haro originates at the southern end of Daunga Gali range and flows through the District as two separate streams towards southwest. The Dor River rises at the northern end of Daunga Gali range and flows in the center of the District in a south western direction. The Siran river enters the District from the north western corner and flows southwards along the western boundary for a short distance and finally leaves the District near Kachi village. These rivers have numerous tributaries, some with permanent flow and other with scanty flow. These tributaries (nullahs) are also used as access road to the hilly terrain where the earthen tracks are not available. **Figure 4.1** shows general topography and seasonal nullahs of the project area.



Fig 4.1: A General View of the Topography and Seasonal Nullahs of the project

area

4.1.2 Geology and Soil

The project area lies in three geological zones along its alignment. At the start near Hasanabdal (District Attock), most part is Pothowar and rocks present under lie are soft grey sand stones and orange to bright red shale's of the siwalik system. In District Haripur, there exhibits a sort of meta-sedimentary rocks of slates, phyllites, phyllitic-slate, quartzite and crystalline limestone. At the end near Abbottabad, the mountains rich in various minerals exist. The major minerals present in the entire stretch of the project area are iron, lead-zinc, manganese, tungsten, bentonite, graphite etc. As a result of substantial rainfall in the project area, soil erosion has been observed as a major problem along the alignment of the proposed expressway. The water percolates inside the land and erodes the soil significantly. The soil in the project area is mostly of alluvial character and

consists of agglomerate of stone fragments, gravel, sand and silty loams. The soil at project area is predominantly of silt. The detailed analysis of soil along proposed project is attached as **Annexure - V**. The general characteristics of soil are shown in **Figure 4.2**.

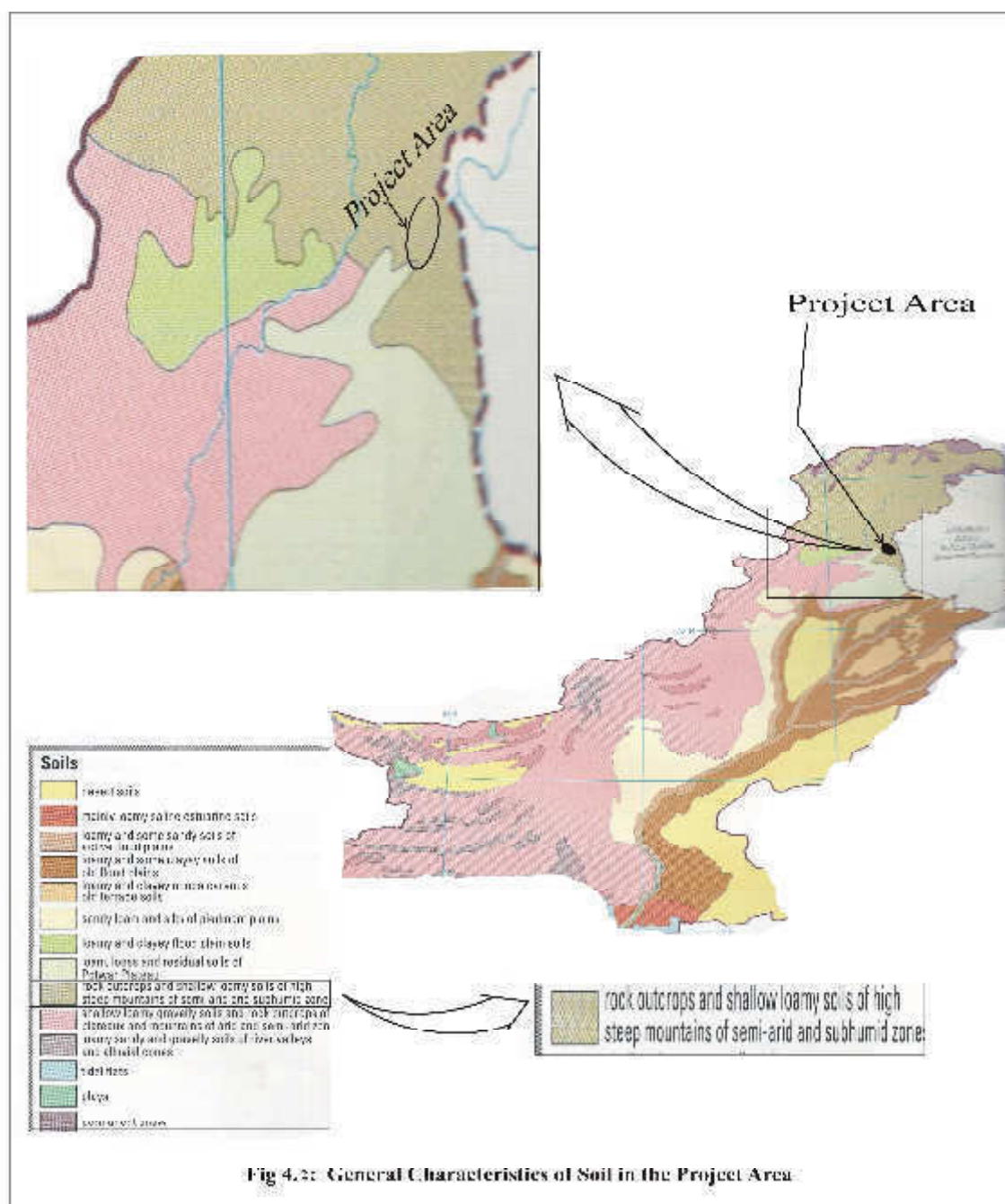


Fig 4.2: General Characteristics of Soil in the Project Area

4.1.3 Climate

The project area falls in three districts namely Attock, Haripur and Abbottabad. As Kakul meteorological station is located close to project area and climatic conditions are quite representative of the project area, therefore, meteorological data of Kakul station has been used in this baseline study. The meteorological data recorded from 1971-2000 at Kakul is presented in **Table 4.1**.

Table 4.1: Meteorological Data Pertaining to Kakul (Climatic Period 1971 – 2000)

Month	Mean Temperature (°C)		Precipitation (millimeters)	Relative Humidity (%)	Wind Speed (knots)
	Max.	Min.			
January	12.2	0.9	73.4	68.6	0.4
February	13.2	2.1	106.7	68.3	0.4
March	17.2	6.0	151.9	65.8	0.4
April	23.4	10.8	112.6	59.8	0.4
May	28.3	14.7	73.8	52.8	0.5
June	31.9	18.6	101.4	52.5	0.4
July	29.1	19.5	263.6	77.7	0.3
August	28.0	18.8	266.5	82.1	0.3
September	27.5	16.0	104.3	71.6	0.2
October	24.7	10.8	53.3	59.2	0.2
November	20.4	6.2	29.3	56.3	0.4
December	15.2	2.6	56.1	62.0	0.4
Annual	22.6	10.6	1392.9	64.7	0.3

Source: Climatic Normal's of Pakistan, Pakistan Meteorological Department, 2005

The above table indicates that project area lies in humid zone and is characterized by high rainfalls, less fluctuation in temperature and relative high humidity. June is the hottest month with mean maximum temperature of 31.9°C and January is the coldest month with mean minimum temperature of 0.9°C.

Wind data for the year 2009 is available on hourly basis and used to draw wind rose by using WR PLOT software and shown in **Figure 4.3**.

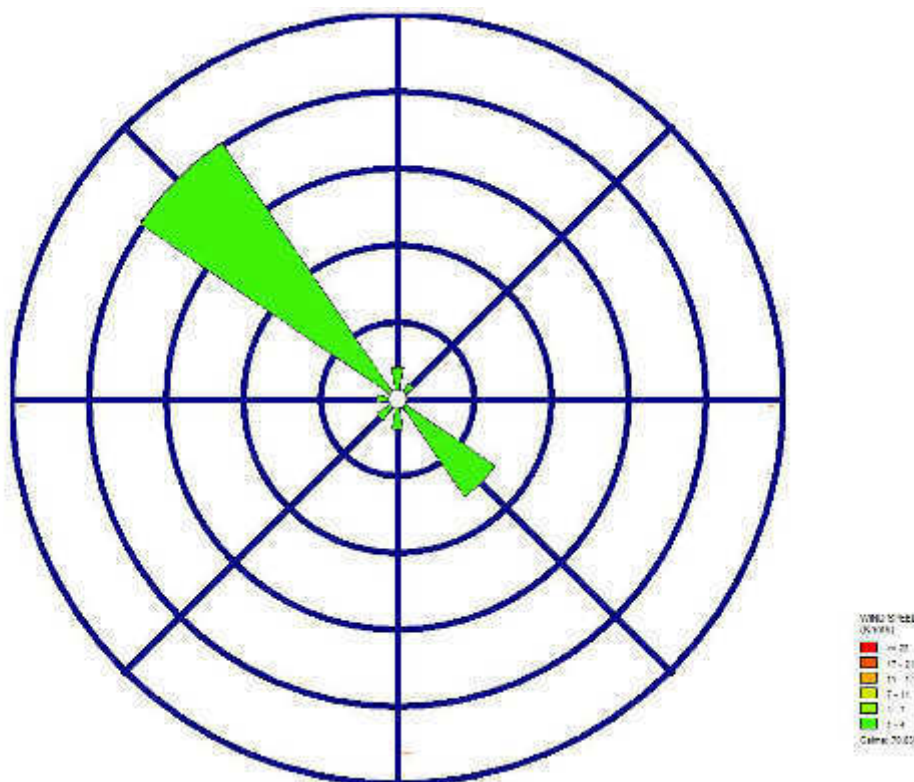


Fig 4.3: Wind Rose for the year 2008 , Kakul Station

The project area has substantial rainfalls. Maximum rainfall occurred in the months of July and August i.e. 263.6 & 266.5 mm, whereas minimum rainfall occurred in the month of November i.e. 29.3 mm. The graphical presentation of temperature, precipitation and humidity of project area are shown in **Figure 4.4 – 4.6** respectively.

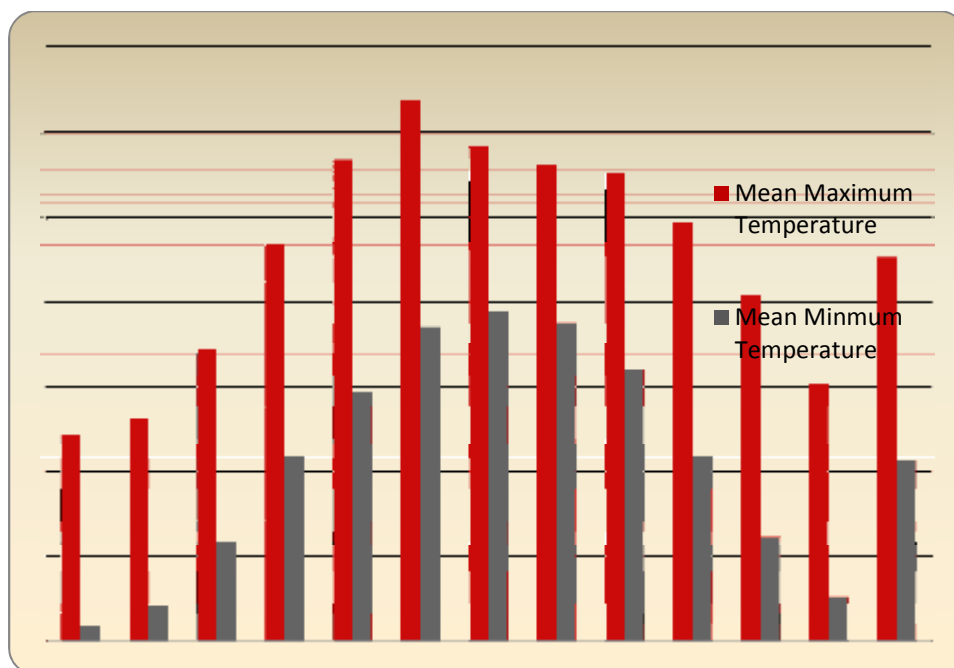


Fig 4.4: Mean Maximum and Mean Minimum Temperature of the Project Area (1971-2000)

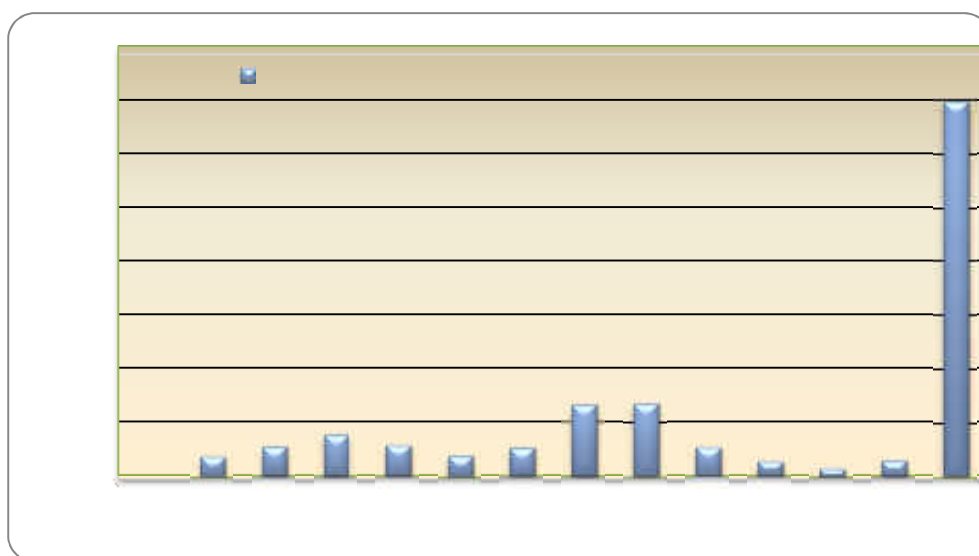


Fig 4.5: Average Rainfall in the Project Area (1971-2000)

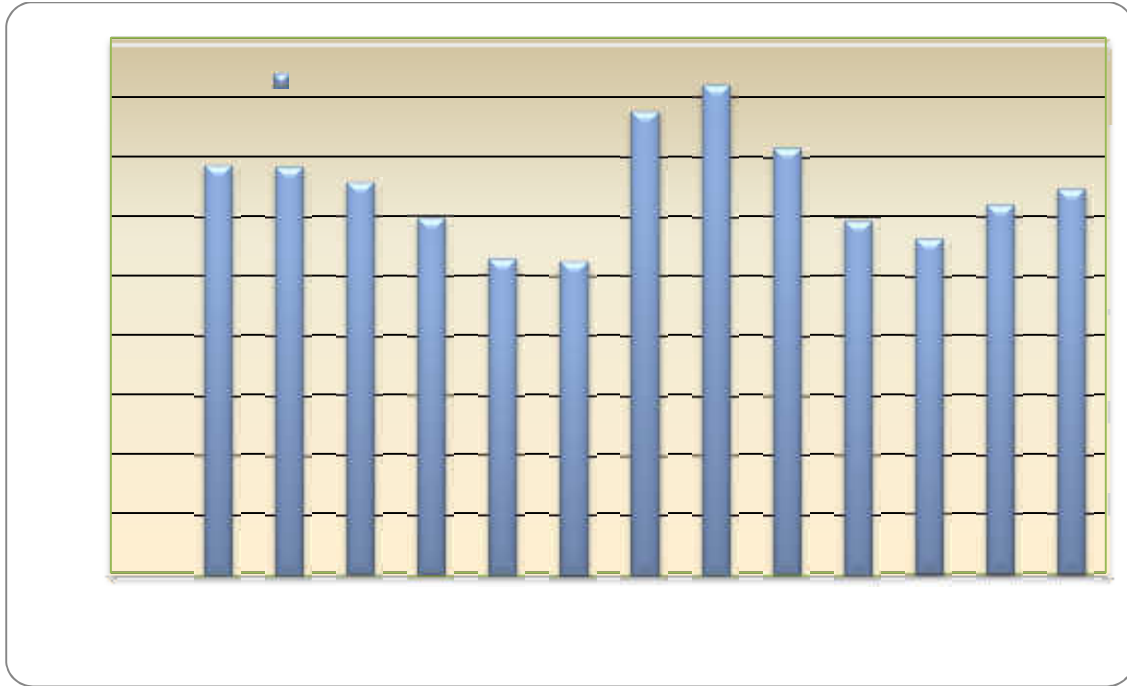


Fig 4.6: Relative Humidity in Project Area (1971-2000)

4.1.4 Air Quality

The ambient air quality monitoring of Carbon Monoxide (CO), Sulfur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Particulate Matter (PM₁₀) was carried out. The sampling was conducted for 24 hours period. Samples were taken at downwind site. **Figure 4.7** shows a view of ambient air quality monitoring in the project area. However, the sampling locations have also been marked on the map as shown in **Figure 4.8**.



Fig 4.7: Ambient Air Quality Monitoring in the Project Area

The monitored data is exhibited in **Annexure - VI**. Air quality is again monitored in year 2015 & monitoring data is exhibited in **Annexure - XI**. The details of results of laboratory analysis of ambient air quality parameters are given in **Table 4.2 (a), (b), (c) & 4.2 (d)**.

Table 4.2 (a): Locations of Ambient Air Quality Samples

Sr. No.	Date	Name of Location	Coordinates
Location 1	02 to 03 April, 2012	Near Govt Girls Primary School, Aamgah	N 33° 54' 24.4"
			E 072° 42' 53.9"
Location 2	03 to 04 April, 2012	Al-Mehria Public School and College, near Dingi	N 33° 54' 42.2"
			E 072° 47' 49.7"
Location 3	04 to 05 April, 2012	Govt. Primary School Rajpur, Distt. Haripur	N 33° 55' 44.1"
			E 072° 53' 53.2"

Table 4.2 (b): Ambient Air Quality Analysis

No. of Location	Parameter	Duration	Result	NEQS
Location 1	CO	24 hours	1.84	5 mg/m ³
	NO _x	24 hours	15.66	80 µg/m ³
	SO _x	24 hours	5.05	120 µg/m ³
	PM ₁₀	24 hours	108.11	250 µg/m ³
Location 2	CO	24 hours	1.84	5 mg/m ³
	NO _x	24 hours	21.36	80 µg/m ³
	SO _x	24 hours	6.05	120 µg/m ³
	PM ₁₀	24 hours	117.84	250 µg/m ³
Location 3	CO	24 hours	1.90	5 mg/m ³
	NO _x	24 hours	11.72	80 µg/m ³
	SO _x	24 hours	4.08	120 µg/m ³
	PM ₁₀	24 hours	101.01	250 µg/m ³

Table 4.2 (C): Locations of Ambient Air Quality Samples (Year-2015)

No. of Location	Date	Name of Location	Packages
Location 1	03-12-2015	E-35 Project Package I	Package I Base Camp 5+260
Location 2	03-12-2015	E-35 Project Package II	Package II Near Batching, Plant RD 28+000

Table 4.2 (d): Ambient Air Quality Analysis (Year-2015)

No. of Location	Parameter	Unit	Result	NEQS
Location 1	PM ₁₀	(ug/m3)	140	150
	NO _{2.5}	(ug/m3)	12	15
	CO	(mg/m3)	1.3	10
	NO _x	(ug/m3)	5.7	80
	SO _x	(ug/m3)	2.4	120
Location 2	PM ₁₀	(ug/m3)	160	150
	NO _{2.5}	(ug/m3)	11.2	15
	CO	(mg/m3)	1.6	10
	NO _x	(ug/m3)	4.1	80
	SO _x	(ug/m3)	3.6	120

Table 4.2 indicates that all the tabulated parameters monitored are well within prescribed permissible limits of NEQS except PM which is little high in year 2015 that is probably due to construction activities. It is therefore recommended that mitigation measure to control dust need to implement in true letter and spirit.

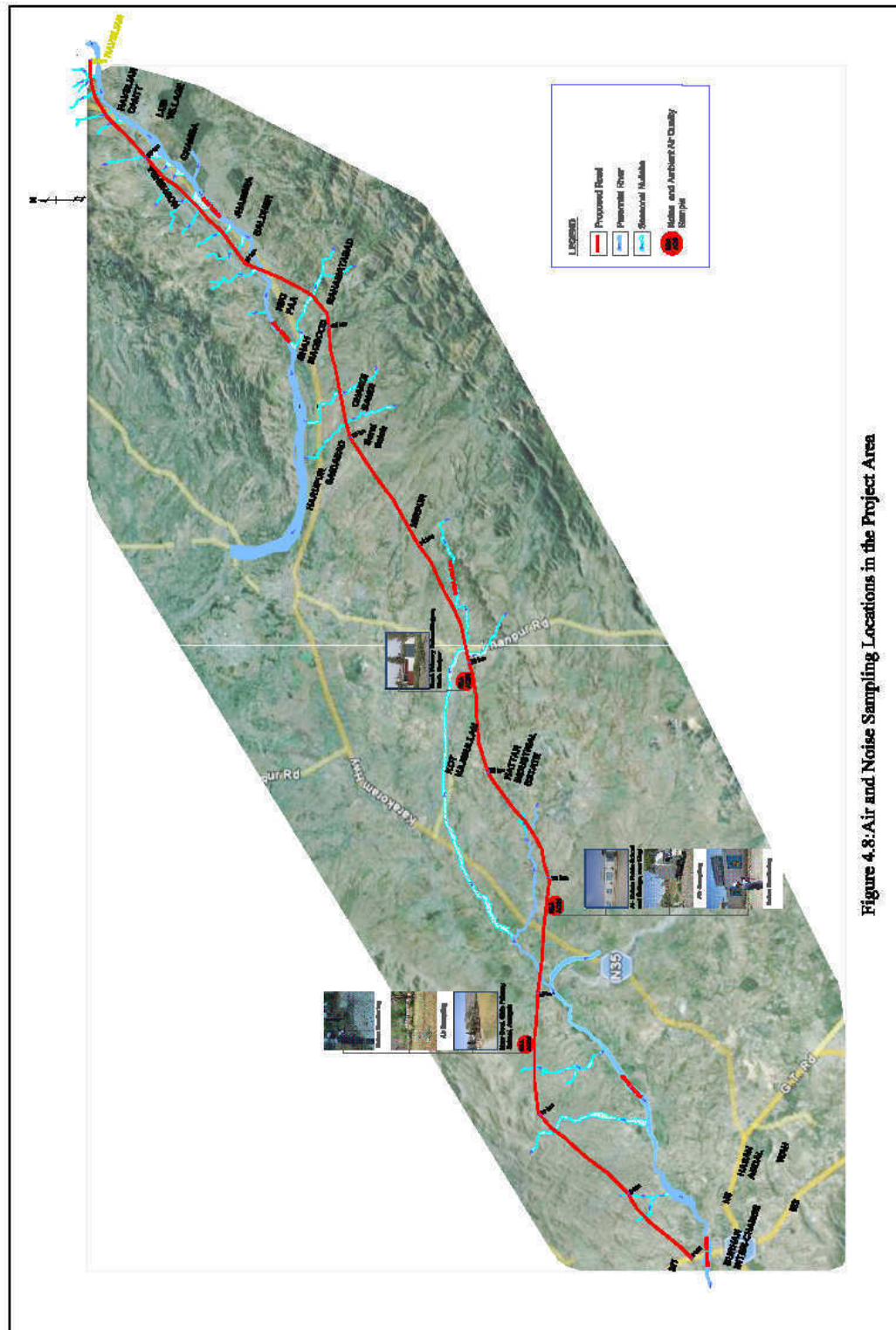


Figure 4.8: Air and Noise Sampling Locations in the Project Area

4.1.5 Noise

Noise along the proposed expressway from Hasanabdal to Havelian Section is not a serious issue as it is a new alignment. Noise levels monitoring was carried out at the same locations where ambient air quality was monitored along the proposed alignment of the expressway. These locations have already been shown in **Figure 4.8**. The monitored data for noise is presented in **Annexure – VI & XI. Table 4.3** indicates that noise level monitored in the April 2012 & December 2015. **Figure 4.9** shows a view of noise level measurement in the project area.

Table 4.3 (a): Noise Levels Monitoring at Various Locations

Sr. No.	Date	Name of Location	Coordinates
Location 1	02 to 03 April, 2012	Near Govt Girls Primary School, Aamgah	N 33° 54' 24.4"
			E 072° 42' 53.9"
Location 2	03 to 04 April, 2012	Al-Mehria Public School and College, near Dingi	N 33° 54' 42.2"
			E 072° 47' 49.7"
Location 3	04 to 05 April, 2012	Govt. Primary School Rajpur, Distt. Haripur	N 33° 55' 44.1"
			E 072° 53' 53.2"

Table 4.3 (b): Noise Levels Monitoring Analysis

Sr. No.	Location	Equivalent Noise Level (L _{eq}) dB(A)		NEQS 2012 Level (L _{eq}) dB(A)	
		Day Time	Night Time	Day Time	Night Time
1	Location 1	55.0	54.5	50	45

2	Location 2	55.6	54.1		
3	Location 3	53.3	51.5		

Table 4.3 (c): Noise Levels Monitoring at Various Locations (2016)

No. of Location	Date	Name of Location	Packages
Location 1	03-12-2015	E-35 Project Package I	Package I Base Camp 5+260
Location 2	03-12-2015	E-35 Project Package II	Package II Near Batching, Plan 28+000

Table 4.3 (d): Noise Levels Monitoring Analysis (2016)

Sr.No		Monitoring point	Min. Noise Level (dB A)	Max. Noise Level (dB A)	Avg. Noise Levels (dB A)	Remarks
1	Package I	Near	71.5	72.6	72.05	All noise levels are found in compliance with permissible limit (85dBA)
2		Near Batching	68.3	69.8	69.05	
3		Near Pile Area	66.1	68.3	67.2	
4		Near Cranes	68.3	71.1	69.7	
5		Near	81.6	84.3	82.9	
6		Near Batching	74.6	75.3	74.9	
7		Near Steel	53.4	56.9	55.1	
8		Near Office	57.9	61.1	59.5	
9		Dump Truck	62.4	63.9	63.2	
10		Near Batching	63.7	65.8	64.7	
1	Package II	Near Batching	62.5	64.6	63.5	
2		Near Site	58.4	61.4	59.6	
3		Near	60.3	65.1	62.7	
4		Foot Sheet	59.4	60.5	59.9	
5		Dump Truck	62.6	64.6	63.6	

The noise monitoring for Location No.1 was conducted Near Government Girls Primary School, Aamgah. The location is surrounded by residential area and a Basic Health Unit also exists in the area. Location No. 2 was selected at Al-Mehria Public School and College, near Dingi The school lies along the N-35 road and the area is surrounded by agricultural fields. Location 3 Government Primary School, Rajpur District Haripur located in medium density residential area. Baseline condition shows that all the three locations, noise levels are higher than NEQS and if mitigation measures are not adopted properly during construction and operation, the impact would be severe especially in the quite areas along the alignment. Noise level monitoring result of year 2016 at construction stage at different noise sources and near sensitive receptors are well within permissible limit. Results verify that noise mitigation measures proposed in EIA are being implemented in true letter and spirit.



Fig 4.9: Noise Level Measurement in Project Area

4.1.6 Surface Water and Groundwater

Two major rivers namely Dor and Haro Rivers flow in the vicinity of the project area. Groundwater is being used for domestic purpose whereas surface water is used for agriculture requirements. The main source of drinking water in the Project area is wells whereas hand pumps are also used at some locations for domestic purpose. **Figure 4.10** shows different sources of surface and groundwater present in the project area. The depth to water table varies between the range of 15 to 60 feet for wells and 200 feet for hand pump. At present, the only source of recharge to groundwater is rainfall, which is about 5 inches per year. In order to evaluate the water quality, the groundwater and surface water

monitoring was carried out in Year 2007 and Year 2010. In Year 2007, the sampling locations were as under:

1. Total Filling Station near Wah Model Town Phase-III, Hasanabdal
2. Near Lub Village
3. Changi Bandi Village

Similarly, in Year 2010, the groundwater and surface water samples were taken from Rahmatabad tubewell and Dor River near Havelian Bridge respectively. Drinking water & surface water monitoring was again carried out in December, 2015 at Package I & II of E-35.



Figure 4.10: A General View of Surface & Groundwater Sources in the Project Area

The water samples were analyzed for chemical and microbiological parameters. The analysis results of groundwater samples are compared with WHO guidelines and that of surface water with NEQS. The detailed monitored results are attached as **Annexure – VI & XI. Table 4.4 (a) & (b)** shows the groundwater analysis and **Table 4.5 (a) & (b)** presents the surface water analysis.

Table 4.4 (a) – Groundwater Analysis of the Project Area

Sr. No.	Parameters	Unit	Locations of Sampling				WHO Guidelines
			Year 2007			Year 2010	
			Wah Model Town Phase-III	Near Lub Village	Changi Bandi Village	Rehmat-abad Tubewell	
A. Chemical Parameters							
1	pH	-	6.99	7.0	6.85	7.10	6.5 -8.5
2	Total Dissolved Solids (TDS)	mg/	664	550	444	322	1000
3	Chloride (Cl)	mg/l	51	14	19	12.67	250
4	Hardness	mg/l	422	378	335	215.33	500
5	Nitrates (NO ₃)	mg/l	ND	ND	ND	25	50
6	Sodium	mg/l	81	20.3	12.7	10.8	200
7	Turbidity	NTU	ND	ND	ND	9.10	5
8	Fluoride (F)	mg/l	0.37	0.42	0.30	-	1.5
9	Nitrites (NO ₂)	mg/l	ND	ND	ND	0.10	3
10	Arsenic (As)	mg/l	ND	ND	ND	0.005	0.01
11	Taste	-	Tasteless	Tasteless	Tasteless	Tasteless	Non Objection-able and Acceptable
12	Color	CU	Colorless	Colorless	Colorless	Colorless	15
13	Odor	NS	Odorless	Odorless	Odorless	Odorless	NS
B. Microbiological Parameters							
1	Total Colony Count	cfu/ml	140/ ml	895/ ml	353/ml	935	<500 cfu/ml
2	Total Coliforms	MPN/100 ml	Absent/100 ml	Absent/ 100 ml	Absent/100 ml	Absent	0/100 ml
3	Faecal Coliforms (E.Coli)	MPN/100 ml	Absent/100 ml	Absent/ 100 ml	Absent/100 ml	Absent	0/100 ml
4	Faecal Streptococci/Enterocci	MPN/100 ml	Absent/100 ml	Absent/ 100 ml	Absent/100 ml	Absent	0/100 ml

* TNTC: Too Numerous to Detect and, ND: Not Detected, CU : Colour units, NS : No Standards

Source: SGS Lab. Test Results, 2007 & 2010

Table 4.4 (b) – Drinking Water Analysis of the Project Area (year 2015)

Sr.No.	Parameters	Unit	Name of Location	Package	WHO maximum allowable guideline	Result
			E-35 Project Package I, Base Camp	Package I 5+260		
	A. Chemical Parameters					
1.	Temperature	oC	--	--	--	20.0
2.	pH	--	--	--	6.5-8.5	8.22
3.	Total Dissolved Solids (TDS)	mg/l	--	--	1000	367
4.	Total Suspended Solids (TSS)	mg/l	--	--	--	21
5.	Chloride	mg/l	--	--	250	65
6.	Fluoride	mg/l	--	--	1.5	0.3
7.	Taste	Object/unobj.	--	--	Unobject.	Unobject.
8.	Odour	Object/unobj.	--	--	Unobject.	Unobject.
9.	Colour	TCU	--	--	15	0
10.	Iron	mg/l	--	--	0.3	0.01
11.	Sodium	mg/l	--	--	200	35
12.	Nitrate (as NO3)	mg/l	--	--	50	1.3
13.	Nitrite (asNO2)	NTU	--	--	3	BDL
14.	Ammonia	mg/l	--	--	1.5	0
15.	Hydrogen Sulphide (H2S)	mg/l	--	--	0.05	BDL
16.	Sulphate	mg/l	--	--	250	65
17.	Lead	mg/l	--	--	0.10	BDL
18.	Total Hardness as CaCO3	mg/l	--	--	500	146
19.	Turbidity	NTU	--	--	5	0
20.	Zinic	mg/l	--	--	3	0.2
21.	Mangancse	mg/l	--	--	0.1	BDL
22.	Benzene	mg/l	--	--	10.120	BDL
23.	Aluminum	mg/l	--	--	0.2	BDL
24.	Molybdenum	mg/l	--	--	0.070	BDL
25.	Chromium	mg/l	--	--	0.050	0.01
26.	Cadmium	mg/l	--	--	0.003	BDL
27.	Born	mg/l	--	--	0.300	BDL
28.	Barium	mg/l	--	--	0.005	BDL
29.	Antimony	mg/l	--	--	0.700	BDL
30.	Arsenic	mg/l	--	--	0.005	BDL
31.	Cyanide	mg/l	--	--	0.010	BDL
32.	Mercury	mg/l	--	--	0.070	BDL
33.	Nickel	mg/l	--	--	0.020	BDL
34.	Total Coliform	Number/100ml	--	--	0/100ml	0
35.	E.Coli	Number/100ml	--	--	0/100ml	0

Table 4.4 indicates that all tabulated parameters monitored in Year 2010 & year 2015 are within prescribed limits of WHO Guidelines except turbidity and Total Colony Count which indicates that water is contaminated and unfit for human consumption. Similarly, for Year 2007, the above table indicates that Total

Colony Count in the groundwater sample taken from Lub Village exceeds the WHO Guideline value which indicates that water is not suitable for drinking purpose. However, groundwater samples taken from Wah Model Town, Phase-III, Hasanabdal and Changi Bandi Village are suitable for drinking purpose as all of its parameters have values within the limits of WHO Guidelines.

Table 4.5 presents sources of surface water sample and the water quality testing results. These values will serve as baseline to compare water quality conditions during the construction and the operation stages of the proposed project.

Table 4.5 (a) Surface Water Analysis of the Project Area

Sr.No.	Parameters	Unit	Locations of Sampling		NEQS
			2007	2010	
			Bahaywala Soka Nullah	Dor River near Havelian Bridge	
A. Chemical Parameters					
1	pH	-	7.47	7.75	6-9
2	Biochemical Oxygen Demand (BOD ₅)	mg/l	7	29	80
3	Chemical Oxygen Demand (COD)	mg/l	16	-	150
4	Total Suspended Solids (TSS)	mg/l	ND	767	200
5	Chloride (Cl)	mg/l	12.5	12.90	1000
6	Fluoride (F)	mg/l	0.31	0.17	10
7	Dissolved Oxygen (DO)	mg/l	6.8	6.80	-
8	Conductivity	μS	536	394	-
9	Nitrates (NO ₃)	mg/l	ND	19	-
10	Nitrites (NO ₂)	mg/l	ND	0.01	-
11	Sodium	mg/l	14.9	8.2	-
12	Total Alkalinity	mg/l	145	136.72	-
13	Turbidity	NTU	ND	582	-
14	Total Hardness as CaCO ₃	mg/l	228	194.29	-
B. Microbiological Parameters					
1	Total Colony Count	cfu/ml	TNTC/ml	TNTC	<500 cfu/ml
2	Total Coli Forms	MPN/100 ml	Absent/100ml	27	0/100 ml
3	Faecal Coliforms (E.Coli)	MPN/100 ml	Absent/100ml	11	0/100 ml

4	Faecal Streptococci/Enterococci	MPN/100 ml	Absent/100ml	Absent	0/100 ml
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* TNTC: Too Numerous to Detect and, ND: Not Detected, cfu: Colony Forming Unit, -: Not defined,

LDL: Lowest Detection Limit

Source: SGS Lab. Test Results, 2007 & 2010

Table 4.5 (b) Surface Water Analysis of the Project Area

Sr.No.	Parameters	Unit	E-35 Project Package II 26+823	WHO maximum allowable guideline value
			Result	
	A. Chemical Parameters			
1.	Temperature	oC	26	---
2.	pH	---	7.6	6.5-8.5
3.	Total Dissolved Solid5 (TDS)	mg/l	3789	1000
4.	Total Suspended Solids (TSS)	mg/l	136	--
5.	Chloride	mg/l	550	250
6.	Fluoride	mg/l	1.09	1.5
7.	Iron	mg/l	1.3	0.3
8.	Ammonia	mg/l	10	1.5
9.	Cadmium	NTU	BDL	0.003
10.	Lead	mg/l	0.03	0.10
11.	Arsenic	mg/l	0.04	0.07
12.	Copper	mg/l	0.63	--
13.	Barium	mg/l	BDL	0.005
14.	Selenium	mg/l	BDL	--
15.	Silver	mg/l	BDL	--
16.	Pesticides	mg/l	BDL	--
17.	Manganese	mg/l	BDL	0.1

The above table shows that all the tabulated parameters monitored in Year 2007 are within prescribed limits of NEQS which indicates good quality surface water for agriculture use. However, for the Year 2010, sample taken Dor River near Havelian bridge indicates the presence of Total Suspended Solids (TSS), Total Coliforms and Faecal Coliforms showing the bacteriological contamination in surface water. Monitoring results of year 2015 show high value of Ammonia, Chloride and total dissolved solids.

4.1.7 Hydrology

The major rivers flowing in the vicinity of project area are Dor and Haro. The Dor River originates at the northern end of Daunga Gali range, flows through the plains of Haripur and joins the Sirin River near north of Gandger range eight (8) kilometers above Tarbela eastern whereas Haro River emerges from the Khanpur Hills. These rivers are perennial sources of water and have sufficient water due to substantial rainfall in the project area through out the year except during months of November to January (low flow season). The major nullahs / streams in the project area are Rakh Bhallar, Tai Kas, Dotal Kas, Gadawa, etc. The estimated peak flood discharges at various return periods of these nullahs/streams are given in **Table 4.6**.

Table 4.6: Estimated Peak Flood Discharge of Major Nullahs/Streams

Sr. No.	Name of Nullahs/Streams	Estimated Flood Discharge (Cusecs)		
		25 Years	50 Years	100 Years
1	Rakh Bhallar	4,156	4,685	5,213
2	Tabbi Khas	23,058	26,186	29,317
3	Dotal Kas	6,341	7,165	7,987
4	Lonnar Kas/Marorasa Kas	6,491	7,330	8,167
5	Gadawa	8,334	9,419	10,502
6	Seth Kas	2,383	2,688	2,992
7	Chalhra Kas	1,621	1,828	2,035
8	Lahoria Kas	1,107	1,249	1,390

Source: Hydrological study of the project area

4.1.8 Seismicity

According to the seismic zone map of Pakistan, the project area lies in Zone 2B of Modified Mercalli (M.M) intensity scale i.e. upper moderate damage as shown in **Figure 4.11**.

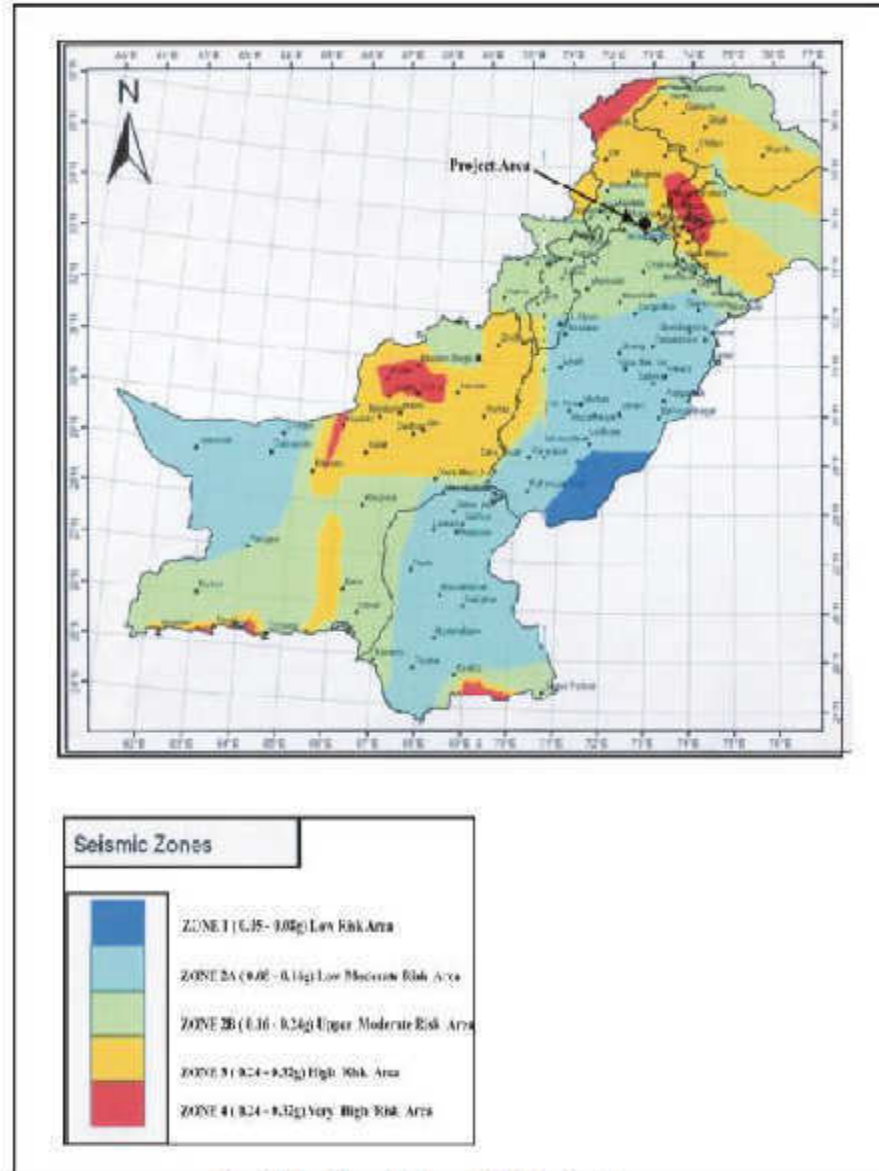


Fig 4.12: Seismic Map of the Project Area

4.1.9 Agriculture and Crop Pattern

Major portion of the tract forming the project area, nearly eighty percent (80%) is under agriculture which is predominantly rainfed (Barani). However, the valley lands which are irrigated by canal water or through tubewells are fertile and productive. A majority of population is linked with agriculture sector, being the most significant economic parameter for their livelihood. The land in the project area is mostly fertile and suitable for the growth of crops, vegetables and fruits. The major Kharif and Rabi crops are maize and wheat. **Table 4.7** shows cropping pattern in Rabi and Kharif season.

Table 4.7: Cropping Pattern in Project Area

Cropping Pattern	
Rabi Season	Kharif Season
Wheat, Barley, Onion, Potato, Garlic	Maize, Jawar, Pulses, Bajra, Rice, Sugarcane, Groundnut

Table 4.8 presents the per acre yield of main crops grown in the project area both in the Rabi and Kharif season. **Figure 4.12** is showing the crop pattern of the project area.

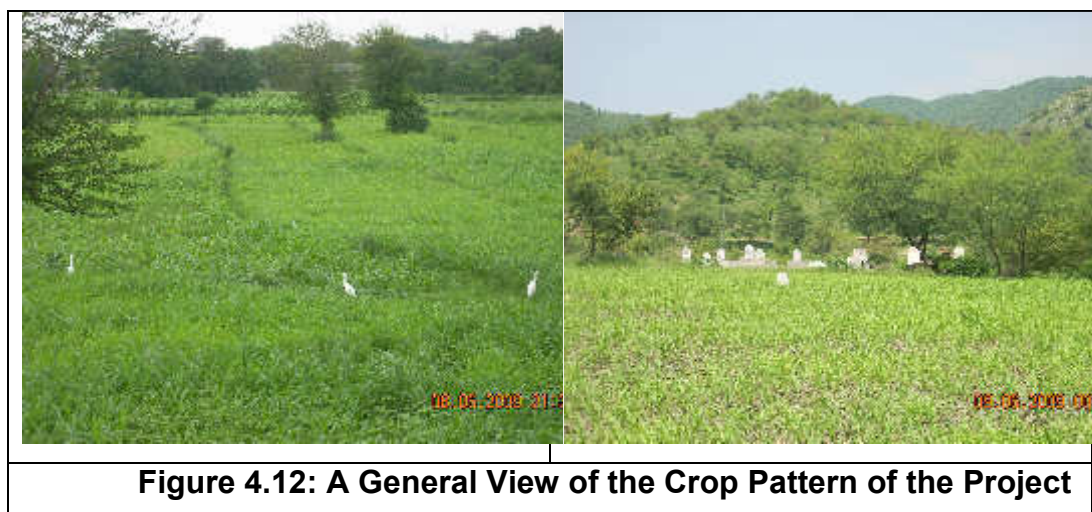


Figure 4.12: A General View of the Crop Pattern of the Project

Area

Table 4.8: Main Crops with their Average Yields in Project**Area**

Sr. No.	Major Crops	Yield/Acre (kg)	Income / Acre
1	Wheat	1000	Rs. 38,000/-
2	Maize	800	Rs. 17,000/-
3	Vegetables		Rs. Upto 100,000/-

The crop pattern followed in the project area is that Rabi crop is sown during months of November – December and harvested during May – June. Kharif crop is sown during June – July and harvested in the months of October – November.

4.1.10 Landuse

In the project area, the land is primarily used for agriculture purposes. The land can be classified as irrigated and un-irrigated. Irrigated land has the certain sources of water like canal water and tubewells. The un-irrigated land is normally rained. Some scattered houses as well as densely populated houses have also been observed to be situated along the entire alignment of the project area.

Figure 4.13 shows land use pattern of the project area.

4.1.11 Industrial and Commercial Activities

The Hattar Industrial Estate extending over 280 hectares located in District Haripur, situated at a distance of 25 km from the start of the project alignment, having ghee, chemical, textile and pharmaceutical industrial, exists in the vicinity of E-35. Some commercial shops are also situated in the vicinity of Hattar Industrial Estate. However, these commercial shops are located at a distance of two (2) kilometers away from the proposed alignment of the project area. In addition, some commercial activities have also been observed along proposed interchanges around the Project area.

4.2 Biodiversity and Natural Resources

This section describes the biodiversity and natural resources as they exist in the project area, its baseline conditions, and ecosystem and discusses existing ecological conditions. This section also lists the fruit and non-fruit trees (forest trees) and wildlife species and identifies those that are to be protected.

4.2.1 Flora

The original vegetation of the tract consisted of Phulahi, Sanatha, Kau and Kikar. However, now the local farmers and land owners have raised Shisham, Sufadah, Poplar, Mulberry, Sirru and other useful species which are abundantly available in the project area (see **Figure 4.14**). The density of tree crops is increasing along the proposed alignment of the expressway from Hasanabdal to Havelian. Phulahi is the most dominant species, growing wild in the sub-mountainous tract. Other trees growing in the tract are Kikar, Shesham, Sufaida, Toot, Sirris, Willow and Ailanthus. Willow is normally growing along streams and water channels. **Tables 4.9 and 4.10** show common fruit trees and non-fruit trees (forest trees) found in the project area and its vicinity.





Fig 4.14: A View of Floral Species present in the Project

Area

Nearly, 2,000 fruit trees of different species exist in the Right of Way (ROW) of the proposed alignment. **Table 4.9** shows common fruit trees in project area.

Table 4.9: Common Fruit Trees in Project Area

Sr. No.	Name of Fruit Tree	Scientific Name	Number of Trees	% age
1	Guava	Psidium guajava	1,034	53
2	Orange	Citrus species	115	5
3	Khoobani or Hari, Aluchaetc	Prunus species	647	33
4	Banana	Musa acuminate	106	5
5	Others		98	4

Non fruit or forest trees are nearly 25,500 in number. **Table 4.10** shows common non-fruit trees (Forest trees) in project area.

Table 4.10: Common Non-Fruit Trees (Forest Trees) in Project

Area

Sr. No.	Name of Tree	Scientific Name	Number of Trees	% age
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Sr. No.	Name of Tree	Scientific Name	Number of Trees	% age
1	Phulahi	Acacia modesta	6,200	24
2	Kikar	Acacia nilotica	4,050	16
3	Shisham	Dalbergia sissoo	3,550	14
4	Chinese Mulberry	Broussonetiapapyrifera	2,730	11
5	Eucalyptus	Eucalyptus camaldulensis	1,610	6
6	Bakain	Meliaazedarach	1,390	5
7	Mulberry	Morus alba	1,170	4.5
8	Taman	Lagerstroemia regina	2,180	8.5
9	Bamboo	Bambusa arundinacea	150	0.5
10	Ber	Zizyphus jujuba	1,000	4
11	Poplar	Populus sciliata	640	2.5
12	Kau	Olea ferruginea	150	0.5
13	Others		830	3.5

a) Shrubs and Herbs

As a result of substantial rainfall and other favorable ecological factors, the tract is mostly covered with shrubs and herbs, in addition to trees. The important shrubs and herbs, present in the project area are given in **Table- 4.11**

Table- 11: Important Shrubs and Herbs in Project Area

Sr. No.	Common Name	Scientific Name
1	Bhaikar	Adhatodavesica
2	Bhang	Canabus sativa
3	Bathu	Chenopodium betrys
4	Arind	Ricinus communis
5	Ak	Calatropis procera
6	Pataki	Gymnosporoaroleana

7	Malla	Zizyphusjuba
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Pataki and Bhaikar are found mostly in the upper reaches of the road alignment near Havelian

b) Grasses

Most common grass found in the tract is Khabbal .Typha and Kana grass was noticed near the banks of nullahs and moist places.

Grasses noticed and reported in the project area are given in **Table-4.12**.

Table 4.12: Grasses in Project Area

Sr.No.	Common Name	Scientific Name
1	Khabbal	Cynodon dactylon
2	Khawi	Cymbopogonjawnica
3	Dab	Desmostachyabipinnata
4	Kana	Saccharummunja
5	Murka	Dicanthiumannulatum
6	Chimmer	Eleusineflagellifera
7	Gam	Panicumantidotale

4.2.2 Fauna

The project area, on account of nature of vegetation and topography, once rich in vegetation and wildlife has now reduced its potential due to over hunting, loss of proper habitat, conversion of forest land. Fauna of the tract consists of mammals, reptiles, amphibians and birds. The details are given as under:

a) Mammals

Mammals reported in the project area are enlisted in **Table 4.13**.

Table 4.13: Mammals in Project Area

Sr. No.	Common Name	Scientific Name
1	Jackal	Canisaureus
2	Porcupine	Hystrixindica
3	Squirrel	Funambuluspennanti
4	Mouse	Musmusculus
5	Mongoose	Herpestesaeropunctatus
6	Hare	Lepusnigricollis
7	Fox	Vulpusvulpus

Mammals like Urial and Chinkara deer were once common in the project area, but due to over hunting and loss of habitat, they have been reduced to nonentity.

b) Reptiles

Reptiles reported in the project area and its vicinity are given in **Table 4.14**.

Table 4.14: Reptiles in Project Area

Sr.No.	Common Name	Scientific Name
1	Cobra	Najanaja
2	Indian Krait	Bungaruscaerueus
3	Spiny Tailed Lizard	Uromastixhardwickii
4	Fringed Toed Lizard	Acanthodactylus cantoris
5	Brown Turtle	Kachugasmithii
6	Indian Monitor	Varanusbengalensis

Other varieties of snakes reported in the project area are Rat Eaters, Sang Choor and a snake locally called as Phissi

c) Amphibians

Amphibians found in the project area are given in **Table 4.15**.

Table 4.15: Amphibians in Project Area

Sr.No.	Common Name	Scientific Name
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1	Frog	Ranatigrina
2	Common Toad	Bufobufo

d) Birds

Avifauna of the tract consists of small and medium sized birds of different colors, flying from one tree to the other or from crop to crop. Most common birds are House Sparrow, House Crow and Mynah.

Birds like Cuckoo, Bulbul, Hoopoe, Parrots, Blue Birds, and Little Egrets etc were frequently sighted. **Table 4.16** shows list of birds listed noticed or reported in the project area.

Table 4.16: Birds in Project Area

Sr.No.	Common Name	Scientific Name
1	House Sparrow	Passer domesticus
2	House Crow	Corvus splendens
3	Mynah	Acridotheris tricolor
4	Parrot	Psittacula krameri
5	Pigeon	Columba livia
6	Koel	Eudynamis scolopacea
7	Red Vented Bulbul	Pycnonotus cafer
8	Common Teal	Anas crecca
9	Little Egret	Egretta garzetta
10	Hoopoe	Upupa epops
11	Indian Robin	Corvus bengalensis
12	Grey Partridges	Francolinus pondicerianus
13	Falcon	Falco peregrinus
14	Shikra	Accipiter badius
15	Tillor	Houbara bustard
16	Eagle	Aquila rapax
17	Jalkookri	Fulica atra
18	Fakhta	Streptopelia decaocto

e) Fisheries

Fishing is not common in the tract. Dor and Haro Rivers, which flow in the northern and southern parts of the project area, are the main abode of fishery. These two rivers traverse through the project area and the proposed Expressway also crosses Dor River near Shah Maqsood and Havelian.

Major species of fish found in these waters are Indian carps, such as Rah (Labeorohita), Thela (Catlacatla), Mori (Cirrhinusmrigala) and Singhari (Aorichthysaor).

Out of these varieties, Rahu and Singhari are most delicious, but their catches are being reduced every year on account of water pollution.

f) Livestock

Livestock rearing is common in the project area and is an important source of income for the rural population. Buffaloes, cows, goat and sheep are seen, freely grazing in open shamlat areas or in fallow agricultural fields. Almost all the households, who have their link with agriculture, are keeping cattle. Field data shows that average household keeps livestock in small herd of 2 to 5, depending upon the household landholding size and capacity to store the crop residues, fodder and hay to feed animals during the winter. The trend of livestock keeping is decreasing due to reduction in grazing areas.

4.2.3 Endangered Fauna

a) Mammals

As a result of excessive hunting and degradation of habitat, Urial, Chinkara, Hog Deer and Wild Boar are as endangered species. The Urial is vulnerable as per IUCN list of species. Deer is endangered specie whereas Wild Boar and Chinkara have been designated as of least concern. These animals are enlisted as endangered in Pakistan whereas none of the species were found in the project area during survey.

b) Birds

Black partridges, Houbara bustard are endangered species as per IUCN endangered species list as their number is decreasing every year due to excessive shooting and hunting for good quality meat. Urial and Houbara bustard are vulnerable as per IUCN list of species similarly; Eagles and Falcons are hunted on account of their commercial value and are in danger zone. These species are endangered, on account of their over hunting and loss of proper habitat, as stated by the local wild life officials and the general public. Partridge, eagle and falcon have been designated as of Least Concern. Mallard and Ruddy shedluck (Surkhab) are also endangered species as they are also excessively sought for their tasty meat. These birds enlisted as endangered in Pakistan whereas none of the species were found in the project area.

4.2.4 Critical Habitats

No wild life sanctuary or game reserve (Critical Habitats) exists within the ROW of the Expressway. However, Mung game reserve is located close outside the project area at a distance of five (5) kilometers away from the proposed alignment of the road.

4.2.5 Modified Habitats

Approximately in 80 % of the project area, the original or natural habitat has been converted into agricultural area or in other words, the habitat has been modified. At present, trees exist along the boundaries of this agricultural land. As during the construction stage, further deterioration of this habitat will take place. Every possible effort shall be made to minimize this deterioration.

4.3 Socio-Economic Environment

This section provides baseline information and description of socio-economic and cultural environment of the project area. It presents information on the project area's locations, population distribution, socio-economic conditions and livelihood activities, state of education and health facilities. The purpose of this socio-economic survey was to gather information about the generic characteristics of nearby communities, their socio-economic status, cultural traditions, social issues and religious affiliations. It also presents the public consultation outcomes during

the field survey. The approach used during data collection was interviews, focus group discussions and rapid rural appraisal techniques to qualitative data collection. Socio-economic and cultural data was collected through semi structured questionnaire and focus group interviews with all the major stakeholders including local community members, village heads, land owners & NGOs in the project area.

The proposed Hasanabdal to Havelian Expressway starts near Burhan Interchange (M-1) and passes from villages located in district Attock, Haripur and Abbottabad. Most people living in the surrounding villages of project area are Hindko farmers. Shalwar Kameez and Doti Kurta are common dresses of males and females. Shalwar Kameez with chaddar during winter season is common.

The demographic profile of various tehsils coming in project area are as follows:

a) Hasanabdal

Total population of the Tehsil was 135,856 with a growth rate of 2.25% as recorded in 1998 census. Population composition was 107.4 females compared to 100 males. Only 28% of the population resided in urban areas and 72% lived in rural areas. Average household size was 6.7.

b) Haripur

Total population of the Tehsil was 579,179 with a growth rate of 2.30% as recorded in 1998 census. Population composition was 99.7 females compared to 100 males. Only 14.3% of the population resided in urban areas whereas 85.7% of population lived in rural areas. Average household size was 6.6.

c) Havelian

Total population of the Tehsil was 31,625 as recorded in 1998 census. The average household size was 7.2.

Table 4.17 shows demographic characteristics of the tehsils in the project area.

Table 4.17: Demographic Characteristics of Tehsils

Sr.No.	Tehsils	Districts	Male (%)	Female (%)
1	Hasanabdal	Attock	51.77	48.22
2	Haripur	Haripur	49.93	50.06
3	Havelian	Abbottabad	52.46	47.53

4.3.1 Socio-Economic Survey of Project Affectees

The information regarding socio-economic conditions is derived from primary data collection and from secondary sources i.e. District Census Reports 1998 for the concerned districts, village profiles, Design utilities folders prepared by design engineering consultants, focus census, women profile survey, building valuation survey, scoping sessions and personal field observations. It was not possible to consult all the affectees. Representative samples were taken during consultation process.

4.3.2 Consultation and Participation Process

About two hundred (200) persons at different locations in project area were contacted. Among the 200 respondents, 120 were male and 80 were females. Methodology selected for selection of respondents was random sampling of respondents from all villages, towns, cities situated along the proposed route. These respondents were from all walks of life with different professional backgrounds. The socio-economic survey was conducted in villages namely Kala Khata, Padarah, Khoi Dara, Aamgah, Kanwan, Dingi, Dehdar, Ganja Kamala, Sirya, Muradabad, Chak Sha Muhammad, Gheba, Mera Toot and Akhoon Bandi etc. Efforts were made to consult people from all localities along the entire stretch of proposed expressway. **Figure 4.15** shows socio-economic survey interview being conducted in Village.



Figure 4.15: Socio Economic Interview being conducted in

Village

4.3.3 Baseline Information

Out of 200 respondents, 60% were male and 40% were female. 78% of the respondents were married and 22% were unmarried. 52% respondents were literate and 48% were illiterate. 97% of the respondents were employed and 3% unemployed.

i) Gender Ratio of Respondents

Table 4.18 shows that 120 of the respondents contacted were males and 80 were females.

Table 4.18: Respondents Gender Ratio

Sr.No.	Gender	No. of Respondents	Percentage (%)
1	Male	120	60
2	Female	80	40
Total		200	100

ii) Age Group of Respondents

Table 4.19 shows that 16% respondents were between the age group of 15-25, 29% were between age group of 26-35 and 21%, 16% and 19% respondents fall

between the age group of 36-40, 41-50 and 51-65 & above respectively. These age groups of respondents indicate that the people contacted were mature enough to have better understandings of the proposed expressway.

Table 4.19: Respondents Age Group

Sr. No	Age Group	No. of Respondents	Percentage (%)
1	15-25	32	16
2	26-30	26	13
3	31-35	32	16
4	36-40	41	21
5	41-50	33	16
6	51-65 and Above	37	19
Total		200	100

iii) **Caste**

Table 4.20 shows caste of people in respective tehsils.

Table 4.20: Caste of people in respective tehsils

Sr.	Tehsils	Castes
1.	Hasanabdal	Sayyed, Awan, Pathan, Khattar, Gujjar, Sheikh etc.
2.	Haripur	Tareen, Gujar, Awan, Miahwani, Pathan, Sayyed, Jadoon, Tanoli etc.
3.	Havelian	Sayyed, Dhund, Awan etc.

iv) **Religion**

Almost whole population of the project area is Muslim. Cultural festivals are mostly linked with traditional religious events. Pilgrimages to shrines (or Ziarats) are common in project area. Only 1% minorities were identified during field visit.

v) Educational Status and Facilities

Basic level educational facilities both for males & females available in the villages located along the proposed expressway. But these facilities are not sufficient to meet the educational requirements of the people of the project area. From survey results (**Table 4.21**), it was found that 38% of the respondents were educated upto primary level, 19% were upto middle level 29% upto matric level, only 4% were educated upto intermediate level. Small percentage i.e. 5% includes those respondents which were educated upto more than intermediate level.

Table 4.21: Education Status of the Respondents

Sr. No	Education Level	No of Respondents	Percentage (%)
1	Primary	40	38
2	Middle	20	19
3	Matriculation	30	29
4	Intermediate	4	4
5	Graduation	4	4
6	Master Level	1	1
7	Technical	2	2
8	Religious	3	3
Total		104	100

Table 4.22 shows the various level educational facilities available in the settlements situated along the proposed expressway. The table indicates that there are 22 Govt. Schools for boys & 16 schools for girls. In addition, about 21 private schools for boys and girls exist along the proposed alignment of the project.

Table 4.22: Status of Educational Facilities along the Proposed Expressway

Sr. No	Govt. Schools	Male	Female	Private School (Male + Female)	Total
1	Primary	10	6	12	28
2	Middle	8	7	7	22
3	High	4	3	2	9
Total		22	16	21	59

vi) Social Amenities

The situation of facilities available at the house of the respondents is depicted in **Table 4.23** given below. It shows that ninety seven percent (97%) of the respondents had the facilities of electricity available at their houses, 8% respondents had sewerage facilities, and 4% respondents had telephone facilities 6% had sui gas facilities and 43% respondents had water supply facilities.

Table 4.23: Social Amenities

Sr. No	Social Facility	No. of Respondents	Percentage (%)
1	Electricity	194	97
2	Sewerage	16	8
3	Telephone (Land Line)	8	4
4	Water Supply	85	43

5	Sui Gas	11	6
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ii) Professional Status

Majority of the respondents i.e. 64% were associated with agriculture, 3% respondents were doing government job for earning their livelihood, 3.5% were businessmen, 24% were labourers, 3% were in private service and 3.5% respondents were unemployed. The detailed statistics regarding occupational status of the respondents are presented in **Table 4.24** given below:

Table 4.24: Professional Status of Respondents

Sr. No.	Professional Status	No. of Respondents	Percentage (%)
1	Agriculturist	127	64
2	Businessmen	7	3.5
3	Labourer	47	24
4	Govt. Job	6	3
5	Private Service	6	3
6	Unemployed	7	3.5
Total		200	100

viii) Monthly Income

Out of 200 respondents, 19% were earning less than 6,500, 30.5% respondents fall within the income range of 6,500-10,000, 23.5% respondents were earning between the income group of 10,000-15,000, 23.5% respondents were in the range of 15,000-25,000 respectively. Only 3.5% respondents were those whose income level was above 25,000. **Table 4.25** shows income status of the respondents.

Table 4.25: Income Level of Respondents

Sr. No	Income Level (Rs.)	No. of Respondents	Percentage (%)
1	Less than 6,500	38	19
2	6,500-10,000	61	30.5
3	10,000-15,000	47	23.5
4	15,000-25,000	47	23.5
5	25,000 and above	7	3.5
Total		200	100

ix) Monthly Expenses

Table 4.26 shows that about 23% of the respondents had their monthly expenses up to Rs. 6,500. 33.5% respondents had monthly expenses ranging between Rs. 6,500 - 10,000. 24.5% respondents had their monthly expenses in the range of Rs. 10,000 to 15,000. Mostly, people are farmers and therefore most of the products of domestic use are produced in their own farms, resulting in less domestic expenses as compared to people living in urban areas. Only 3.5% respondents had their home expenses more than Rs. 25,000. It is evident from the table that monthly expenses of people are normally more than the income which indicates no savings at all.

Table 4.26: Monthly Expenses of Respondents

Sr. No.	Expenses Level (Rs.)	No. of Respondents	Percentage (%)
1	Less than 6,500	46	23

2	6,500-10,000	67	33.5
3	10,000-15,000	49	24.5
4	15,000-25,000	31	15.5
5	25,000 and above	7	3.5
Total		200	100

x) House Size

During the Socio-economic survey, respondents were also inquired about their house sizes to overview the living standard of the respondents. Table 4.27 shows that 8% of the respondents had their house area up to 5 marla and 32.5% of the respondents had their house size in the range of more than 5 marla but less than 15 marla. 40.5 % respondents had big houses having house area up to 1 kanal and 19% respondents had large size houses of more than 25 marla.

Table 4.27: House Size

Sr. No	Area (Marlas)	No. of Respondents	Percentage (%)
1	Less than 5	16	8
2	5 – 15	65	32.5
3	15 – 25	81	40.5
4	More Than 25	38	19
Total		200	100

xi) Type of Construction of the Houses

Table 4.28 shows the type of construction of houses of the respondents. Houses of the fifty nine percent (59%) respondents were pacca, 25.5% houses were of semi-pacca type and 15.5% houses were kacha.

Table 4.28: Construction Type of the Houses

Sr. No	Construction Type	No. of Respondents	Percentage (%)
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1	Kacha	31	15.5
2	Pacca	118	59
3	Semi Pacca	51	25.5
Total		200	100

xii) Borrowing Status

During the public consultation, it was identified that a nominal proportion of the respondents, i.e. 17 % had borrowed money from different sources such as Agriculture Banks, Feudal Lords, or relatives and major proportion of the respondents (83%) are free from any kind of debt burden. Table 4.29 shows the borrowing status of the respondents.

Table 4.29: Borrowing Status of Respondents

Sr. No.	Borrowing Status	No. of Respondents	Percentage (%)
1	Under Debt	35	17
2	Without Any Debt	165	83
Total		200	100

xiii) Borrowing Source

The respondents who were under debt burden had taken loan from different sources. Most of the respondents (63%) had taken loan from their friends or relatives, 29% had taken loan from different banks and only 8% respondents had taken loan from Non Governmental Organizations (NGOs). Table 4.30 shows the borrowing source of the respondents.

Table 4.30: Borrowing Source of Respondents

Sr. No	Borrowing Source	No. of Respondents	Percentage (%)
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1	Bank	10	29
2	Relative/Friend	22	63
3	Non Government Organization	3	8
Total		35	100

4.4 Gender Issues and Analysis

A total of 80 women from the project area were interviewed by the female staff regarding awareness of the project. Most women were aware of the construction of road project. Table 4.31 indicates the social conditions of the women surveyed. 44% had access to school, 36% had to college level education and only 18% ladies had access to university level education. This indicates that they were free in getting education if willing. The educational facilities were available in their surrounding areas. In addition, 30% women had access to lady health visitor, 31% consult government doctors, 24% consult private doctors and 15% consult quacks in case of sickness/ailments.

Table 4.31: Social Conditions of Women in the Project Area

Age Group	Access to Education			Access to Health Facility			
	School	College	University	Nurse/ LHV	Govt. Doctors	Private Doctors	Quacks
16-25	18	4	6	4	6	6	3
26-35	8	9	4	5	9	6	2
36-45	7	7	1	8	4	4	3
46-55	4	6	4	5	3	2	2
55/above	-	3	-	2	3	2	2
Total	37	29	15	24	25	20	12

% age	46	36	18	30	31	24	15
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4.5 Culture and Tradition

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 areas. Milk is also available abundantly. The people of the project 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-rings and bangles.

4.6 Public Concerns Regarding the Project Execution

During the field survey, people were asked about their views regarding the E -35 Project. People had positive thinking and good hopes about the project but fears and doubts for unforeseen issues were also in their minds. Almost, all the people showed their concerns regarding the Project. Respondents had multiple choices and they gave more than one response, the frequency of the responses of the respondents is shown in **Table 4.32**.

Table 4.32: Stakeholders Concerns

Sr. No	Perceived Impacts	Frequency	Percentage (%)
1	Livelihood will be disturbed in case of losing agriculture land and businesses	87	21.5
2	People will never be given judicious compensation against land acquired	73	18
3	Residential area will be affected	28	6.9
4	No compensation payment is given to affectees, especially tenant	87	21.5
5	Jobs will not be provided to local people during construction	56	13.8
6	Privacy will be disturbed due to construction work	73	18
Total:		404*	100

*Multiple Responses

4.7 Community Health and Safety

The Client will inform the affected communities about the significant potential hazards in appropriate manner. The Client will be prepared to respond to accidental and emergency situations. For this purpose, a comprehensive EIA report has been prepared for the subject project and will be duly submitted to ADB Environment cell. In this EIA report, a special attention is given to public safety during project construction and its operation phases. In this report, special focus is given on rehabilitation of those health institutions which will be demolished by the execution of proposed project. But during the field visit, it was confirmed that no hospital, “Basic Health Unit (BHU)” or any other health institution is going to be relocated or demolished.

4.8 Physical Cultural Resources

During the field survey, it was confirmed that no physical or cultural resources like shrine, mosque or historical place are falling within the Right of Way (ROW). However, a number of mosques, shrine and graveyards are located in nearby settlements which bear significant importance for the concerned localities. These cultural resources are discussed below:

i) Shrines

Astana Hazrat Yahya Daud is an important shrine near Project area which is located in the Dingi Village. This shrine is visited by local people. Local people come to visit the shrine to pay homage to the saint.

ii) Mosques

There are about eight (8) small mosques located in the localities along project road. These mosques are locally constructed with the mutual contributions of the concerned communities. People come in the mosques to offer prayers.

iii) Graveyards

Graveyards are important cultural heritage of the area and are visited by the descendents of the departed people. There are about eleven (11) graveyards located in various communities along proposed road.

iv) Historical Monuments

No historical or archeological site of significant importance is situated in the localities along the proposed project alignment. Location of theses physical cultural resources have been identified later in **Figure 6.1**.

SECTION - 5

ALTERNATIVES

5.0 General

201. The discussion and analysis of alternatives in Environmental Impact Assessment (EIA) should consider other practicable strategies that will promote the elimination of negative environmental impacts identified. This section is a requirement of the EPA Pakistan and ADB and is critical in consideration of the ideal development with minimal environmental disturbance. During study of alternatives, the major environmental impacts were identified by the Environmental Experts. The findings of these impacts were utilized to analyze possible options for the final development.

202. The following alternatives have been identified and are discussed in further detail below:

Alternative-I “No Project Option”

Alternative-II “Dualization of Existing Carriageway (N-35)”

Alternative-III “Construction of an Expressway (E-35)”

Alternative-IV “Alignment through Taxila from M-1 to Chechian Interchange”

5.1 Alternative-I ‘No Project Option’

203. The “No project option” considers continuation of utilizing existing road (N-35) and no further development would be done. It reflects no apparent change to the physical, cultural and social environment. The existing road from Hasanabdal to Havelian (Part of N-35) will continue to be the main transportation corridor in the area. It is surrounded by the residential area and dense commercial area. The existing road is the main trade corridor linking northern areas of Pakistan to China, an important centre of trade at present. Hasanabdal, Hattar, Haripur, Havelian, Abbottabad, Qalenderabad, Mansehra and Sarai Saleh are the main areas at present where traffic congestion is already observed and the situation may become worse. With the future developments in the area, the road

will become more congested and blockades would increase due to increase in traffic loads in urban areas.

204. Thus, no project conditions will result in; air and noise pollution due to traffic jams and associated health risks, increase in maintenance costs of vehicles due to their wear and tear, increased fuel consumption, higher probability of accidents and will impede chances of development and trade opportunities as the access will remain limited to the existing road. In addition the areas having no access by road at present may face delays in rescue services in case of disasters/emergencies.

5.2 Alternative-II ‘Dualization of Existing Carriageway (N-35)’

205. The alternative-II considers dualization of the existing 2-lane highway as the existing capacity of the road from Hasanabdal to Havelian (Part of N-35) is not sufficient to cater the present and expected future traffic loads.

206. The existing carriageway is surrounded by dense commercial areas, factories, flour mills hospitals/medical centers, schools, temporary cabins (wooden shops) of fruit and plant nurseries etc and other infrastructure. Due to this fact, widening of existing highway would require extensive resettlement, tree cutting and disturbance of utilities which is major negative impact. In addition, it requires a number of bypasses to be considered in design. Thus, the cost of this option especially for land acquisition will considerably increase making it less viable option.

207. The widening of the existing highway will be done to facilitate smooth flow of traffic from a number of urban areas such as Hasanabdal, Hattar, Haripur, Havelian, Abbottabad, Qalenderabad, Mansehra etc. It will reduce the environmental hazards related to traffic jams considering expected future traffic volumes. Thus, dualization of the existing carriageway will only solve the existing problem of the traffic congestion and is quite evident from the Traffic and Axle Study Report (**see table 3.3, 3.4 and 3.5**) that the traffic will almost be doubled in the next ten (10) years time.

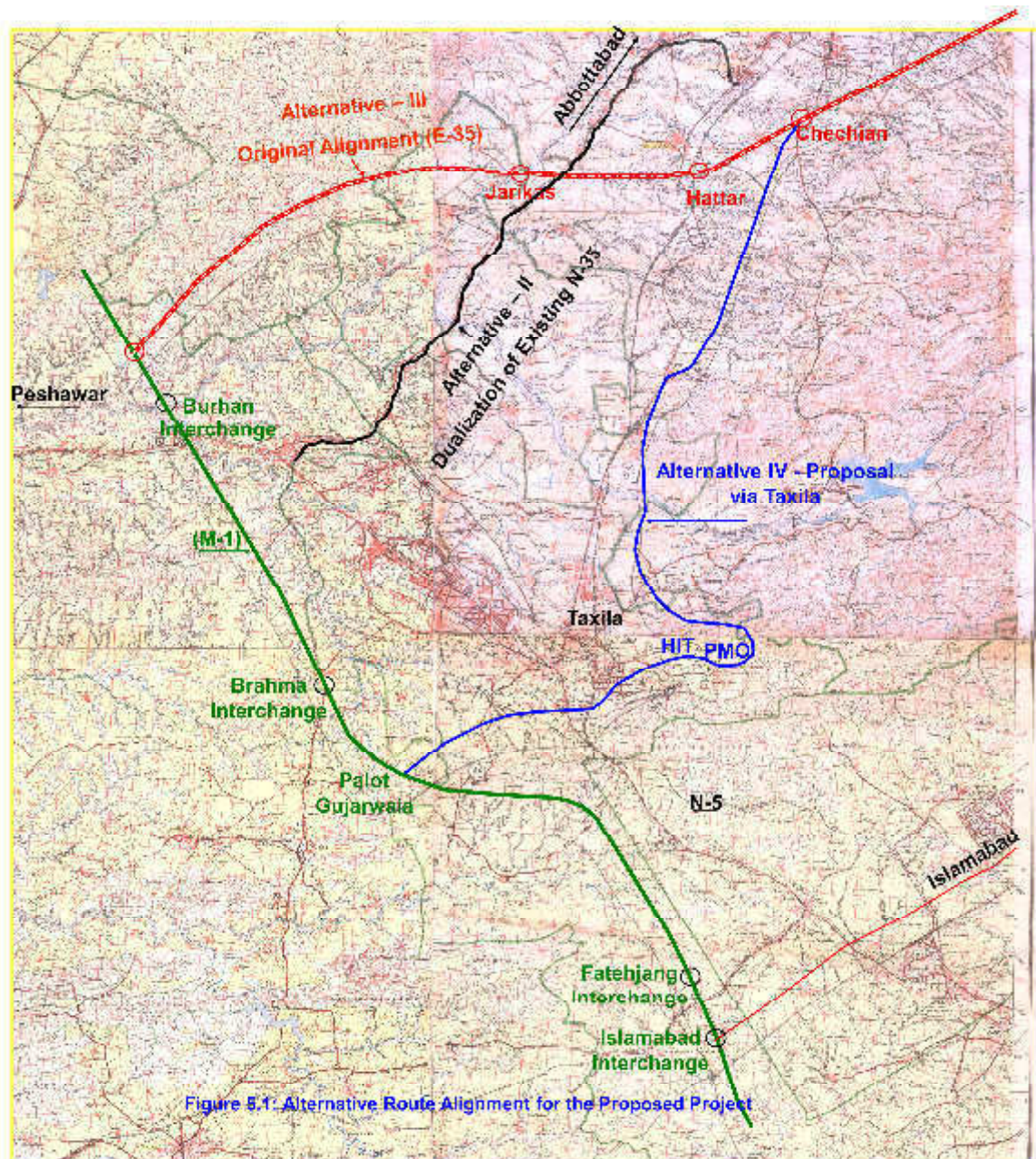
208. The dualization of existing road will not provide access to new villages and areas, limiting new market opportunities, impeding trade and development in new areas. In case of any natural disasters, like earthquakes in 2008, the dualization of the existing highway will limit the access to existing areas only which may cause delays in rescue and rehabilitation operations in other areas where access via road is not available.

5.3 Alternative-III ‘Construction of an Expressway (E-35)’

209. This alternative involves construction of Expressway from Hasanabdal to Havelian on completely new alignment. The Expressway will form a part of the planned National Trade Corridor (NTC) infrastructure required to connect the Gwadar Port through Motorway/Expressway Network with the Gilgit Baltistan leading towards China.

210. The proposed Expressway will be constructed on a new alignment, which will traverse through agricultural land, barren land, settlements, hills/rocks etc. It is expected that the air pollution may increase due to movement of the heavy machinery and construction vehicles in the agricultural fields along with cutting of trees and clearing of vegetation/crops, but can be reduced by adopting effective mitigation measures. However, construction of the road will save travelling time by smooth and speedy flow of traffic, reduction in wear and tear of vehicles, efficient fuel consumption and reduction in chances of accidents. Due to disturbance/fragmentation of habitat, migration of faunal species may also occur and may affect the breeding of these species but the impact can be minimized/managed by adopting proper mitigation measures.

211. Land acquisition and resettlement will be involved but the cost is considerably lesser than the land acquisition and resettlement involved in alternative II. Thus, decreasing the overall cost of the project. The new alignment will provide access to new areas facilitating trade, development, rescue services etc. The Expressway will also allow speedy transit of vehicles due to higher speed limits than the National Highways.



5.4 Alternative-IV ‘Alignment through Taxila M-1 to Chechian Interchange’

212. According to this alignment, E-35 starts from Plot Gujarwala (M-1) near Brahma Interchange. It passes through Ban-Bolo village, crossing N-5 near Niclson Mountain (01-Km towards Taxila city), and terminates/connects with original alignment at Chechian Interchange coming from Burhan Interchange.

213. Length of proposed Expressway through Taxila will be increased about 13-km in comparison to alternative III. Additional length of expressway needs additional land of 2100 kanals. Several difficulties to address design requirements will arise, e.g. Beyond Haro River, proposed alignment passes through SARRA Range (about 3-km hilly terrain), thus design criteria of hilly terrain will have be adopted and design speed will have to be reduced.

214. Provision of bridge over Haro River will be required with approximate length of 300m. Construction of Bridge will result in deterioration of surface water quality of River Haro. About 9-km between Kamalpur and Chachian, the proposed alignment passes through widespread water-shed area where frequent drainage structures will be required along with additional protection works. This will result in additional civil work and associated cost. It will also disturb the natural drainage pattern of the area.

215. During construction, the traffic load on existing Taxila City/Cantt will increase resulting in air pollution, noise and disturbance. In addition to this, vital and sensitive infrastructures will have to be acquired, which includes Heavy Industries Taxila (HIT) and Pakistan Military Ordinance (PMO) both areas controlled by Pak Army (about 5 km) and needs “No Objection Certificate” (NOC) from Pak Army. The land cost will be higher as the alignment passes through productive agricultural land with dense fruit gardens. Thus the land acquisition and resettlement issues will be costly and complicated to be addressed.

5.5 Comparison Analysis of Alternatives

216. The comparison between three possible alternatives based on the environmental, health, safety, social and economic impacts are described in **Table**

5.1 below, while the **Figure 5.1** shows different alternatives considered for the proposed road project.

Table 5.1- Comparison Analysis of Alternatives

Impacts	Project Alternatives			
	Alternative I: No Project option	Alternative II: Dualization of Existing Carriageway N-35	Alternative III: Construction of Expressway, E-35	Alternative-IV Alignment through Taxila from M-1 to Chechian Interchange
Environment, Health and Safety	<ul style="list-style-type: none"> ▪ Increased load of traffic on existing road (N-35) will result in the following; <ul style="list-style-type: none"> ○ Traffic Jams; ○ Air and noise pollution; ○ Health hazards due to air and noise pollution; ▪ Increase in probability of accidents. ▪ Limited access for rescue in case of emergency/disasters; 	<ul style="list-style-type: none"> ▪ Cutting of trees. ▪ Reduction in air pollution due to smooth flow of traffic; ▪ However, according to the traffic study, the dualization of N-35 may become insufficient due to expected increase in traffic volume ; 	<ul style="list-style-type: none"> ▪ Cutting of Trees; ▪ It is expected that the air pollution may be caused due to cutting of trees and movement of vehicles but can be reduced by adopting effective mitigation measures. ▪ Migration of fauna due to disturbance/ fragmentation of habitat; ▪ Reduction in wear and tear of vehicles; ▪ Efficient fuel 	<ul style="list-style-type: none"> ▪ Cutting of Trees; ▪ It is expected that the air pollution may be caused due to cutting of trees and movement of vehicles but can be reduced by adopting effective mitigation measures. ▪ Migration of fauna due to disturbance/ fragmentation of habitat; ▪ During construction, the traffic load on existing Taxila City/Cantt will

			<p>consumption;</p> <ul style="list-style-type: none"> Reduction in chances of accidents. 	<p>increase.</p> <ul style="list-style-type: none"> Disturbance to natural drainage pattern as 9 km of the alignment passes through water shed area. Increase in chances of accidents due to hilly terrain.
Socio-economic	<ul style="list-style-type: none"> Minimum trade and development activities; Travel delays and longer travelling times; Wear and tear of vehicles; Increased fuel consumption. 	<ul style="list-style-type: none"> Damage to the existing utilities; Dense commercial activities exist on the both sides of the existing road which involves massive resettlement and relocation of people. High cost due to extensive resettlement of public, private structures and utilities; and 	<ul style="list-style-type: none"> Less resettlement as compared to dualization of N-35; It will provide development opportunities in new areas; Increase in trade activities; Lesser compensation cost as compared to dualization of existing road. 	<ul style="list-style-type: none"> Additional road length and design features will increase the cost of the project as compared to alternative III. Higher land acquisition and resettlement costs. Disturbance to vital and sensitive areas/zones which includes Heavy Industries Taxila (HIT) and PMO as both areas controlled by Pak Army.

		<ul style="list-style-type: none">▪ Lesser trade opportunities as compared to the new alignment.	<ul style="list-style-type: none">▪ Faster Travel facility and saving of travelling times;	
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5.6 Overview of Alternative Analysis

217. Based on the above comparison, the most environmentally sound and most economical alternative is the Construction of New Expressway (E-35) while considering the future developments.

SECTION - 6

ANTICIPATED ENVIRONMENTAL IMPACTS

AND MITIGATION MEASURES

6.0 General

218. This section provides the analysis of the potential impacts during pre-construction/design, construction and operational phases of the proposed project on the physical, biological and socio-economic environment of the project area. Environmental sensitivity of the project area is described through the thematic sensitivity map and evaluation of significance of impacts is carried out through Environmental Matrices. In addition, it also narrates the measures that will mitigate the project's potential environmental impacts. Environmental impacts have been considered not only as they pertain to road ROW, but also to the site associated with the road project.

Impact Matrices

219. Primarily, anticipated impacts have been categorized as direct, indirect and induced impacts. These groups of impacts can be further broken down according to their nature into:

- Positive and negative impact;
- Minor, major and moderate impact;
- Local and widespread impact;
- Temporary and permanent impact;
- Short and long term impact; and
- Reversible and Irreversible impact

220. Characterization of potential impacts during construction and operation stage of the project has been classified based on the above characteristics and is given in **Table 6.1 and 6.2**.

221. Furthermore, the environmental impact evaluation matrices have also been developed to indicate magnitude of the impacts on different environmental

settings for both construction and operational phases (see **Tables 6.3 and 6.4**). The following scale has been used for the evaluation of potential impacts on different environmental settings:

O = Negligible/No Impact

LA = Low Adverse

MA= Medium Adverse

HA = High Adverse

B = Beneficial

The criteria used to define the high medium and low adverse impacts are as follows:

Negligible/No Impact: The impact, which has unapparent and negligible influence on natural and socio-economic environment.

Low Adverse Impact: The impact, which has a slight influence on the natural and socio-economic environment.

Medium Adverse Impact: The impact, which can be eliminated/ mitigated after applying the appropriate mitigation measures.

High Adverse Impact: The impact, which can be partially/ but not fully mitigated by applying the mitigation measure.

Positive/Beneficial Impact: The impact, which improves/enhances the natural and socio-economic environment.

Table 6.3: Environmental Impacts Evaluation Matrix during the Construction

Sr. No.	Project Activities	Physical Environment								Biological Environment		Socioeconomic Environment				
		Topography	Soil Quality	Landscape	Surface Water Quality	Groundwater Quality	Land Slide/ slope Stability	Air Quality	Noise & Vibration	Flora	Fauna	Public Safety	Employment	Population Disturbance	Economic Activities	Traffic Management
1	Movement of Vehicle	O	O	O	LA	LA	LA	LA	LA	O	LA	LA	MB	O	MB	O
2	Ticketing	O	O	O	O	O	O	O	LA	O	O	O	HB	O	MB	O
3	Generation of waste Water	O	LA	O	LA	LA	O	LA	O	O	O	LA	O	O	O	O
4	Generation of Solid Waste	O	LA	LA	LA	LA	O	LA	O	O	LA	LA	LB	O	O	O
5	Signaling / Traffic Control	O	O	O	O	O	O	LA	O	O	O	O	MB	O	MB	HB
6	Maintenance of Building	LA	LA	LA	LA	LA	LA	LA	LA	LA	LA	LA	MB	LA	MB	LB
7	Generators (Power Supply)	O	O	O	O	O	O	LA	LA	O	LA	O	O	O	O	MB
8	Parking	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB

LegendO - Insignificant / no impact
NA - Not ApplicableLA = Low Adverse
LB = Low Beneficial

Table 6.4: Environmental Impacts Evaluation Matrix during the Operation

Legend

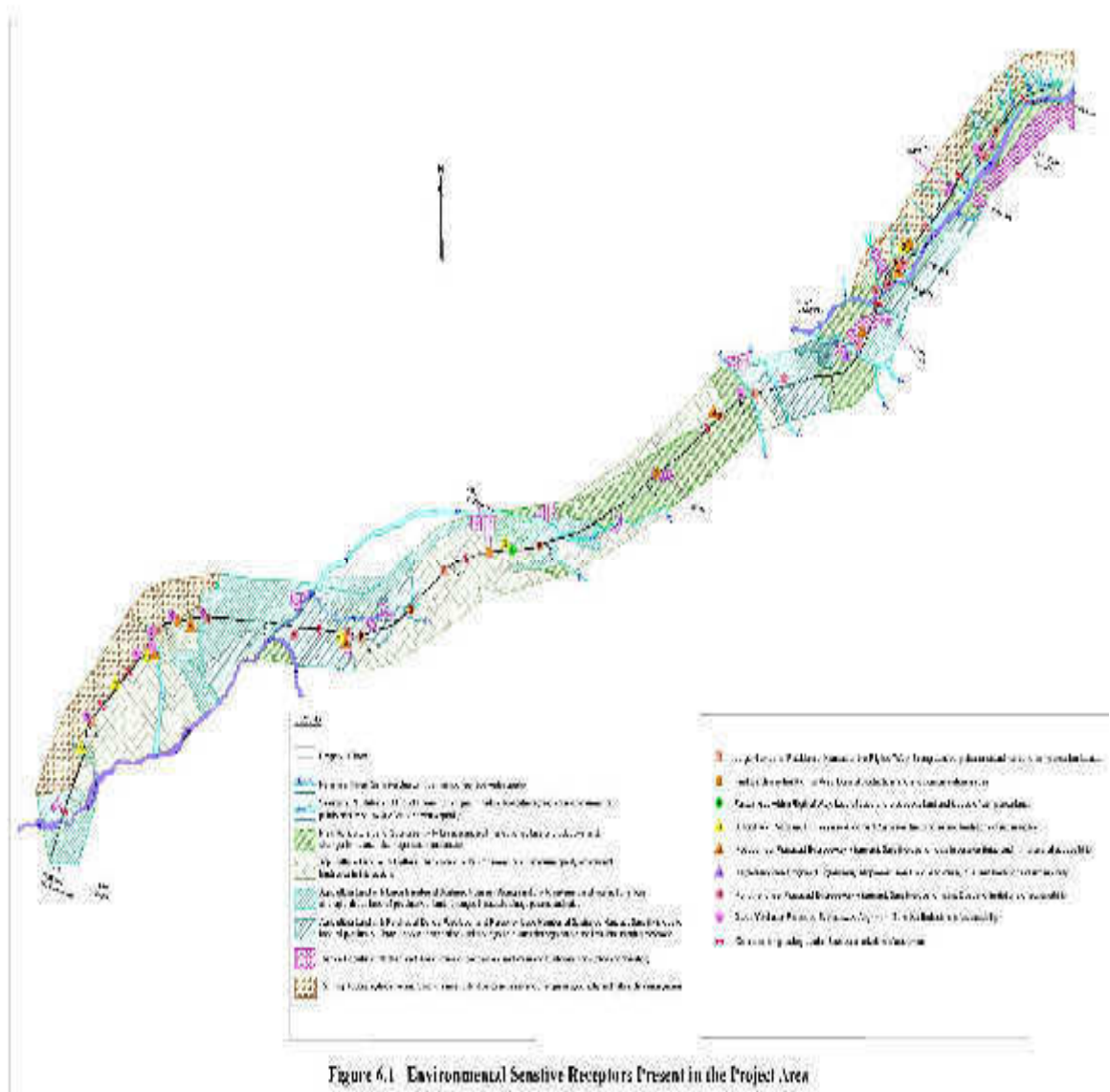
O - Insignificant / no impact

LA = Low Adverse

MA = Medium Adverse

6.1 Environmental Sensitivity Map

222. A comprehensive map showing environmental sensitive receptors of the project area such as, surface water bodies, animal corridor, agricultural land, urban areas, schools, mosques, monuments, dispensaries, etc. is given as **Figure 6.1**. Tentative locations of these sensitive receptors are indicated on the map. The map depicts that the proposed alignment mainly passes through agricultural areas with scattered and thick populated areas. The schools, mosques, monuments and health facilities may be affected during and after the construction of the proposed alignment. Further it is also studied that due to the proposed increase in two lanes on each side the impacts will remain the same or will slightly enhance but will be of minor nature. However, Site Specific Environmental Management Plans (SSEMPs) of all three sections will be revised to incorporate and mitigate any additional impacts.



6.2 Pre-Construction/Design Phase

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

6.2.1 Topography

224. The topography in the project area will change but only to some extent due to the construction of project related structures such as embankments, bridges, flyovers and interchanges.

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

6.2.2 Land Acquisition and Resettlement

226. One of the major project related impact will be the land acquisition for the Project ROW that will result in causing disturbance to the affected residents of the project area. About 5,952 Kanals of land would be acquired for the ROW (80 meter) for the 58.6 kilometer proposed Expressway Section. Moreover, the land required for the proposed project is mostly fertile agricultural land with mainly scattered population. The total affected persons (APs) in the project area are estimated to be approximately 13,601. Few villages are also coming in the ROW of the Project. This impact will be permanent and major negative in nature.

227. Mitigation measures will involve careful alignment and route selection by the designer to minimize the impacts by avoiding the residences of these families. Proper access should be provided to the farmers to cultivate the divided land at a minimum travel distance. For the land coming in the ROW, the affected people will be compensated as per provisions of LARPs prepared for all the three packages of E-35 Project. For the additional proposed development to a 6-lane motorway no additional land will be acquired, and the additional proposed two lanes will be constructed within the acquired ROW.

6.2.3 Changes in Land Value

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

6.2.4 Social Issues

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

230. To mitigate this impact, the provision of 22 underpasses is made in the 58.6 km length of the Expressway. Underpasses have been provided (after every 2 to 3 km) in the final design on all the existing district council routes and where, it is deemed necessary for the connectivity of the settlements. The chainage wise location of all the underpasses is given below in **Table 6.5**.

Table 6.5: Chainage Wise Location of Underpasses

Sr. No.	Proposed Structure	Chainage
Package_I		
1	Underpass	13+270
2	Underpass	19+890
3	Underpass	7+200
4	Underpass	8+275
5	Underpass	10+730
6	Underpass	17+680
7	Underpass	20+15
Package-II		
8		23+740
9	Underpass	26+800

Sr. No.	Proposed Structure	Chainage
10	Underpass	28+890
11	Underpass	30+680
12	Underpass	31+980
13	Underpass	32+877
14	Underpass	34+575
15	Underpass	38+138
16	Underpass	38+550
Package-III		
17	Underpass	41+662
18	Underpass	44+967
19	Underpass	52+992
20	Underpass	69+840
21	Underpass	86+820
22	Underpass	105+753

231. The locations of the underpasses have been discussed with the communities in the consultation meetings held during the month of July 2012. The participants of the meetings are agreed and satisfied with the proposed locations and no revision is required in the design for any additional provision of underpass.

6.2.5 Physical Cultural Resources

232. Since no Physical Cultural Resource is falling within the Right of Way (ROW) of the proposed alignment of the Expressway, so there is no need for relocation of such resource. Cultural resources such as graveyards, mosques and shrine are situated in nearby communities and are visited by local people.

233. Mitigation measures will include provision of pedestrian corridors near the communities which have important Physical Cultural Resource.

6.2.6 Biodiversity Conservation and Natural Resource Management

234. Due to the proposed Project, about 27,500 numbers of trees of various species will be affected. Out of these, 2,000 trees are fruit trees mainly Guava and the rest of 25,500 trees include Phulai, Sheesham, Kikar, Eucalyptus, Bakain, Taman, Kau etc. This may have an adverse affect on the ecological habitat of the project area. This impact will be permanent and moderate negative in nature. Due to the additional two lane proposed construction no extra trees of any species will be affected.

235. The proposed mitigation measures will include:

- Incorporate technical design measures to minimize removal of these trees, if possible such as change in alignment;
- Plan for compensatory planting for eight trees against each fallen tree of similar floral function;
- Provision of compensation in the Project Budget for the loss of trees to the affected people;
- Disallow introduction of invasive/ exotic species and native species should be recommended for plantation ;
- Provision of animal corridors for the free movement of faunal species, especially, near the attractive sites such as grazing lands, and water bodies. Care should also be taken for provision of crossings for the free movement and access to River Haro of pastoralists coming in the area of influence of the project during different seasons.

6.2.7 Air Quality and Noise Level

236. Due to the construction of the proposed project, noise and air pollution and associated health risks in the project area may increase. This impact is permanent and moderately negative in nature. The additional two lanes to upgrade the 4-lane Expressway to a 6-lane Motorway will further increase the

impact due to increase in traffic. The SSEMPs of all three project packages will be revised to incorporate mitigation of the additional impact.

237. Mitigation measures will include:

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

6.2.8 Solid Waste Management

238. Proper solid waste management system is required for the efficient handling of waste and reduction of waste related impacts. Impacts due to solid waste are expected to be temporary and minor negative in nature.

239. Mitigation measures will include:

- Planning for disposal sites with reasonable distance from the human settlements;
- Disallow siting for work camps, including waste dump sites, in a distance closer than one 500 m to any inhabited areas;
- Incorporate technical design features for refuse collection containers at sites that would minimize burning impacts;
- Devise plan(s) for safe handling, storage and disposal of harmful materials; and
- Burning of waste will not be allowed in any case. Procedures have already been adopted for the under construction of dual carriageway, little modifications will be adopted for the proposed two lane addition.

6.2.9 Excavation of Earth

240. The excavation of earth from borrow areas and for clearance of ROW may result in change of edaphic characteristics of soil. Loss of fertile top soil may

affect adversely on the agriculture of the project area. For the construction of this section of the proposed project, about 5,952 Kanals of land will be acquired with a width of 80 meter. This impact is permanent but major negative in nature.

241. Mitigation measures will include:

- Borrow pits will not be located on agricultural land unless completely unavoidable;
- Contractor needs to obtain approval for excavation and submit the plan of rehabilitation of the site after excavation;
- The top 1 ft soil will be stored for future use in rehabilitation of the site; and
- Plan for Rehabilitation of Borrow Pits (attached as **Annexure-VII**) will be implemented. It is expected that for the proposed additional two lanes, the number of borrow areas may increase but the rehabilitation plan will remain the same. For the additional borrow areas (if required) the contractor will be required to provide the lease agreement to the supervision consultant.

6.2.10 Public Utilities

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

243. Mitigation measures will include:

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

6.2.11 Change in Hydrologic Regime

244. The project has an extensive network of drainage channels/ nullahs falling in to the Rivers Haro and Dor. High fluctuation in groundwater table is

observed during monsoon season. Wells and hand pumps are the main source for drinking water, especially, in the first packages of the project area. These wells could be dried by changing the drainage pattern of the area and that would be major negative irreversible impact. For the crossing of drains and water courses, small bridges and culverts should be constructed.

245. Mitigation measure would involve:

- Proper design of bridges on nullahs to accommodate design flows;
- Small bridges will be constructed on drains coming in the ROW;
- Provision of box culverts to control flood damages and provision of safety of embankments; and
- Provision of sufficient sizes of drains to take design flows. Due to the addition of 2 lanes for the upgradation of the expressway to a motorway, the impacts will remain the same as even for the dual carriageway (expressway) all structures, bridges, flyovers, underpasses, etc. are being constructed on six lane design with the approval of ADB.

6.2.12 Loss of Agricultural Land

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

6.2.13 Surface and Ground Water

247. As the proposed alignment is running along the rivers, so the surface water may get contaminated due to the surface runoff during construction and operation phase. Ground water may also get contaminated from the wastewater generation from the construction camps.

248. Mitigation measures will include:

- To control the surface water run off and sedimentation loading, cut of drains, cascades, chutes and sedimentation ponds should be incorporated in the design;
- Planning of location of construction camps must be at an appropriate distance from the surface water bodies; and
- Septic tanks and soakage pits should be designed to cater the wastewater from the construction camps.

6.3 Construction Phase

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

6.3.1 Topography

250. The project area does not have plain topography. Extensive work is involved for the preparation and clearing of the land. This may involve blasting, dismantling of damaged pavements, cutting and filling of the land in the ROW and borrow pits, and may lead to erosion of top soil cover. This impact is permanent and minor negative in nature.

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

252. Mitigation measures will include:

- Where the use of agricultural land is unavoidable, the top 1 ft of the plough layer will be stripped of and stockpiled for redressing the land after the required borrow material has been removed;
- Where deep ditching is to be carried out, the top 1m layer of the ditching area will be stripped and stockpiled. The ditch will initially be filled up with scrap material from construction and then levelled with the stockpiled topsoil;
- Low embankments will be protected from erosion by planting indigenous grasses that can flourish under relatively dry conditions;

- High embankments will be protected by constructing stone pitching or a riprap across the embankment;
- Ditches or borrow pits that cannot be fully rehabilitated will be landscaped to minimize erosion and to avoid creating hazards for people and livestock; and
- Landowners will be compensated according to the terms of lease agreements negotiated with them and the restoration actions agreed upon by the Contractor will be duly carried out.

6.3.2 Soil

253. The project area is a rolling terrain with fertile silty land prone to soil erosion. Soil erosion may occur on roadside, at contractors' camps and at embankment works as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation; whereas, contamination of soil may be caused by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. Also, due to unauthorized use of borrow areas and quarries, soil erosion may occur resulting in degradation of landscape. This may limit the future use of land for agricultural purposes. This impact is, however, of temporary and moderate negative in nature.

254. Mitigation measures will include:

- Low embankments will be protected by planting vetiver grass that can flourish in relatively dry conditions;
- High embankments will be protected by constructing stone pitching or riprap across embankments. This practice will also be applied across cross-drainage structures where embankments are more susceptible to erosion by water run-off;
- Soil contamination by asphalt will be minimized by placing all containers in a bunded area away from water courses;
- Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;
- Collection of oil and tube drips in container during repairing construction equipment vehicles;

- Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area;
- Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas;
- All spoils will be disposed of as desired and the site will be restored back to its original conditions before handing over;
- Non-bituminous wastes from construction activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites ;
- In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;
- As applicable and needed, plantation of grasses and shrubs will be done for slope protection;
- Soil erosion checking measures such as the formation of sediment basins, slope drains, etc. will be carried out;
- Productive land or land adjacent to agricultural / irrigated land may not be preferred for excavation;
- Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands should be given preference for borrowing materials; and
- Aggregate required for Expressway construction procured from quarries and river beds will need approval from authorities.

6.3.3 Blasting

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

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

to avoid blasting in sensitive locations. Moreover, Blasting Management Plan has been prepared for the project and has been attached as an **Annexure-VIII**.

6.3.5 Physical Cultural Resources

257. There are no physical cultural resources existing along the whole alignment as listed in UNESCO World Heritage list of archeological sites. However, Taxila is of great importance as per UNESCO list and is located at a distance of about 15km from the start point of the Project and is the nearest known archeological site.

258. Taxila is a Tehsil in the Rawalpindi District of Punjab province of Pakistan. It is an important archaeological site. The city dates back to the Gandhara period and contains the ruins of the Gandharan city which was an important Hindu and Buddhist centre, and is still considered a place of religious and historical sanctity in those traditions. In 1980, Taxila was declared a UNESCO World Heritage Site with multiple locations.

259. As the project involves excavation work and in case of any accidentally discovered archeological/ historical heritage during the construction phase, contractor should stop the activities immediately and inform the SC and chance find procedures should be adopted as given in **Annexure IX**.

6.3.6 Construction Camps/Camp Sites

260. For the additional proposed two lane construction, no new/separate camp will be constructed. The already constructed camps on the three packages will be utilized. The impacts due to the establishment of construction camps are temporary and minor negative impact in nature. However, a range of impacts remain likely to occur or are unavoidable. For these impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence, and any associated adverse effects. **Table 6.6** summarizes potential impacts and proposed avoidance and mitigation measures associated with construction camps.

Table 6.6: Summary of Worker Camp Impacts & Mitigation Measures

Potential Impact	Proposed Avoidance and Mitigation Measures
<p><i>Environmental</i></p> <ul style="list-style-type: none"> • Temporary habitat loss or disturbance; • Temporary visual intrusion; • Noise level increase at a single location and associated disturbance to wildlife and human receptors; • Waste generation; • Discharge of sanitary effluent and rainwater run-off to water courses. 	<p><i>Environmental</i></p> <ul style="list-style-type: none"> • Individual trees and shrubs of high conservation value to be marked and preserved wherever possible or transplanted if the root conditions are suitable for such an operation; • Reinstate any temporary facilities to pre-existing conditions in ecologically sensitive areas; • Implement landscaping plan for all facilities in areas where high landscape value and visual vulnerability to the proposed activities warrants site-specific landscape restoration measures; • Limit the working hours of noisy activities when near identified sensitive receptors to normal daytime working hours; • Operate equipment in a manner sympathetic to the ambient noise environment. Do not leave equipment idling unnecessary; • Eliminate tonal, impulsive or low frequency noise through noise control engineering techniques where practicable (fitting of mufflers, damping, etc.), and substitute for a different method if necessary (e.g., instead of hammering actions, use hydraulics); • Provide adequate warnings of impending works to all potential receptors within a 1 km corridor surrounding the right-of-way via public notices and local news; • Implement Waste Management Plan to include procedures for the classification, storage and disposal of all construction wastes and the training of employees who handle hazardous materials; • Ensure that discharge of sewage from temporary construction facilities to surface courses does not impact

	<p>surface water ecology. This will be achieved through the provision of treatment facilities and by enforcing the discharge standards.</p>
<p>Social</p> <ul style="list-style-type: none"> • Worker camp sitting: consultation surrounding potential construction camp sites revealed concerns regarding the location (in particular, proximity to towns and villages) of proposed sites for Worker Camps; • Tension between Communities and Workers: cultural differences, behavior of construction workers, potential disregard for local cultural norms, potential for prostitution and the attraction of “hangers on” at camp sites could lead to increased tension between local communities and the workers and camps. The scale of this impact will depend on successful implementation of mitigation measures and in part on the origin of the workforce staying in construction camps. Some communities have expressed particular concerns in this regard. 	<p>Social</p> <p>In order to minimize social disturbances as a result of construction workers, existing camps from previous projects were identified as a first preference. State land was a second preference for Worker Camp locations, followed by land where there is a willing lessee;</p> <p>The project will seek to avoid sitting camps where their presence might contribute to any conflicts between villages;</p> <p>Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values;</p> <p>Training will be provided to all staff, both national and expatriate, on camp management rules and overall discipline and cultural awareness. This will include, in appropriate languages:</p> <ul style="list-style-type: none"> • A briefing on Camp Rules; • A community relations orientation to increase awareness about the local area, cultural sensitivities and the project Code of Conduct; • Awareness-raising on health considerations, including STDs. <p>The construction contractor is required to develop a Construction Camp Management Plan to address:</p> <ul style="list-style-type: none"> • Discipline; • Community liaison; • Ethnic tensions; • Market distortion (see employment and local sourcing mitigation); and • Communicable diseases.

	A Code of Conduct and Camp Rules will be required within the Construction Camp Management Plan, which provides policies and a disciplinary framework with respect to worker behavior.
Camp Location The final location and number of sites will be determined by the construction contractors and agreed with the NHA.	Camp Location The construction contractor will be required to assess the environmental/social sensitivity of any additional or alternative sites prior to their approval for adoption.

261. Some additional mitigation measures will include:

- All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites;
- The contractor(s) will provide plan for removal and rehabilitation of site upon completion;
- Photographical and botanical inventory of vegetation before clearing the site; and
- Compensatory plantation to be scheduled when construction works near completion.

6.3.7 Health and Safety

a) Occupational Health and Safety

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

263. Mitigation measures will include;

- Obligatory insurance against accidents for labourers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;

- Layout plan for camp site, indicating safety measures taken by the contractor, e.g. fire fighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers;
- Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines;
- Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;
- Proper maintenance of facilities for workers will be monitored;
- Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves etc;
- Ensure strict use of wearing these protective clothing during work activities;
- Elaboration of a contingency planning in case of major accidents;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads.

b) Community Health and Safety

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

Mitigation measures will include:

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

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

6.3.8 Borrow/ Open Pits

265. 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.

266. Borrow/ Open pits may also result in potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife. This will also degrade hygienic condition of the project area. Plan for closure and rehabilitation of the borrow pit sites will be prepared and implemented and is attached as an **Annexure VII**. This impact is permanent and minor negative in nature.

267. Mitigation measures will include:

- Conversion of borrow pits into fish farms and care in selection of borrow areas;
- Necessary permits must be obtained for any borrow pits from the competent authorities;
- No excavations are allowed within distance of 500 m to ROW;
- In borrow pits, the depth of the pit will be regulated so that the sides of the excavation will have a slope not steeper than 1:4;
- Soil erosion along the borrow pit shall be regularly checked to prevent / mitigate impacts on adjacent lands; and

- In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites.

6.3.9 Pollution Prevention and Abatement

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

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

a) Air Quality

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

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

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

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

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

Air Sensitive Receivers

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

274. Based on the criteria set out above, the representative ASRs have been identified close to the Project Site and a brief description of the representative ASRs is presented in **Table 6.7**.

Table 6.7: Air Sensitive Receivers (ASRs)

SR. No.	ASRs	Location	Use
1	Govt. Primary School Boys	Jaber	Institutional
2	Govt. Primary School Boys	Padarah	Institutional
3	G. P. School	Padarah	Institutional
4	Mosque	Padarah	Worship Place
5	Mosque	Dhok Pathan	Worship Place
6	Aastana Hazrat Yahya Daud	Dingi Tubewell	Shrine
7	School	Dingi Tubewell	Institutional

SR. No.	ASRs	Location	Use
8	Mosque	Kot Najibullah	Worship Place
9	School	Sirya	Institutional
10	Monument	Jandad	Historical Place
11	Tomb and Mosques	Near Akhoon Bandi	Worship Place
12	Dispensary	Akhoon Bandi	Health facility
13	Monuments	Akhoon Bandi	Historical
14	Mosques	Kalo Mera	Worship place
15	Monument	Kalo Mera	Historical
16	Thick Population	Padarah	Residential
17	Scattered Population	Khoi Dara	Residential
18	Scattered Population	Moriyan	Residential
19	Thick population	Mohri	Residential
20	Thick Population	Jahar Village	Residential
21	Scattered Population	Bhandri siriya	Residential
22	Scattered Population	Meher Ali Khan	Residential
23	Scattered Population	Jandad Village	Residential

275. Mitigation measures will include:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor's camps should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations. Regular water sprinkling of the Site should be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions;
- Quarry areas and asphalt plants should be located at least 500m downwind from populated areas, wildlife habitats and contractor's camps to minimize the impact of dust emissions;
- Asphalt, hot mix and batching plants should be equipped with dust control equipment as a pollution preventive measure such as fabric filters or wet scrubbers to reduce level of dust emissions;
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works; and
- Ensure precautions to reduce the level of dust emissions from hot mix plants, crushers and batching plants e.g. providing them as applicable, with protection canvasses and dust extraction units. Mixing equipment should be well sealed and equipped as per existing standards.

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

- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;
- All excavation work should be sprinkled with water;
- Construction workers should be provided with masks for protection against the inhalation of dust;
- Vehicle speed in the project area should be prescribed not more than 20 km/ hr and controlled accordingly; and

- Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases.

b) Noise

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

278. **Tables 6.8** illustrate maximum permissible noise levels for different situations and is given below;

Table 6.8: 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

Noise Level dB (A)	Situation
70	Normal road traffic near residential areas

Source: "Environmental Degradation" by Engr. Col. Mumtaz Hussain

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

280. According to **Table 6.9** given below, which presents the damage risk criteria for hearing loss, noise level above 110 dB(A) can be tolerated for half an hour only.

Table 6.9: Damage Risk Criteria for Hearing Loss

Sr. No.	Maximum Allowable Duration per day (Hours)	Noise-Level in dB (A)
1	8	90
2	6	92
3	4	95
4	3	97
5	2	100
6	1 ½	102
7	1	105
8	½	110
9	¼ or less	115 (Max.)

Source: Occupational Safety and Health Administration, OSHA, USA

Noise Sensitive Receivers

281. Representative noise sensitive receivers (NSRs) were identified during the site visit of the project area. As some of the part of the project area is highly residential with the structures along the roads on both sides of the proposed alignment, therefore, the first layer of these noise sensitive receivers provides

acoustic shielding to those receivers behind them. The noise sensitive receivers include the following:

Residential Uses	:	All domestic premises including temporary housing
Institutional Uses	:	Schools
Worship Places	:	Mosques
Others	:	Dispensary, Hospitals

Table 6.10 summarizes the selected NSRs for the noise impact assessment.

Table 6.10: Noise Sensitive Receivers (NSRs)

SR. No.	NSRs	Location	Use
1	Boys Primary School	Jaber	Institutional
2	Govt. Primary School Boys	Padarah	Institutional
3	G. P. School	Padarah	Institutional
4	Mosque	Padarah	Worship Place
5	Mosque	Dhok Pathan	Worship Place
6	Aastana Hazrat Yahya Daud	Dingi Tubewell	Shrine
7	School	Dingi Tubewell	Institutional
8	Mosque	Kot Najibullah	Worship Place
9	Steel Mill	Kot Najibullah	Commercial
10	School	Sirya	Institutional
11	Monument	Jandad	Historical Place
12	Tomb and Mosques	Near Akhoon Bandi	Worship Place
13	Dispensary	Akhoon Bandi	Health facility
14	Monuments	Akhoon Bandi	Historical

SR. No.	NSRs	Location	Use
15	Mosques	Kalo Mera	Worship place
16	Monument	Kalo Mera	Historical
17	Thick Population	Padarah	Residential
18	Scattered Population	Khoi Dara	Residential
19	Scattered Population	Moriyan	Residential
20	Thick population	Mohri	Residential
21	Thick Population	Jahar Village	Residential
22	Scattered Population	Bhandri siriya	Residential
23	Scattered Population	Meher Ali Khan	Residential
24	Scattered Population	Jandad Village	Residential

Construction Noise Modeling

282. For the prediction of noise generated from the machinery used for the construction activities and its effect on the Noise Sensitive Receiver (NSR), a model was developed by performing calculation on the excel sheet.

Methodology

283. Construction equipment sound levels are the sound levels emitted by equipment under actual field operating conditions. Construction equipments operate under two primary modes – mobile and stationary. Mobile equipment such as dozers, scrapers etc., operate in a cycles in which full power is followed by reduced power. Stationary equipment can be subdivided in two groups: one group such as compressor, batching and asphalt plants and generator which operate at constant power while the jack hammers, auger drill, falls into impact machinery with instantaneous sound levels. The following steps were taken to develop the noise model to predict the hourly equivalent noise levels at the site:

- Identification of main construction operation or phases;

- Equipment used to complete each construction phase;
- Determination of the peak noise levels and minimum noise level for a work cycle of equipments;
- Determination of hourly equipment equivalent noise level at the receptor by considering the distance between the receptor and equipment and also the usage factor;
- Determination of expected cumulative hourly equivalent noise level at the site from different construction operations. Results of the noise modelling are attached as **Annexure – X**, which shows the projected noise level will be 107 dB(A), 101 dB(A), 98 dB(A), 95 dB(A) and 93(A) for 20m, 40m, 60m, 80m and 100m distances respectively. The results of the modelling show the worst case scenario when all equipments are operating at the same time which is least likely to occur.

284. All mitigation measures mentioned below should 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 up-to-date and well maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices;
- Confining excessively noisy work to normal working hours in the day, as far as possible;
- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use;
- Preferably, restricting construction vehicles movement during nighttimes;
- Heavy machinery like percussion hammers and pneumatic drills should not be used during the night without prior approval of the Client;
- Vehicles and equipment used should be fitted, as applicable, with silencers and properly maintained;
- Use of low noise machinery, or machinery with noise shielding and absorption;
- Contractors should comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures;

- Noise barriers in sensitive areas in the form of high boundary walls (concrete or wood), earth berms, etc. in front of schools, hospitals and mosques;
- Public hearings to discuss appropriate solutions and materials to control noise (e.g. mud or brick walls, bushes, etc.); and
- Locating the rock crushing, concrete mixing, and materials shipment yards at least 2km from residential areas, particularly schools, hospitals, and nursing homes will also help reduce local noise levels. Such activity taking place near or through villages will broadcast continuous noise in the 70–80 dB (A) range or above.

c) Waste and Hazardous Waste

285. Due to construction activities, waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and solid waste etc. As the project deals with the construction of the road, so no hazardous waste will be generated during the construction waste. But the handling and storage of oil, asphalt/bitumen may be a source of environmental pollution as a hazardous waste. This will result in unhygienic conditions, health risk to work force and public at the camp site. This impact is temporary and minor negative in nature.

286. Mitigation measures will include:

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

- Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;
- Reusing bitumen spillage;
- Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at-least 0.5m);
- Used oil should be collected in separate containers stored on impervious platform with restricted access and must be sold to licensed contractor and the burning of waste oil should be strictly restricted;
- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;
- Collecting and stockpiling excessive bituminous material for reuse or controlled disposal;
- Training of employees involved in the transportation of hazardous material regarding emergency procedures;
- Providing the necessary means for emergency response on call 24 hours/day;
- The sewage system for camps will be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters; and
- Lined wash areas will be constructed within the camp site or at site, for the receipt of wash waters from construction machinery.

d) Green House Gas (GHG) Abatement

287. The main sources of green house gases (CO₂, CH₄, NO_x etc.) during the construction activities of the proposed Expressway will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants. Emission of green house gases cause global warming and other climatic changes on regional and global scale. There might be a minor increase in GHGs in case of the increase in the number of the machinery for upgradation of the four lane expressway to a six lane motorway, but that can be mitigated with the measures mentioned below.

288. Mitigation measures will include:

- Regular motioning of the vehicles for engine efficiency;
- Avoid any unnecessary work and transportation;
- Alternative energy resources should be considered where possible;
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.

6.3.10 Resource Conservation

289. Almost all the materials to be used in the construction of Expressway are non-renewable and therefore their sustainable use is necessary for the future use. Large quantities of water are used in the construction of concrete structures and in watering the unfinished surfaces. Use of water is of major concern while developing resource conservation strategy. Although plenty of water is available in the project area but its use might affect the community water consumption. Other construction material like aggregate and sand are locally available and there is no concern of scarcity in future use. Bitumen is not locally produced and its sources are not locally available so its sustainable use is prerequisite.

290. Mitigation measures will include:

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

6.3.11 Energy Efficiency

291. Use of electricity will be insignificant. Diesel and residual fuel oils will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not to continue future use but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important. Electricity shortage is not expected but the sustainable use of diesel and residual fuel is necessary.

292. Mitigation measures will include:

- Ensure adequate insulation to reduce heat loss through batching plants;
- Regularly monitor CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes;
- Maintain clean heat transfer surfaces in asphalt batching plant;
- Regular service of the vehicles and batching plants will reduce the mechanical losses of energy.

6.3.12 Surface and Groundwater

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

294. There is a possibility that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater, if they are not handled properly. During the construction phase, the sanitary wastewater will be generated at the workers' camp(s). If this wastewater is allowed to stagnate in water ponds on the site, it can percolate into the soil, thereby, contaminating groundwater. This impact is temporary and minor negative in nature.

Sensitive Water receivers

295. The assessment area for the water quality assessment is normally taken as all the areas within 5 km of the project boundary. The water sensitive receivers were identified. The proposed method of construction and operational activities of the project were reviewed and potential sources of water quality impact that may arise during the construction and operational phase were described. Identified Water Receivers (ESRs) in and around the project area are listed below as **Table 6.11**.

Table 6.11: Water Sensitive Receivers

SR. No.	WSRs	Location
1	Haro River	-
2	Dor River	-
3	Rakh Bhallar	Kalo Pind
4	Tabbi Kas	Kalo Pind
5	Dotal Kas	Kot Najibullah
6	Lonnar kas	Ganja Kamala
7	Gadawa Nullah	Siriya
8	Seth Kas	Doyian Village
9	Chalhra Kas	Meher Ali Khan
10	Lahoria Kas	Meher Ali Khan
11	Nullah	Near Noshera

296. The need for mitigation measures to reduce any identified adverse impact on water quality to acceptable levels was established.

297. Mitigation measures will include:

- Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;

- The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements;
- water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- For construction purposes, water shall be drawn from surface water bodies on priority and as available;
- Regular water quality monitoring according to determined sampling schedule;
- The contractor shall ensure that construction debris do not find their way into the drainage or irrigation canals which may get clogged;
- Work on irrigation canal areas will be kept to a minimum, protective walls be (re-constructed);
- To maintain the surface water flow/drainage, proper mitigation measures will be taken along the Expressway, like drainage structures in urban areas;
- 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;
- Take precautions construct temporary or permanent devices to prevent water pollution due to increased siltation;
- Wastes must be collected, stored and taken to approved disposal site; and
- Maintenance workshop, material yard, crushers, asphalt plant and construction camps should not be sited within 1 km of water resources.
- Septic tanks, Settling ponds, washing yards shall be established to control the wastewater and sediment loadings near construction camps.

6.3.13 Biodiversity Conservation and Natural Resource Management

Flora

298. Trees are vital ecosystem, which perform variety of functions for the improvement of environment such as reduction in air pollution, noise abatement, cooling effect on earth, supply of oxygen etc. Due to the expressway under construction and even due to the proposed two lanes in already acquired ROW,

about 27,500 numbers of trees of different species and belonging to different age groups will be cut.

299. The trees coming in the ROW are mostly Phulai, Eucalyptus, Shisham, Kikar, Mulberry, Poplar, Willow etc.

300. No new construction camps and the warehouses for storage of equipment will be constructed for the proposed two lanes. The already established contractor's camps and warehouses for storage of equipment, material etc. will be used and their construction has already involved clearing of vegetation from the area causing a negative impact. During the entire construction period, dust laden polluted air will form a dust film on the leaves, thus blocking sunshine and stomata, thereby hindering photosynthesis process and causing a detrimental effect on plant health. Also during the construction activities, the contractor's workers may damage the vegetation including trees (for use as firewood to fulfill the camp's requirements).

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

302. Mitigation measures will include:

- The indigenous trees most suited to the tract like Neem, Sheesham, Simal, Gul-e-Nishtar, Peepal, Alstonia, Bottle Brush, Siris, Amaltas etc will be re-planted in ROW. The land requirement for plantation has already been included in the ROW of the Expressway;
- Flowering and fruiting shrubs will be planted along the Expressway to beautify the landscape. Planting would however be done keeping in view the principles of landscape designing;
- An awareness campaign targeted on the neighborhood farmers shall be run to popularize the planting of trees; and
- Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides;
- The contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands;

- Construction vehicles, equipments and machinery will remain confined within their designated areas of movement;
- Contractor will supply gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed;
- Camp sites and asphalt plants will be established on waste/barren land rather than on forested or agriculturally productive land. However if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to the trees, under growth and crops; and
- Compensation for trees required to be cut on account of their coming in the ROW of Expressway must be paid to farmers/owners in accordance with market rates.

Fauna

303. The usual fauna found in the project area have already been mentioned earlier in Section-4. Due to the implementation of the proposed Expressway Project, the free movement of fauna would be disturbed as the construction of the Expressway will restrict their free movement. Another impact on the fauna of the project area will be the probable dislocation of the birds/animals (rodents) from their nests and burrows.

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

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

306. Mitigation measure will include:

- Plantation of large number of trees along the proposed Expressway to regain the ecological habitat;
- New and good condition machinery with minimum noise will be used in construction;
- Animal corridors must be provided along the whole alignment wherever necessary;
- Noisy work will not be carried out in night time so that there should be no disturbance to local birds and animals;
- Contractor will ensure that the no hunting, trapping of animal will be carried out during construction;
- Borrow pits will be fenced so that no animal can fall into these;
- The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly waste of the camps will be properly disposed off to prevent the chances of eating by wild animals, which may prove hazardous to them;
- Special measures will be adopted to minimize impacts on wild birds such as avoiding noise generating activities during the critical period of breeding; and
- Alternate nesting facilities shall be tried for those birds disturbed during hatching season.

6.3.14 Disposal of Mucking Material

307. Inevitable cut and fill earthwork operations will open up scars on the land around the project area. This impact is temporary and minor negative in nature.

308. Mitigation measure will include proper landscaping, which should be given due consideration along with re-establishment of the local/indigenous vegetation. The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.

6.3.15 Disruption of Existing Public Utilities/ Infrastructure

309. There may be some disruption to the already existing utilities like electricity poles, underground telephone lines, power transmission lines, water courses, small village roads, etc. in the project area during the construction phase. These impacts are, however, temporary and minor negative in nature.

310. Mitigation measures will include rehabilitation of existing utilities before construction to avoid any inconvenience to the residents of the project area or provide them with alternate arrangement during the construction period.

6.3.16 Traffic Management

311. Due to the proposed construction activities, proper traffic management may pose a challenge in the project area, particularly, where the construction of Interchanges, underpasses and Flyover will take place. This may result in traffic jams and cause inconvenience to the people passing through the project area due to movement of vehicles carrying construction materials. It will also increase the traffic load on the existing road network, thus deteriorating the existing condition of the road. Also, the movement of vehicles along the haulage routes may cause soil compaction and alteration of percolation, vegetation pattern and damage to properties and utilities. This impact is temporary and minor negative in nature.

312. Mitigation measures will include:

- Proper traffic management plan will be needed to avoid traffic jams/public inconvenience;
- Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents;
- Coordinated planning of traffic diversions by the traffic police and the Transport Department in accordance with the construction programme with advance warnings to the affected residents and road users;
- Construction vehicles, machinery and equipment will move or be stationed in the designated ROW to avoid un-necessary compaction of soil.
- Availability of continuous services of the police in the diversion and control of traffic; and

- The executing agency is required to maintain liaison between the Highway/Traffic Police, local residents/ travelers and the contractor to facilitate traffic movement during construction stage.

6.3.17 Waste Disposal

313. Due to construction activities, waste will be generated at construction and contractors camp site. This may result in health risk to work force and public, if disposal site is improperly selected and operated. This impact is temporary and minor negative in nature.

314. Mitigation measures will include:

- The waste generated from the camp site will be disposed off through Municipal Committee;
- Burning of waste will be prohibited; and
- Solid Waste will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan.

6.3.18 Economic Activity

315. Due to the construction of the proposed Project, economic activity will be generated in the project area as the labourers and semi-skilled staff will have an opportunity to work in the project area. This will provide them an opportunity to develop their skills and capacities. This is a moderate positive impact.

6.3.19 Lifestyle and Culture

316. There are chances of arising of issues related to cultural differences/conflict between the Contractor's workforce and the local inhabitants, conflicts arising due to the mix of local and migratory job seekers as the use of local resources and products will be increased. In this situation, local residents may resist Contractor's workforce attitudes, cultural clashes particularly when local/international contractors are engaged, social disturbance and dissatisfaction with employing outsiders, competition for natural resources e.g. with

farmers/livestock raisers etc may arise . This impact is temporary and minor negative in nature.

317. This impact can be mitigated by adopting the following mitigation measures:

- Timely and full public consultation and announcement of mobilizing equipment;
- Establishment of formal links with affected communities;
- Plan for social grievance redress mechanisms including the Nazims of Union Councils and community leaders;
- Seek assistance from and cooperation with local NGOs;
- Familiarize outside labourers on local etiquettes;
- Local labour should be employed for construction works; and
- Water supply and sanitation facilities, Contractor's workforces should not exacerbate the existing shortages and environmental hazards; contractor should primarily seek their own sources of water in due distance (min. 1 km) from local user's wells.

6.3.20 Wastage of Fertile Plough Layer

318. The fertile plough layer of 80 meter ROW will be wasted if the construction of the proposed Expressway is carried out on top of the fertile layer. For the construction of the proposed Project, about 5,952 Kanals of land will be acquired. This is permanent and minor negative impact.

319. This impact can be mitigated by utilizing the soil excavated to reclaim the nearby borrow pits/ excavated areas for landscaping along the proposed Expressway.

6.3.21 Impacts of Heavy Vehicles on the Existing Road Network

320. The plying of heavy vehicles on the existing road network may result in air pollution (if unpaved roads), noise pollution due to tire-road friction especially near sensitive receptors (residential areas, school, health facility etc.), and damage to roads and traffic congestion. However, the impacts would be

temporary and moderate negative in nature for which the following mitigation measures are proposed:

- Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitted side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin shall be properly secured and extended to at least 300 mm over the edges of the sideboard and tailboard;
- Where dust emissions are high, diversion tracks, if required, shall be overlain with shingle or surface treated. Diversion roads in built-up areas shall be established and scheduled to minimize traffic congestion;
- The Contractor shall not use any vehicles either on or off road with grossly excessive noise pollution. In case of built-up areas, noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the Contractor;
- The Traffic Management Plan shall be prepared, which will comprise strengthening and widening of the existing minor and major roads or construction of new temporary roads; and
- The traffic on the existing roads shall be managed by NHA in cooperation with the local traffic police department in order to avoid traffic accidents and congestions causing unnecessary delays.

6.4 Anticipated Impacts during Operational Phase

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

6.4.1 Biodiversity Conservation and Natural Resource Management

Flora

322. No negative impacts are envisaged on the flora of the area during the operational phase. However, improper maintenance of the saplings planted against the trees cut for the proposed Project may adversely affect the growth of those saplings which were planted to improve the environmental aesthetics of the project

area. Raising of new trees in two rows on either side of the Expressway (except the bridges), shall render a positive impact on the flora of the area and will also cause a positive impact on the landscape of the area, which shall be of permanent in nature.

323. Presence of adequate flora will absorb CO₂ gas, through photosynthesis, emitted from an expected large number of cars, vehicles and public transport, thus purifying air of hazardous particles.

324. Mitigation measure will include planting of 185,000 number of plants along both sides of the expressway, in accordance with the tree plantation plan.

325. Although it shall take 10-15 years, before these plants become trees, this planting on Expressway, shall not only compensate for the loss of trees, but shall contribute towards improvement of flora and environment of the tract.

Plantation Plan

326. Three rows of plants will be raised on either side of the proposed expressway i.e. Western side and Eastern side. Outer row will be planted at a distance of 2 meters from the outer boundary fence. This row will consist of large, shady and evergreen trees. No invasive species would be introduced. Recommended trees are given in **Table 6.12**.

Table 6.12: Trees to be planted in First (outer) Row

Sr. No.	Local Name	Scientific Name
1.	Neem	Azadirachata indica
2.	Bahera	Terminalia beleria
3.	Shisham	Dalbergia sissoo
4.	Asmani	Ailanthus altissima
5.	Simal	Bombax ceiba
6.	Gul-e-Nashtar	Erythrina suberosa
7.	Peepal	Ficus religiosa

327. Second row shall be planted at a distance of 2 meters from the outer fence. This row will consist of plants with small to medium height. These plants should preferably be ornamental. Trees recommended for this second row are given in **Table 6.13**.

Table 6.13: Trees to be planted in 2nd Row

Sr. No.	Local Name	Scientific Name
1.	Alstonia	Alstonia scholaris
2.	Bottle Brush	Callistemon lanceolatus
3.	Jacarand	Jacaranda mimisofolia
4.	Magnolia	Magnolia grandiflora
5.	Sirris	Albizzia lebbek
6.	Kachnar	Bauhinia variegata
7.	Amaltas	Cassia fistula
8.	GulMohar	Poinciana regia
9.	Sukh Chain	Pongamia glabra

328. Three rows of plants will be raised on either side of the proposed Hasanabdal-Havellian Expressway. Plant to plant distance will be kept as 2 meters, so there will be 500 plants in one row of one Km length. As total road stretch is 60 km in length, therefore, number of plants to be raised one kilometer length, on both sides will be 3000.

329. Therefore, the number of plants, which can be grown along the entire length of the Expressway section of E-35, are (3000 x 60) 1,80,000. We can safely add, another 5,000 plants, which will be raised along the six interchanges to be built along the Expressway. These plants are to be planted along the side roads and within the loops.

330. The saplings planted in the project area against the trees affected would be properly maintained with the help of Forest Department throughout their initial growth period in terms of water requirement and necessary nutrients. Therefore, proper care of newly planted trees will need special care;

331. An awareness campaign targeted on the neighbourhood farmers will be run to popularize the planting of trees; and

332. Organic manuring will be encouraged to minimize the use of chemicals.

Fauna

333. The Project activities will bring some negative impacts on the fauna of the project area such as the uneasiness of movement and increased probability of accidents, if the animals/live stock approach the proposed Expressway. This impact is permanent and minor negative in nature. Noise and air pollution caused due to heavy and fast traffic on Expressway, shall be a source of disturbance to the fauna of the area and especially to the avifauna of the area, which is an another minor negative impact.

334. Raising of dense plantation of shady trees on both sides of the Expressway shall provide resting, nestling and roosting habitat to the fauna and especially to the avifauna which is a major positive impact.

6.4.2 Surface and Groundwater

335. No major adverse impact on groundwater is anticipated during the operational phase with the exception of some occasional oil spills, which may be restricted upto the road surface, however, may be sometimes washed into groundwater during rains etc.

6.4.3 Pollution Prevention and Abatement

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

337. During the construction phase, gaseous emission may occur from vehicles and road maintenance works. The impacts of different project activities and their appropriate preventive and abatement techniques and mitigation measures are discussed below:

a) Air Quality

338. Improvement in road condition will help reduce traffic related emissions in the short term by allowing a smoother traffic flow. However, in the longer run, increased traffic levels and congestion will lead to PM₁₀ pollution levels above the

international standards, which may result in causing public health risks, nuisance and other impacts on bio-physical environment.

339. These conditions will result in the rise of vehicular emissions (CO, NO_x, SO_x, PM₁₀) associated with the adverse effects on the environment and human.

340. This impact is permanent and positive, in case of improvement of road conditions and minor negative, when traffic volume is increased.

341. Mitigation measures will include:

- Setting up of a system to monitor air quality along project area in accordance with the applicable standards/limits;
- Helping the owners and occupants of the affected premises to identify and implement special measures such as hedges and vegetation to reduce air pollution;
- Roadside tree plantations as applicable and feasible under harsh climatic conditions; plants should be selected in accordance to their ability to absorb emissions;
- Regular road maintenance to ensure good surface condition;
- Speed limits at sensitive locations;
- Monitoring air quality at defined schedule;
- Regular vehicle check to control/ensure compliance with NEQS; and
- Enforcement and penalties against traffic rules violators.

b) Noise

342. During the operational phase, the noise levels are anticipated to increase due to traffic related noise pollution; vibrations from engines and tires and mainly use of pressure horns. This impact is permanent and moderate negative in nature.

343. Mitigation measures will include:

- According to monitoring results, additional sound barriers in form of trees and hedges will be discussed with the affected people and planted if agreed;
- Signs for sensitive zones (health centers / educational institutions etc.) to disallow the use of pressure horns; and

- Enforcement and penalties against traffic rules violators.

c) Wastes/ Hazardous Waste

344. During operation phase Non-hazardous waste may be road sweepings or small quantities of municipal waste from highway offices. No hazardous waste is expected to generate in operation phase except during road maintenance works. Transportation of hazardous waste is also expected and must be regulated.

345. Mitigation measures will include:

- Solid Waste generated during from offices will be properly disposed off through local solid waste management system;
- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information of containers will be checked at toll plazas;
- Providing the necessary means for emergency response on call 24 hours/day;
- Management of hazardous waste during road maintenance works will be similar as given for construction phase.

6.4.4 Road Safety

346. Enhanced vehicular movement and speed in the long run may result in road safety issues like traffic accidents. This impact is permanent but moderately adverse in nature, since the frequency of accidents may be lowered, but their intensity may be quite severe due to enhanced speeds at which vehicles will move.

347. Mitigation measure will include strict enforcement of speed limits, installation of speed guns and channelization of traffic with respect to categories (heavy vehicle traffic and light vehicle traffic) and enforcement of penalties for the violators.

6.4.5 Deterioration of Vehicles

348. During the operation of the proposed Expressway, lesser wear and tear of the vehicles will occur and it will also result in lesser fuel consumption and decrease in operating cost. This impact is permanent and has a major positive impact.

6.4.6 Landscape

349. At present, the landscape of the project area is dominated by open agricultural fields. However, after the construction of Hasanabdal – Havelian section of E-35 Expressway, the landscape of the project area will be changed in terms of road infrastructure (two-lane dual carriageway), construction of bridges & flyovers, interchanges, and planned plantation of trees along the Expressway. This will permanently change the landscape of the project area due to loss of agricultural land and cutting of hills, but at the same time will have a positive impact in terms of socio-economic development of the project area.

6.4.7 Community Development

350. Improved communication infrastructure will promote new business opportunities. In addition such an activity will also increase the land value that will benefit the local residents. This impact will be permanent and major positive in nature.

SECTION - 7

ECONOMIC ASSESSMENT

7.0 General

351. This section includes the overall economic benefits in relation to environmental cost resulting due to implementation of the proposed Project.

7.1 Economic Benefits

352. The economic benefits resulting due to the implementation of the proposed Project will include;

- Improved communication infrastructure will promote new business opportunities;
- Increase in value of land in the project area resulting due to gentrification effects;
- During the operation of the proposed Expressway, lesser wear and tear of the vehicles will occur which will decrease the vehicle operating cost due to better road conditions;
- The proposed Expressway will also improve the fuel consumption of the vehicles;
- Less time will be required for travelling and reaching the destination;
- Economic activity will be accelerated by providing smooth access to nation wide markets;
- As a result of job opportunities, local labour will be accommodated during the construction phase of the project; and
- Decreasing the vehicle operating cost due to better road conditions.

7.2 Environmental Costs

353. The total environmental cost has been worked out to be Rs.605, 703,152 (Rs. 605.7 million). This includes Rs.557,027,152 (Rs. 557.03 million) resettlement cost and Rs.48,676,000 (Rs.48.6 million) environmental monitoring, environmental training and tree plantation cost. This cost has been added to the total Project cost and the Economic Internal Rate of Return (EIRR) was 36% which was well above 12% the assumed opportunity cost of Capital in Pakistan, thus rendering this project economically viable for implementation (Feasibility Report June 2005 Economic Analysis).

SECTION - 8 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

8.1 Environmental Management

354. To implement the recommendations and suggestions for environmental protection included in Section - 6, a comprehensive management plan is needed.

355. 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 proposed 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 programme 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.

356. For effective environmental management, the Client should assign the necessary responsibilities to Deputy Director Environment (EALS), which should be responsible for Environmental Monitoring of the proposed Project. The Deputy Director (DD) Environment will be assisted by an Environmental Engineer and a Sociologist in implementing the mitigation measures proposed in the EMP.

357. The Contractor will be responsible for the implementation of the proposed Project under the direction of "Supervision Consultant (SC)" and NHA (EALS). The Contractor should be bound to follow the provisions of the contract documents especially about environmental protection and apply good construction techniques and methodology without damaging the environment. Obligation of the contractor, to safeguard, mitigate adverse impacts and

rehabilitate the environment should be addressed through environmental provisions in the contract document as already highlighted in Section-6 and through adequate implementation at site.

8.2 Institutional Responsibilities

358. Following functionaries will be involved in the implementation of EMP:

- EALS (NHA);
- Environmental Engineer (EE)/Officer of Supervision Consultant (SC);
- Environmental Engineer/Officer of Contractor.

The duties/responsibilities of the functionaries are discussed below:

8.2.1 Responsibilities of EALS (NHA)

359. NHA (EALS) will be responsible for the environmental management and supervisory affairs during the construction phase of the proposed Project. Director Environment (EALS) will designate the Deputy Director Environment who will look after the environmental related issues during the construction phase. The responsibilities of DD Environment are as follows:

- Coordinating and planning of activities of EALS;
- Monitoring progress of the project as per planned schedule of activities;
- Exercising oversight over the implementation of environmental mitigation measures by the contractor;
- Guiding the Environmental Specialist by providing appropriate environmental advise and solutions;
- Documenting the experience in the implementation of the environmental process;

- Preparing training materials and implementing programs;
- Maintaining interfaces with the other lined departments/ stakeholders; and
- Reporting to the Bank/EPD on status of EMP implementation.

8.2.2 Responsibilities of Environmental Engineer of Supervision Consultant

360. Environmental Engineer/specialist of SC will oversee the performance of contractor to make sure that the contractor is carrying out the work in accordance with SSEMP/EMP as mentioned in the contract documents. The Environmental Engineer/Specialist will also provide assistance to the Contractor's Staff to implement EMP. Package wise Site Specific Environmental Management Plan (SSEMP) will be prepared by the contractor under the supervision of EE of SC. The SSEMP would be approved by the EALS (NHA) and ADB. EE of SC will provide guidance to the contractor's EE for implementing each of the activity as given in EMP. EE of SC will be responsible for record keeping providing instruction through the "Resident Engineer (RE)" for corrective actions and will ensure the compliance of various statutory and legislative requirements. EE will maintain the close coordination with the contractor and EALS for successful implementation with environmental safeguard measures. However, overall responsibilities of EE of SC are as follows:

- Directly reporting to the RE;
- Discussing various environmental issues and environmental mitigation, enhancement and monitoring actions with all concerned directly or indirectly;
- Review contractor's SSEMP, and any revised SSEMPs prepared to address additional impacts due to the construction of the proposed additional two lanes as part of their work program;
- Inspect, supervise and monitor all the construction and allied activities related to the EMP for the project;
- Visiting construction sites including incomplete construction work sites, where there is no contractor's activities, active construction work sites, completed areas of work sites as well as ancillary sites such as borrow areas, quarries,

asphalt and crusher sites, hot mix plant sites, construction camps and work shop areas etc. to ensure contractors compliance with EMP stipulations and conditions of statutory bodies;

- Assist the RE to ensure the environmental sound engineering practices;
- Assisting contractor and EALS in all matters related to public contacts including public consultation pertaining to environmental and community health & safety issues;
- Assisting EALS to carry out environmental monitoring;
- Organizing training to the EE of contractor and field staff; and
- Preparing and submitting monthly and quarterly environmental progress/ compliance reports to the EALS.

8.2.3 Responsibilities of Environmental Engineer of Contractor

361. Site Environmental Engineer of contractor will carry out the implementation of the mitigation measures at construction site. Contractor will be bound through contract documents to appoint the Site Environmental Engineer/Specialist with relevant educational background and experience. The responsibilities of EE of Contractor are as follows:

- EE of contractor will prepare SSEMP, monitoring plan, traffic control/diversion plan, and asphalt and batching plant area plans and will submit all the plans to the EE of SC. In case of additional impacts due to the construction of the proposed additional two lanes, the SSEMPs will be revised to address the additional impacts.
- EE of contractor will be responsible for the implementation of EMP and to take effective measures against corrective actions plan;
- EE will prepare the compliance reports as per schedule and will submit it to the SC;
- Provision of proper Personal Protective Equipments (PPEs) to the workers and train them for there proper use; and

- EE will conduct the environmental and health & safety trainings to the workers /labor.

8.2.4 Reporting Mechanism and Feedback

362. EE of contractor will prepare and submit the environmental compliance monthly reports to the SC. EE of SC after reviewing the reports will submit the monthly Due Diligence reports based on the contractors' monthly reports to the EALS. Deputy Director of EALS will submit the reports to EPD and ADB. NHA (EALS) shall inform the ADB on any major environmental issues at any time, independently from the schedule of regular reporting. After project completion, NHA (EALS) will be in charge of the operation of the project. NHA (EALS) is responsible for compliance of monitoring plan during operation (**Table 8.8-a**). At the completion of the project, EE of SC will prepare the project completion report based on the periodical progress reports and will submit it to the EALS. Feedback and adjustment will be carried out in two tiers. Upon request for EMP modification by the Contractor, NHA (EALS) will review the proposals in detail and consider their acceptance or rejection. Only those modifications will be considered, which do not contradict to the Conditions of the Environmental Impact Permit. NHA (EALS) will consider comments and suggestions from SC and ADB. Appropriate responses and revisions in the EMP will be implemented, if necessary. The contractor and NHA (EALS) will then implement the modifications.

8.2.5 Non-Compliance of the EMMP

363. The implementation of the proposed SSEMP involves inputs from various functionaries as discussed earlier. 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 monthly compliance reports. However, if the contractor fails to comply with the implementation of EMP and submission of the monthly compliance reports, NHA (EALS) will be responsible for enforcing compliance of contractor with the terms of the contract, including adherence to the EMP. For minor infringements, an incident which causes temporary but reversible damage, the contractor will be given 48 hours to rectify the problem and to restore the environment. If restoration is done satisfactorily during this period, no further actions will be taken. If it is not done during this period, NHA (EALS) will arrange for another contractor to do the restoration, and deduct the cost from the offending contractor's next payment. For major infringements, causing a long-term or irreversible damage, there will be a financial penalty up to 1% of the contract value in addition to the cost for restoration activities.

8.3 Environmental Action Plan

364. The Environmental Action Plan provides the framework for the implementation of the mitigating measures and environmental management during the construction and operation phases of the proposed project. **Tables 8.1** portray impacts, mitigations measures and the responsible organizations for the implementation of the mitigation measures during the construction and the operation phases respectively.

Table 8.1: Environmental Management Plan

Table 6.11: Environmental Management Plan					
Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
A: Design/ Pre-Construction Phase					
1.	Land Acquisition	<ul style="list-style-type: none">▪ Loss of agricultural land (about 1156 acres); and▪ Resettlement Issues	<ul style="list-style-type: none">▪ Mitigation measures will involve careful alignment and route selection by the designer to minimize the impact; and▪ Adequate budget will be provided in the Project cost for the compensation to the affected people as per Land Acquisition Act, 1894 and ADB Safeguard Policy Statement 2009.	DC	NHA (EALS)
2.	Alignment selection	<ul style="list-style-type: none">▪ Accidents due to improper design;▪ Resettlement issues of local people;▪ Disturbance to properties/ businesses; and▪ Tree cutting	<ul style="list-style-type: none">▪ Avoid sharp curves/turns in the design;▪ Assure minimum tree cutting and vegetation clearance during alignment selection; and▪ Selection of the route with minimum dislocation/ resettlement of the structures/residents.	DC	NHA
3.	Social Issues	<ul style="list-style-type: none">▪ Bifurcation of settlements; and▪ Inconvenience in daily business and social activities	<ul style="list-style-type: none">▪ Provision of 22 No. underpasses (after every 2 to 3 km) for the connectivity of the settlements with consultation of the local residents.	DC	NHA
4.	Physical and cultural resources	<ul style="list-style-type: none">▪ Disturbance to people visiting public; properties i.e. mosque, schools, shrines, and graveyards etc.	<ul style="list-style-type: none">▪ Incorporate technical design features to avoid any interference with cultural heritage site and public property as far as possible; and▪ Provide pedestrian and vehicular underpasses in the design to minimize the social issues.	DC	NHA
5.	Biodiversity Conservation and Natural	<ul style="list-style-type: none">▪ Cutting of 27,500 trees of various species i.e. Guava, Phulaj, Sheesham, Kikar,	<ul style="list-style-type: none">▪ Incorporate technical design measures to minimize removal of these trees;	DC	NHA

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
	Resource Management	Eucalyptus, Bakain, Taman, Kau, etc; and ▪ Disturbance of movement of animals due to fragmentation of habitat	<ul style="list-style-type: none"> ▪ Plan for compensatory planting for eight trees against each fallen tree of similar floral function; ▪ Provision of compensation in the Project Budget for the loss of trees to the affected people according to Land Acquisition Act, 1894 and ADB Safeguard Policy Statement 2009 ▪ Disallow introduction of invasive/ exotic species and native species should be recommended for plantation ; and ▪ Provision of animal corridors for the free movement of faunal species, especially, near the attractive sites such as grazing lands, and water bodies. Care should also be taken for provision of crossings for the free movement and access to River Haro of pastoralists coming in the area of influence of the project during different seasons. 		
6.	Shifting of Public Utilities	▪ Disturbance to the public may occur.	<ul style="list-style-type: none"> ▪ Incorporate technical design features to minimize effect on public utilities; and ▪ All public utilities likely to be affected by the proposed project need to be relocated well ahead of the commencement of construction work. 	DC	NHA
7.	Identification of site for construction camps, asphalt & batching plant	<ul style="list-style-type: none"> ▪ Disturbance to the public may occur; and ▪ Tree cutting may involve for the construction of camp site, asphalt and batching plant site. 	<ul style="list-style-type: none"> ▪ Site must be 500m away from the localities & cultural sites and 100m away from the existing road; ▪ Asphalt, batching and crushing plants must be installed in the downwind 	DC	NHA

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
	and crushers		direction of residential areas.		
8.	Excavation of Earth	<ul style="list-style-type: none"> Result in change of edaphic soil characteristics; Loss of fertile top layer of soil; Air quality may also deteriorate; and Stockpile generated during excavation which may be a nuisance. 	<ul style="list-style-type: none"> Designer will not propose the borrow pits on agricultural land unless completely unavoidable; Borrow pits must be 500 m away from ROW; and A detailed Plan for quarry management and Rehabilitation of Borrow Pits must be formulated by the designer in line with the Plans given in Annexure-IV, VII & VIII. 	DC	NHA (EALS)
B: Construction Phase					
1.	Site clearing or Leveling/tree cutting	<ul style="list-style-type: none"> Loss of vegetation may occur; Soil erosion & instability of the soil; Surface water pollution; and Occupational health of workers and community may be affected. 	<ul style="list-style-type: none"> Assure minimum disturbance to native flora during construction especially where the asphalt, batching and crushing plants will be installed; Minimize the amount of clearing. Clear small areas for active work one at a time; Clear without destroying large plants and turf where possible and preserve them for replanting in temporary nurseries; Move earth and vegetation only during dry periods. Store topsoil for re-spreading. If vegetation is required to be removed during wet periods, disturb ground only just before actual construction; Install temporary erosion control features when permanent ones will be delayed especially near River Haro & Dor and 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>nullahs. Use erosion control measures such as hay bales, mulches, straw, or fabric barriers;</p> <ul style="list-style-type: none"> Re-vegetate with recovered plants and other appropriate local flora immediately after equipments are removed from a section of the site; and Stockpiling spoil at designated areas and at least 5m away from traffic lane. 		
2.	Construction crews and camps	<ul style="list-style-type: none"> Construction and operation of crew camps may pollute the surface & groundwater; and Workers working at site may rise conflicts with the locals. 	<ul style="list-style-type: none"> Explore off-site accommodation for crew. Keep camp size to a minimum; Avoid as much clearing of vegetation as possible, for example, by creating defined foot paths; The contractor will provide plan for removal and rehabilitation of site upon completion; Photographical and botanical inventory of vegetation will be prepared before clearing the site; Provide temporary sanitation on site, such as pit latrines (assuming the water table is low enough and soil and geology of appropriate composition); Use local or regional labor; Screen potential crew members for HIV/AIDs, tuberculosis and other communicable diseases; Maintain emergency response system; Locate soakage pits for sewage at least 50m away from any ground water 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			extraction source/hand pump; ▪ Strictly prohibit poaching, and cutting of trees; ▪ Provide adequate quantities and good quality of food; ▪ Provide septic tanks for treating sewage from toilets before discharging through soakage pit; ▪ Drinking water should meet the NEQS and WHO Guidelines; ▪ Provide gas cylinder for cooking; ▪ Water used for construction purpose should be clearly demarcated; and ▪ No domestic pets or livestock should be allowed on the site.		
3.	Material extraction/quarrying	▪ Change in landscape may occur by quarry and borrow areas; ▪ Water ponds may be formed where reproduction of mosquitoes may occur; and ▪ Deterioration of air quality	▪ Identify the most environmentally sound source of materials that is within budget; ▪ Use material from local road cuts first, if possible; ▪ On removal of material, the area should be restored and be treated with erosion control measures; ▪ Take photos of site before initiating excavation so restoration can match original site characteristics as much as practically possible. Restore site quarries and gravel pits so that they are not visible to the road users; ▪ Top soil fertile layer stockpiles shall be convex and not more than 2 meter high. Stockpile should be shaped so that no	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>surface water ponding can take place. Stockpiles should be protected from erosion by wind or rain by providing the cut off drains; it should not be covered with materials like plastic that would lead to start of composting process and kill the seed bank. Stockpile should not be compacted and pushed by bulldozer for more than 50 meter.</p> <ul style="list-style-type: none"> ▪ Monitor adherence to plans and impacts of extraction and modify as necessary; ▪ Restore area so it is suitable for sustainable use after extraction is completed; ▪ Install drainage structures to direct water away from pits; ▪ Controlled blasting should be done at predetermined times; ▪ Implement safety protocols to minimize risks from falling rock or debris, or accidental falls from cliffs ▪ Discuss with local community the option of retaining quarry pits as water collection ponds for cattle, crops, or similar uses; ▪ In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites; ▪ Convert the borrow pits into fish farms and take care in selection of borrow areas; ▪ Provide temporary side drains, catch water banks or sedimentation basin to 		

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			avoid or minimize erosion and prevent sedimentation to receiving water bodies; and ■ A detailed Plan for quarry management, Rehabilitation of Borrow Pits and Blasting Management must be implemented by the contractor in line with the Plans given in Annexure-IV, VII, VIII.		
4.	Construction material storage, handling and use	■ Soil contamination may occur due to mishandling of oil and asphalt; ■ Water may also be contaminated due to the oil spillages if the water source is nearby the storage yard; and ■ Health risk to workers.	■ Material shall be appropriately secured to ensure safe passage between the destinations during transportation. Loads shall have appropriate cover to prevent spillage and contractor should be responsible for any clean up resulting from any failure; ■ Material from borrow site should be directly transported and deposited to the site where it has to be used. Stockpiles should be positioned and sloped to create least visual impact. No foreign material generated or deposited should remain on the site after completion of the activity and the areas affected by stockpiling should be reinstated; ■ Over spray of bitumen products out side the road surface on the road vegetation should be prevented, especially to the area where agricultural land is located on either sides of the proposed road; ■ Concrete mixing on the ground shall not be allowed;	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<ul style="list-style-type: none"> Concrete and asphalt batching plant should be equipped with primary or secondary emission control system such as bag filters or cyclones or separators etc; Avoid using sites for storage that drain directly into sensitive areas including agricultural land and water bodies (i.e. Rivers including Haro river, Dor river and Nullahs/irrigation channels including Rakh bhallar, Tabbi Kas, Dotal Kas, Lonnar Kas, Gadawa Nullah, Seth Kas, Chalhra Kas and Lahoria Kas); All runoff from batching plant should be strictly controlled and cement-contaminated water should be collected, stored and disposed off at the designated site; Used empty cement bags should be collected and stored to deliver to solid waste contractor for recycling; Contaminated water storage facilities should not be allowed to over flow and appropriate protection from rain should be implemented; Materials shall not be loaded to a higher level than the side and tail boards and shall be covered with a good quality tarpaulin; Soil contamination by asphalt will be minimized by placing all containers in 		

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			caissons; ■ Collection of oil and lube drips in container during repairing construction equipment vehicles; ■ Provide impervious platform and collection tank for spillage of liquid fuel and lubes at storage area ■ Used oil should be sold to local licensed contractors; and ■ Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas.		
5.	Handling/ transportation of hazardous materials	Toxicity, soil contamination and air pollution are the major impacts, which may occur by mishandling of hazardous waste.	■ Prevent dumping of hazardous materials specially near Rivers and seasonal nullahs; ■ Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc; ■ Emergency Response plan should address the accidental spillage of fuels and hazardous goods; ■ Immediate collection of spilled oils/fuels/lubricants through collection of contaminated soils and skimming oils from surface water through appropriate technologies; ■ Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at least 0.5m); and	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<ul style="list-style-type: none"> Prohibit use of waste oil as cooking fuel. 		
6.	Use and maintenance of heavy equipment and machineries	<ul style="list-style-type: none"> Soil structure may get affected by using the heavy machinery away from the provided routes; and Noise pollution may generate. 	<ul style="list-style-type: none"> Minimize use of heavy machinery; Source-control of noise through proper maintenance of haul equipments; Set protocols for vehicle maintenance and prevent fuel tank leaks by: <ul style="list-style-type: none"> (a) monitoring and cross-checking fuel level deliveries and use; (b) checking pipes and joints for leaks; (c) tightening generator fuel lines; (d) preventing over-filling of main storage and vehicle tanks; Heavy equipment should not be parked under the tree to avoid soil compaction and damage to the roots of the trees; Traffic management plan shall be prepared in cooperation with local traffic police in order to avoid the accidents specially at the junctions of existing roads like at Burhan, Kot Najibullah and Sarai Saleh on N-35. Well maintained equipments will be used to avoid the air and noise pollution especially near the following sensitive receptors: <u>Schools</u> in Jaber, Padarah, Dingi, Seria <u>Mosques</u> in Padarah, Dhok Pathan, Kot Najibullah, Akhoon Bandi, Kalo Mera 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>Monuments in Jandad, Akhoon Bandi, Kalo Mera</p> <p><u>Scattered populations</u> in Khoi Dara, Moriyar, Mohri, Jahar Village, Bande Seria, Meher Ali Khan, Jahandad village</p> <p><u>Aastana Hazrat Yahya Daud</u> in Dingi</p> <ul style="list-style-type: none"> Noise barriers should be provided for sensitive receptors coming within 100m; like, Schools in Jaber, Padarah, Dingi Tubewell, Siriya; Mosques in Padarah, Dhok Pathan, Dingi Tubewell, Kot Najibullah, Akhoon Bandi, Kalo Mera and settlements of Padarah, Khoi Dara, Moriyar, Mohri, Jahar Village, Bhandri Siriya, Meher Ali Khan and Jandad Village; Provide impervious platform and oil and Grease traps for collection of spillage from construction equipment vehicle maintenance platform; The heavy machinery should not be parked haphazardly at undesignated location nor should they be parked idle; The heavy machinery must be operated mostly at night time and must be used least during prayer timings in mosques and school timings; and Temporary noise barriers should be used during construction near sensitive receptors. 		

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
7.	Handling of solid waste	Solid waste may be generated from the active construction sites and also from the camp sites.	<ul style="list-style-type: none"> Training of site personnel in waste management and chemical waste handling procedure; Bitumen waste should be stored in closed containers and placed in a fenced storage area with paved floor; Recording system for the amount of waste generated, recycled and disposed; Proper storage and site practices to minimize the potential for damage or contamination of construction material; General refuse should be stored in enclosed bins to separate from construction material; A reputable waste collector should be employed by the contractor to remove the general refuse from the site; and Presently, there is no engineered landfill site in the project Area, so best practice should be followed dispose off the solid waste by the contractor. 	EE of CC	EE of SC and DD Environment of EALS
8.	Excavation, cutting, and filling	<ul style="list-style-type: none"> Soil erosion may occur at the site where excavation will be done; and Soil un-stability and surface water contamination may also occur. 	<ul style="list-style-type: none"> Cover stockpile with plastic sheeting, prevent run-off with hay bales, or use similar measures; Place fence around excavation; and safety procedures should be followed; Construction crews and supervisors shall be alert for buried historic, religious, and cultural objects and provide them with procedures to follow if such objects are discovered. Provide incentives for 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>recovery of objects and disincentives for their destruction;</p> <ul style="list-style-type: none"> ▪ Ensure excavation is accompanied by well engineered drainage; ▪ Do not fill the flow-line of a watershed as occasional rains may create strong water flows in channels; ▪ Balance the cuts and fills whenever possible; ▪ High embankments will be protected by constructing stone pitching or rip rap across embankments; ▪ Water sprinkling should be carried out at the temporary access road and all the areas prone to dust generation; and ▪ A detailed Plan for proper management of earthworks will be implemented by the contractor in line with the Plans given in Annexure-IV, VII, VIII. 		
9.	Water Resources Management	<ul style="list-style-type: none"> ▪ Contamination of water bodies (River Dor and River Haro) due to construction waste reaching these areas during the project construction 	<ul style="list-style-type: none"> ▪ Protection of surface and groundwater reserves (Haro River, Dor River, Rakh Bhallar, Tabbi Kas, Dotal Kas, Lonnar kas, Gadawa Nullah, Seth Kas, Chalhra Kas, Lahoria Kas Nullah) from any source of contamination such as the construction and oily waste that will degrade its potable quality; ▪ Best practice should be followed to dispose off solid waste to sustain the water quality for domestic requirements; ▪ Water required for construction shall be 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>obtained in such a way that the water availability and supply to nearby communities remain unaffected;</p> <ul style="list-style-type: none"> ▪ For construction purposes, water shall be drawn from surface water bodies on priority and as available; ▪ Regular water quality monitoring according to determined sampling schedule must be done for the water bodies i.e. (Haro River, Dor River, Rakh Bhallar, Tabbi Kas, Dotal Kas, Lonnar kas, Gadawa Nullah, Seth Kas, Chalhra Kas, Lahoria Kas Nullah) ▪ The contractor shall ensure that construction debris do not find their way into the drainage or irrigation canals which may get clogged; ▪ Work on irrigation canal areas will be kept to a minimum, protective walls be (re-constructed); ▪ To maintain the surface water flow/drainage, proper mitigation measures will be taken along the Expressway, like drainage structures in urban areas; ▪ Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond for treatment prior to its discharge in water bodies i.e. (Haro River, Dor River, and seasonal Nullahs). 		

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<ul style="list-style-type: none"> Construction work close to the streams or other water bodies will be avoided, especially during monsoon period; Take precautions construct temporary or permanent devices to prevent water pollution due to increased siltation; Wastes must be collected, stored and taken to approved disposal site; and Maintenance workshop, material yard, crushers, asphalt plant and construction camps should not be sited within 1 km of water resources; and Septic tanks, settling ponds, washing yards shall be established to control the wastewater and sediment loadings near construction camps. 		
9.	Traffic control	<ul style="list-style-type: none"> Traffic jams and congestion may take place and cause inconvenience to the people where the construction of interchanges will take place. 	<ul style="list-style-type: none"> Efforts should be made to accommodate the traffic along the interchanges (Burhan interchange, Kot Najibullah), as far as practically possible; Provision of signboards directing the drivers about the diversion; Providing and maintaining traffic management comprising diversion warning, guiding and regulatory signage, flagmen, channelizers and delineators, lightening etc; Contractor staff could be trained and put on the duty to manage the traffic during the construction activities taking place along the road; 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<ul style="list-style-type: none"> ▪ Availability of continuous services of the police in the diversion and control of traffic; and ▪ Temporary bypass, if possible, should be avoided if it involves clearing of land; and ▪ Max allowable speed for heavy machinery on the site should not exceed 20km/hr. 		
10.	Health & Safety of Workers at active construction and camp site	<ul style="list-style-type: none"> ▪ Health problems or immediate risk may take place. 	<ul style="list-style-type: none"> ▪ Providing basic medical training to specified work staff and basic medical service and supplies to workers; ▪ Layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; ▪ Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers; ▪ Protection devices (ear muffs) will be provided to the workers operating in the vicinity of high noise generating machines; ▪ Provision of adequate sanitation, washing, cooking and dormitory facilities including lighting up to satisfaction; ▪ Proper maintenance of facilities for workers will be monitored; ▪ Provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear for bituminous 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>pavement works, protective goggles, gloves etc;</p> <ul style="list-style-type: none"> ▪ Ensure strict use of wearing these protective clothing during work activities; ▪ Availability of safe drinking water for the workers; ▪ Elaboration of a contingency planning in case of major accidents; ▪ Adequate signage, lightning devices, barriers and persons with flags during construction to manage traffic at construction sites, haulage and access roads; ▪ Timely public notification on planned construction works; ▪ Close consultation with local communities like Kalu, Chapprian, Morian, Aamgah and Khoi Dawan to identify optimal solutions for diversions to maintain community integrity & social links; ▪ Seeking cooperation with local educational facilities (school teachers) for road safety campaigns; ▪ Provision of proper safety signage at sensitive/accident-prone spots; ▪ Setting up speed limits in close consultation with the local stakeholders; and ▪ Screen potential crew members for HIV/AIDS, tuberculosis and other communicable diseases. 		

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
11.	Running of asphalt mix plants, crushers, etc.,	Dust generation from construction machineries causing health risks to operating workers, impact on bio-physical environment.	<ul style="list-style-type: none"> ▪ Ensure precautions to reduce the level of dust emissions from, hot mix plants, crushers and batching plants will be taken up, e.g. providing them, as applicable, with protection canvasses and dust collection/extraction units. Mixing equipment will be well sealed and equipped as per existing standards; ▪ Wet scrubbers will be used in asphalt plant to minimize the dust pollution and wastewater ponds will be formed/constructed with baffle walls to trap the oil and grease generating from the wet scrubber outlet; ▪ Water will be sprayed in the lime/cement and earth mixing sites; and ▪ PPEs like dust masks shall be provided by the contractor to ensure no health risks for operators. 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
12.	Implementation of Plantation Plan	Clearing of vegetation from the area may cause environmental impact.	<ul style="list-style-type: none"> ▪ The indigenous trees most suited to the tract like Neem, Sheesham, Simal, Gul-e-Nishtar, Peepal, Alstonia, Bottle Brush, Siris, Amaltas etc will be re-planted; ▪ Exotic or alien/invasive species of plants should not be introduced as a compensation of plants to be removed; ▪ Flowering and fruiting shrubs will be planted along the Expressway to beautify the landscape. Planting would however be done keeping in view the principles of landscape designing; ▪ An awareness campaign targeted on the neighborhood farmers shall be run to popularize the planting of trees; ▪ Maximum transplantation of trees to be affected; ▪ Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides; ▪ The contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the specified paths and tracks for movement and will not be allowed to trespass through farmlands; ▪ Construction vehicles, equipments and machinery will remain confined within their designated areas of movement; ▪ Contractor will supply gas cylinders at the camps for cooking purposes and cutting of 	EE of CC	EE of SC and DD Environment of EALS

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			<p>trees/bushes for fuel will not be allowed;</p> <ul style="list-style-type: none"> ▪ Camp sites and asphalt plants will be established on waste/barren land rather than on forested or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to the trees, under growth and crops; and ▪ Compensation for trees required to be cut on account of their coming in the ROW of Expressway must be paid to farmers/owners in accordance with market rates. 		
C: Operational Phase					
1.	Road maintenance	Deterioration of road and associated structures and accidents of hazardous material.	<ul style="list-style-type: none"> ▪ Monitor and maintain drainage structures and ditches including culverts. Clean out culverts and side channels when they begin to fill with sediment and lose their effectiveness; ▪ Fill mud holes and pot-holes with good quality gravel; remove fallen trees and limbs obscuring roadways; and ▪ Use water from settling basins and retention ponds for road maintenance. 	NHA (EALS)	External Monitor

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
2.	Accidents of hazardous material	Oil spill may occur which in turn may be a cause to accidents.	<ul style="list-style-type: none"> ▪ In case of any accidental spill, there should be a relevant department dealing with it in accordance with emergency plan; and ▪ A road administration department should be established after the completion of the project which will administrate the hazardous substance. 	NHA (EALS) traffic police	External Monitor
3.	Use and maintenance of equipment	Water and soil pollution may occur.	<ul style="list-style-type: none"> ▪ Install concrete pads, drains, and oil/water pits in areas where vehicle and equipment maintenance and fueling will occur regularly. 	NHA (EALS) traffic police	External Monitor
4.	Vehicle management	Noise and air pollution may occur.	<ul style="list-style-type: none"> ▪ Vehicle with excessive noise should be prohibited to travel on the road especially near the communities; and ▪ Public should be educated about the noise and air pollution. 	NHA (EALS) traffic police	External Monitor
5.	Floral species maintenance	Chances of damage of saplings due to road accidents and improper maintenance.	<ul style="list-style-type: none"> ▪ The saplings planted in the project area against the trees cut should be properly maintained throughout their initial growth period in terms of water requirement and necessary nutrients. Therefore, proper care of newly planted trees will need special care; ▪ An awareness campaign targeted on the neighborhood farmers will be carried to popularize the planting of trees, and saplings should be provided on subsidized costs; ▪ Organic farming will be encouraged to minimize the use of chemical fertilizers 	NHA (EALS) and Pak EPA	External Monitor

Sr. No	Environmental Activity	Impacts	Mitigation	Responsibility	
				Implementation	Supervision
			and pesticides; and ▪ Raising of dense plantation on both sides of the Expressway will not only mitigate the ill effects of construction of Expressway on flora, but it will also improve the landscape of the area and enhance its aesthetic beauty. Enough space is available on both sides of the Expressway for raising sufficient number of plants on each side.		
6.	Faunal species conservation	Limitations in the movement of faunal species.	▪ Maintenance of animal/livestock crossings provided after every 2 to 3 kilometre to facilitate their movement; ▪ Speed limits near the animal corridors provided along the whole alignment wherever necessary; and ▪ Installation of sign boards for the Expressway users to avoid accidents.	NHA and Pak EPA	External Monitor
7.	Road Safety	Possibility of road accidents.	▪ Enforcement of speed limits, installation of speed guns and enforcement of penalties for the violators.	Highway Police	External Monitor

KEY

DC

Design Consultant

CC

Construction Contractor

NHA (EALS) National Highway Authority

EE

Environmental Engineer

SC

Supervision Consultant

8.4 Environmental Mitigation (Plantation) Cost

365. To minimize the negative impacts that will arise due to increased vehicular activity on the proposed Expressway and to enhance the landscape of the project area, the mitigation measures would include; plantation along the whole stretch of the expressway as a noise barrier. Following plantation plan would be followed:

366. Three rows of plants will be raised on either side of the proposed Hasanabdal-Havelian Expressway. Plant to plant distance will be kept as 2 meters, so there will be 500 plants in one row of one Km length. As total road stretch is 60 km in length, therefore, number of plants to be raised one kilometer length, on both sides will be 3000.

367. Therefore, the number of plants, which can be grown along the entire length of the Expressway section of E-35, are (3000×60) 1,80,000. We can safely add, another 5,000 plants, which will be raised along the six interchanges to be built along the Expressway. These plants are to be planted along the side roads and within the loops.

368. Moreover, it is concluded that 4 rows of trees and shrubs will be raised all along the Expressway, two each on western and eastern sides, with a total of about 1,85,000 plants. Native species would be planted and no invasive/ exotic species would be introduced. So more than 6 times of the trees affected shall be replaced in this section of E-35.

Plantation Cost

369. A total of 1,85,000 plants will be raised in lieu of nearly 27,500 trees to be affected due to construction of the Expressway. Thus the number of plants to be raised is more than 6 times the plants to be removed/ transplanted. The cost of plantation includes the cost of equipment and initial planting and maintenance for first four years. The tentative cost of equipment is given in **Table 8.2** below:

Table 8.2: Tentative Cost of Equipment

Sr. No.	Name of Equipment	No.	Price (Rs.)
1.	Tractor	4	40,00,000
2.	Water Tanker/Bowzer	4	20,00,000
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	4	500,000
6.	Cost of Diesel for 4 years		400,000
Sub-total			6,980,000

370. Following **Tables 8.3, 8.4, 8.5 and 8.6** show the cost break-up of planting and maintenance for a period of four years respectively.

Table 8.3: Estimated Cost of Plantation of 500 Plants for First Year

Sr. No.	Particulars of Work	Quantity (No.)	Rate (Rupees)	Amount (Rs.)
1	Clearance of site	500 plants (4 MD)	400/MD*	1600
2	Layout	500 plants (2 MD)	400/MD	800
3	Digging of Pits 2.65 x 500 = 1325 cft.	500 pits (20 MD)	400/MD	8,000
4	Average cost of plants	500 plants	15/plant	10,000
5	Carrying of plants 250 Nos. from Nursery to Site including loading/unloading	500 plants	5/plant	2500
6	Planting of plants with ball of earth	500 plants (10 MD)	400/MD	4,000
7	Replacement of earth with silt 1 cft. (0.351 m ³) Per pit 500 cft. (175.5 m ³)	250 cft.	Lumpsum	500

Sr. No.	Particulars of Work	Quantity (No.)	Rate (Rupees)	Amount (Rs.)
8	Hand watering 200 times x 500 = 50,000 plants	1,00,000 plants (150 MD)	400/MD	60,000
9	Weeding 4 times 500x4	2000 plants (4 MD)	400/MD	1600
10	Miscellaneous			1000
Sub-total				90,000

*MD: Man Days

Table 8.4: Estimated Cost of Plantation of 20% of First Year (100) plants and their Maintenance for Second Year

Sr. No.	Particulars of Work	Quantity (No.)	Rate (Rupees)	Amount (Rs.)
1	Restocking of 20% plants	100	20/plant	2,000
2	Carriage of plants from Nursery to site including loading/ unloading	100	5/plant	500
3	Re-digging of pits 20% 100 No.	100 (4 MD)	400/MD	1600
4	Planting of plants with ball of earth – 100 No.	100 (2 MD)	400/MD	800
5	Hand watering 150 times 150x500 = 37,500 plants	37,500 (100 MD)	400/MD	40,000
6	Reopening of pits twice 1 cft per pit	500 cft (3 MD)	400/MD	1,200
7	Weeding twice 500x2	1000 (2 MD)	400/MD	800
8	Miscellaneous			500
Sub-total				47,400

**Table 8.5: Estimated Cost of Plantation of 20% (100) plants and maintenance
For Third Year**

Sr. No.	Particulars of Work	Quantity (No.)	Rate (Rupees)	Amount (Rs.)
1	Restocking of 20% plants	100	20/plant	2,000
2	Carriage of plants from Nursery to site including loading/unloading	100	5/plant	500
3	Re-digging of pits 20% 60 No.	100 (2 MD)	400/MD	1600
4	Planting of plants with ball of earth – 100 No.	100 (12MD)	400/MD	800
5	Hand watering 150 times of 500 plants	75000 (100 MD)	400/MD	40,000
6	Reopening of pits twice 1 cft per pit	1000 cft (6MD)	400/MD	2400
7	Weeding twice 500x2	1000 (2 MD)	400/MD	800
8	Miscellaneous			460
Sub-total				48,560

Table 8.6: Estimated Cost for maintaining 500 plants for Fourth Year

Sr.No.	Particulars of Work	Quantity (No.)	Rate (Rupees)	Amount (Rs.)
1	Hand watering 100 times 50x500	25,000 (50 MD)	400/MD	20,000
2	Weeding twice 500x2	1000 (2 MD)	400/MD	800
3	Trimming/pruning of plants	500 (6 MD)	400/MD	2400
4	Miscellaneous			400
Sub-total				23,600
Grand Total (Table 8.4 to 8.7)				209,560*

*Cost of Raising 500 Plants & their Maintenance for 4 Years

371. Above given **Tables 8.3 to 8.6** may be summarized as below:

Cost for raising 500 plants and their maintenance for 4 years	Rs.0.20956 million
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Cost for raising 1,85,000 plants and their Maintenance for 4 years	Rs.77.5372 million
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Cost of Equipment:	Rs. 6.98 million
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Total cost for raising 185,000 Plants and their maintenance for 4 years including equipment	Rs. 84.5172 million
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372. In addition, tree plantation is also proposed to reduce the air pollution and excessive noise. The proposed mitigation measures will incur cost for which a separate PC-1 for plantation of trees on either side of the proposed Project including maintenance job is being prepared by Forest Department separately. The same shall be approved subsequently.

8.5 Environmental Technical Assistance and Training Plan

373. In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. Director Environment (EALS) should play a key role in this respect and arrange the training programs.

374. NHA (EALS) will train the SC to effectively implement the EMP, and SC will train the contractor to prepare the site specific EMP and its implementation. The contractors will train its staff about the best environmental management practices at the construction site and implementation of the EMP.

375. The training modules will include air, noise and water pollution monitoring, social awareness, Environmental Laws, "National Environmental Quality Standards (NEQS)", Usage of personal protection equipments, and health and safety related issues on the construction site.

376. The contractor will train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of Sexually Transmitted

Infections (STI) HIV/AIDS and in general health and safety matters, and on the specific hazards of their work. Training should also consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation. Training of trainers is also a basic element of training. The details of this training program are presented in **Table 8.7**.

Table 8.7: Personnel Training Program/ TA Services

Provided by	Contents	Trainees/Events	Duration
Technical Assistance (TA) consultants/ organizations specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations daily monitoring and supervision	Three seminars for EALS project staff	3 days
TA consultants/ organizations specializing in ADB Environmental Safeguard Policy	Short seminars and courses on: ADB Environmental Safeguard Policy	Three seminars for project staff dealing in Environmental matters	3 days
TA consultants/ SC/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	Two seminars for contractor's staff	4 days

8.6 Monitoring Mechanism (MM)

377. Monitoring of environmental components and mitigation measures during construction and operation stages is a key component of the EMP to safeguard the protection of environment. The objectives of the monitoring are to (i) monitor changes in the environment during various stages of the project life cycle with respect to baseline conditions; and (ii) manage environmental issues arising from construction

works through closely monitoring the environmental compliances. A monitoring mechanism is developed for each identified impact and it includes:

- Location of the monitoring (near the project activity, sensitive receptors or within the project influence area)
- Means of monitoring, i.e. parameters of monitoring and methods of monitoring (visual inspection, consultations, interviews, surveys, field measurements, or sampling and analysis)
- Frequency of monitoring (daily, weekly, monthly, seasonally, annually or during implementation of a particular activity)

378. The monitoring program will also include regular monitoring of construction activities for their compliance with the environmental requirements as per relevant standards, specifications and EMP;

379. The purpose of such monitoring is to assess the performance of the undertaken mitigation measures and to immediately formulate additional mitigation measures and/or modify the existing ones aimed at meeting the environmental compliance as appropriate during construction. The environmental parameters that may be qualitatively and quantitatively measured and compared are selected as 'performance indicators' and recommended for monitoring during project implementation and operation stages. These monitoring indicators will be continuously monitored to ensure compliance with the national standards and comparison with the baseline conditions established during design stage. The list of indicators and their applicable standards to ensure compliance are given below:

- Air Quality (PM), SO₂, NO₂, and CO) NEQS, Pakistan 2012;
- Noise Levels – NEQS, Pakistan 2012;
- Surface Water Quality – NEQS, 2012;
- Groundwater Quality – NEQS, 2012; and

380. During the preconstruction period, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time.

381. Construction environmental monitoring is a function of supervision, and the essential purpose is to ensure adherence to the EMP. The monitoring is a day to day process, which ensures that departures from the EMP are avoided or quickly rectified, or that any unforeseen impacts are quickly discovered and remedied. Specific actions in the EMP that are to be monitored are included in the Monitoring Plan. During construction, environmental monitoring will ensure the protection of landslide, side slopes, and embankment from potential soil erosion, borrow pits restoration, quarry activities, siting of work sites and material storages, siting of batch, concrete and asphalt plants especially close to the nature reserve, preservation of religiously sensitive locations, community relations, and safety provisions.

382. Post monitoring evaluation will be carried to evaluate the impacts of the project during first 3 years of operation of the project. Regular monitoring of the condition of the road surface, bridges, culverts, drainage structures and slope protection structures is important from an environmental management point of view, but takes place as part of regular road maintenance. In addition to this activity, information on the locations, type and consequences of traffic or traffic related accidents is required, in co-operation with traffic police. Recommended air, noise and water quality monitoring, greening and landscaping and community feedback are also included in the Monitoring Plan.

383. The monitoring plan and details of monitoring locations for environmental condition indicators of the project during the construction and operation stage are presented in **Table 8.8-a**.

8.6.1 Monitoring Schedule and Performance Indicator

384. The monitoring schedule has been developed based on the possible occurrence of adverse impacts and required mitigation actions. However, this schedule is subject to change depending on the analysis results obtained. The performance indicators and protocol for changing the monitoring schedule is given below:

Tree Plantation

385. The 75% survival rate of re-plantation shall be monitored on the first year of the operation phase. If the survival rate is found below 75%, necessary measures will be taken to increase the survival rate and monitoring shall be again conducted taken up each year of operation. This cycle should continue until the 75% survival rate is achieved.

Soil Erosion and Drainage Congestion

386. No significant soil erosion problem is anticipated due to the project either in the construction phase or in the operation phase. However, in the construction phase, some localised soil erosion may be noticed owing to construction activities. However, if soil erosion is noticed during construction and operation phase, the corrective action shall be initiated and frequency of check be increased to assess the tendency of occurrence.

387. The cross drainage structure shall be free from siltation. Visual check shall be made periodically to identify any drainage congestion or water logging along the road. Appropriate corrective action shall be taken to clear the congestion and prevent reoccurrence.

Air and Noise Quality

388. Due to the variability of the construction activities e.g; changes in batch composition, type of construction activity and other anthropogenic influences, the ambient air quality of the project area may change. If the air quality with respect to

any parameter exceeds by more than 25% of its last monitored value, the monitoring frequency shall be doubled and cause of the increase investigated. If the construction activities are found to be the reason for this increase, suitable measures should be adopted.

389. Similarly, due to the variability in traffic movement, e.g; changes in traffic volume, traffic compositions and other anthropogenic influences, the noise quality in the project area is likely to change. If the noise quality exceeds by 20% of the applicable ambient noise quality standard or 5% of its last monitored value, the monitoring frequency shall be increased and the cause of the increase investigated. If the construction activities are found to be the reason for this increase, suitable measures should be adopted.

Water Quality

390. No significant change in water quality is perceived due to the project in the operation phase. However, in the construction phase, the monitored values for pH, BOD, COD, TDS, DO and Oil & Grease might change owing to construction activities. Hence, it is suggested that if the monitored value for any water quality parameter exceeds by more than 20% of its last monitored status the monitoring frequency shall be increased.

8.6.2 Environmental Mitigation and Monitoring Plan

391. The Environmental Mitigation and Monitoring Plan provides the framework for the implementation of the mitigating measures and monitoring during the construction and operation phases of the proposed Project (**Table 8.8-a**) whereas, (**Table 8.8-b**) gives estimate for monitoring of the environmental quality parameters during both (construction and operational) phases of the proposed project.

Table 8.8 (a): Environmental Mitigation and Monitoring Plan

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
A: Construction Phase						
1.	Vegetation Clearance	Construction Corridor (All along the Expressway)	Visual inspection of loss of vegetation, soil erosion & instability, surface water pollution and occupational health of workers and community	Weekly	EE of CC	EE of SC
2.	Top Soil	Construction Corridor (All along the Expressway)	Visual inspection of top soil of 30 cm depth should be excavated and stored properly	Beginning of earth works	EE of CC	EE of SC
		Construction Corridor (All along the Expressway)	Visual inspection for the stored top soils to be used as cladding material over the filled lands	Immediately after filling and compaction of dredged materials	EE of CC	EE of SC
3.	Erosion	Side slopes of the embankments and material storage sites	Visual inspection of occurrence of erosion and erosion prevention Measures	At the end of filling activity	EE of CC	EE of SC

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
4.	Operation of Borrow and quarry site	Quarry Sites	Visual inspections of quarry sites/ borrow areas for change in landscape and creation of water ponds.	Monthly	EE of CC	EE of SC
5.	Excavation of Earth	Construction Corridor (All along the Expressway)	Visual inspection for soil erosion & stability.	Weekly	EE of CC	EE of SC
6.	Material Supply	Material Supply Sites	Inspection of possession of official approval or valid operating license of suppliers materials (asphalt, cement, quarry and borrow material)	Before the agreement for supply of material is finalized.	EE of CC	EE of SC
7.	Land slide/ Rock fall control	Active rock fall sections and steep mountainous slopes	Visual Inspection	Monthly	EE of CC	EE of SC
8.	Storage and handling of materials	Material storage yard/Work area and Construction camps	Visual Inspection of storage facilities	Monthly	EE of CC	EE of SC
9.	Local roads	Approach Roads	Visual inspection to ensure local roads are not damaged	Monthly	EE of CC	EE of SC

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
10	Traffic safety	Haul Roads and at the construction site of interchanges	Visual inspection to see whether proper traffic signs are placed and safety barriers and flagmens for traffic management are engaged	Monthly	EE of CC	EE of SC
11	Air Quality	Active site and near the sensitive sites and settlements, asphalt plant downwind and upwind	Air Quality Monitoring Mobile Lab	Quarterly	EE of CC	EE of SC
		Material storage & active sites	Visual inspection to ensure water sprinkling is being Implemented	Daily	EE of CC	EE of SC
		Asphalt Plant	Visual inspection to ensure asphalt plant is located at least 500 m from residential areas.	Monthly	EE of CC	EE of SC
12.	Noise	Near the sensitive sites and settlements	Noise meters	Quarterly	EE of CC	EE of SC
		Construction sites	Visual inspection of conditions of equipment in use	Weekly	EE of CC	EE of SC

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
13.	Surface Water Quality	At water body near the bridge construction sites one upstream and one down stream	Sampling and analysis of surface water Quality	Monthly	EE of CC	EE of SC
14.	Groundwater Quality	Drinking water sources near the camp site	Sampling and analysis of groundwater Quality	Quarterly	EE of CC	EE of SC
15.	Drinking Water and Sanitation	Construction camps and construction sites	Visual inspection of safe water and sanitation facilities for the construction workers on the site	Weekly	EE of CC	EE of SC
16.	Solid waste	Construction camps and construction sites	Visual inspection that solid waste is disposed at designated site	Weekly	EE of CC	EE of SC
17.	Floral and Faunal Monitoring	In the project area	Visual inspection	Daily	EE of CC	EE of SC
18.	Cultural and archeological sites	At work sites	Visual inspection	Daily	EE of CC	EE of SC

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
19.	Reinstatement of work site	At work sites	Visual Inspection	After completion of all works	EE of CC	EE of SC
20.	Safety of Worker	At work sites	Inspection of usage of Personal Protective Equipment	Daily	EE of CC	EE of SC
		Camp office	Accident/Incident reporting record	Monthly	EE of CC	EE of SC
B: During Operation Phase						
21.	Surface Water Quality	At all major river Sites near Dor and Haro River	Sampling and laboratory analysis	Yearly	NHA(EALS)	External Monitor
22.	Groundwater	At the Baseline Monitoring Sites	Sampling and Laboratory analysis	Yearly	NHA(EALS)	External Monitor
23.	Air Quality	At the baseline monitoring sites	Air Quality Monitoring Mobile Lab	Quarterly	NHA(EALS)	External Monitor
24.	Noise Quality	Close to the sensitive receivers	Noise meters	Quarterly	NHA(EALS)	External Monitor
25.	Landscape	Along project alignment	Visual inspection of long-term degradation of natural landscape at land strips and	Quarterly	NHA(EALS)	External Monitor

Sr. No	Environmental Activity	Location	Means of Monitoring	Frequency	Responsibility	
					Implementation	Supervision
			slopes adjacent to road. Development of landslides, rock falls and other natural hazardous process change of drainage patterns, erosion and degradation of vegetation			

KEY

CC

Construction Contractor

EE

Environmental Engineer

NHA (EALS)

National Highway Authority

SC

Supervision Consultant

Table 8.8-b: Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Components	Parameters	No. of Samples (No. of Samples x Frequency x Year)	Frequency	Responsibility	Duration	Cost (Rs.)
Construction Phase (3 years)						
Air Quality	CO, NO _x , SO _x , PM ₁₀	4x4x3 = 48	Quarterly	EE of CC and SC	24 hours	1200, 000/-
Surface Water Quality	Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium	2x2x3 = 12	Quarterly	EE of CC and SC	-	96,000/-
Ground Water Quality	pH, Dissolved Oxygen, TSS, TDS, Alkalinity, BOD ₅ , COD, Turbidity	4x4x3 = 48	Quarterly	EE of CC and SC	-	288,000/-
Noise Level	-	12x4x3 = 144	Quarterly	EE of CC and SC	24 hours	576,000/-
TOTAL						2,160, 000/-
Operation Phase (3 years)						
Air Quality	CO, NO _x , SO _x , PM ₁₀	8x4x3 = 72	Quarterly	NHA	24 hours	1,800, 000/-
Ground Water Quality	Total Coliforms, Fecal E. Coli, Total Colonial Count, Fecal Enterococci, pH, TDS, Total Hardness, Nitrate, Chloride, Sodium	2x1x3 = 6	Annually	NHA	-	48,000/-
Surface Water Quality	pH, Dissolved Oxygen, TSS, Alkalinity, BOD ₅ , COD, Turbidity	2x1x3 = 6	Annually	NHA	-	36,000/-
Noise Level	-	20x4x3 = 240	Quarterly	NHA	24 hours	960,000/-
TOTAL						2,844,000/-
GRAND TOTAL						5,004,000/-

KEY

EC – Environmental Committee, NHA – National Highways Authority

8.7 Environmental Monitoring, Mitigation and Training Cost

392. The cost required to effectively implement the mitigation measures is important for the sustainability of the Project both in the construction and operation stages of the Project.

These costs are summarized as below:

Environmental Monitoring Cost	=	5,004,000/-
Environmental Training Cost	=	1,000,000/- (lump sum)
Tree Plantation Cost	=	84,517,200/-
Total	=	90,521,200
Say	=	90.521 Million Rupees

SECTION - 9

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

9.0 General

This section describes the outcomes of the public consultation sessions held with different stakeholders that may be affected by the project. The consultation process was carried out in accordance with the Asian Development Bank Guidelines on public consultation. The objectives of this process were to:

1. Share information with stakeholders on the construction of the proposed Expressway 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 available transport facilities, construction of the new Expressway and the likely impacts of construction related activities and operation of the project;
3. Understand the perceptions, assessment of social impacts and concerns of the affected people/ communities in the nearby vicinity of the newly proposed alignment for the Expressway;
4. Provide an opportunity to the public to provide valuable suggestions in the project design in a positive manner; and
5. Reduce the chances of conflict through the early identification of controversial issues, and consult them to find acceptable solutions.

9.1 Identification of Main Stakeholders

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 the stakeholders had different types of stakes according to their professions.

9.2 Focus Group Discussions and Scoping Sessions

A series of scoping sessions and informal focus group discussions were carried out with local communities and local government representatives. The meetings were held at various locations.

Generally, people were found to be aware of the need of the proposed Expressway, and indicated their support for the present NHA Project. Local communities demanded that they must be part of a continuous consultation process with other stakeholders at different stages of the project including the design, construction, and operational periods. The consultation sessions were held according to the schedule indicated in **Table 9.1**.

Table 9.1: Schedule of Scoping Sessions

Sr. No.	Date	District/Tehsil	Village	No. of Participants
1	12-5-2009	Attock - Hassanabdal	Kalu	12
			Chapprian	11
			Morrian	07
2	13-5-2009	Attock - Hassanabdal	Aamgha	10
			Khoi Dwan	08
			Sabez Pir	10
3	14-5-2009	Haripur	Sari Saleh	06
			Beri Bandi	08
			Kot Najib Ullah	09
4	5-5-2009	Haripur	Mehra Ali Khan	10
			Rehana	11
			Beri Bandi	07
			Dingi	14
5	29-10-2009	Haripur	Noshera	11
			Donali	10
			Mirpur	10

Sr. No.	Date	District/Tehsil	Village	No. of Participants
6	30-10-2009	Abbottabad	Mori	12
			Banda Sahib	11
7	2-7-2012	Attock - Hassanabdal	Aamgah	2
			Padra	3
			Jabr	3
			Khuidara	10
8	3-7-2012	Haripur	Shah Maqsood	1
			Thanda choa	1
			Akhoom Bandi	9
			Do bandi bala	7
			Kholian Wala	2
			Kalu Mara	13
			Mala	6
			Drone Mara	3
			Moree	8
9	3-7-2012	Haripur	Lora Chowk	1
			Bari Bandi	1
			Akhoun Bandi	1
			Kalu Mera	1

9.3 Commonly Raised Concerns of the Stakeholders

The most commonly raised concerns during the meetings are given below:

(a) Expressway Design

- Provide underpasses where these are required to facilitate the local population;
- Provide interchanges at appropriate places so that residents of the project area can avail the Expressway travel;

- Improve general standards of construction;
- Abate dust emissions by providing paved road shoulders;
- Provide drain outlets to help drain away run-off from the expressway, particularly in areas where road level is higher than that of surrounding settlements; and
- Plant trees along the Expressway that could reduce air and noise pollution.

(b) Expressway Construction

- Avoid dumping construction material along the Expressway;
- Adopt measures to minimise dust, smoke, and noise pollution, and to control spillages from construction machinery;
- Implement a proper solid waste management plan;
- Induct local labour into the construction workforce as far as possible to avoid social conflict between the migrant labour and local communities; and
- Provide proper diversions, where required, for the traffic during construction to avoid traffic congestion, related hazards, and dust emissions.

(c) Expressway Operation

Erect cautionary and informative signs;

- Control use of loud horns near schools, traffic disorders and violations of traffic regulations;
- Specify speed limits where required;
- Ensure that cross-drainage pipes and culverts are regularly cleaned; and
- Regularly remove accumulated piles of rubbish from the RoW.

9.4 Proposed Measures for Addressing the Stakeholders' Concerns

(a) Expressway Design

The contractors and design consultants will include the following environmental and safety provisions in the project design under the Project:

- Underpasses, bridges and interchanges should be located at appropriate and possibly shorter distance;
- A tree plantation programme to compensate for the anticipated loss of vegetation during the construction activities, and to help abate pollution caused by emissions, dust, and noise during expressway operation; and
- Drainage system will be provided to control surface runoff.

(b) Expressway Construction

The following measures will be carried out in order to protect surrounding communities from the potential impacts of construction:

- Project facilities will be located at a minimum distance of 500 metres from existing settlements and built-up areas. In order to avoid restricting the mobility of local people, construction vehicles will remain confined within their designated areas of movement;
- Sensitivity towards local customs and traditions will be encouraged to minimise social friction. Good relations with local communities will be promoted by encouraging contractor to provide opportunities for skilled and unskilled employment to locals, as well as on job training in construction for young people;
- NHA will be bound to comply with the prevailing national/provincial regulations concerning pollution and waste disposal;
- Solid waste generated during construction and at camp sites will be properly treated and safely disposed of only in demarcated waste disposal sites approved by the supervision consultant; and
- All necessary measures will be taken to ensure the safety of traffic during construction, including barricades (including signs, pavement markings, flags, and lights) erected as required by the NHA/NH&MP (National Highway and Motorway Police). All such barricades will be set up as per local regulations.

(c) Expressway Operation

- Cautionary and informatory signs will be erected;
- Use of loud horns near schools, traffic disorders and violations of traffic regulations will be monitored and controlled by NH&MP;
- Speed limits will be specified and NH&MP will control it; and
- Cross-drainage pipes and culverts cleaning will be ensured on regular basis.

9.5 Village Meetings

Village meetings have many uses in participatory development, including information sharing and group consultation, consensus building, prioritising and sequencing of interventions and collaborative monitoring and evaluations. Meetings were held in May and October 2009 at some places and the same exercise was repeated in July 2012 for disclosure purpose, to share measures taken and to address the concerns raised during the consultations held in 2009. Concerns raised during village meetings are discussed in **Table 9.2** and **9.3** for year 2009 and 2012 respectively.

Table 9.2
Village Meetings and the Concerns (2009)

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
1	Kalu	750	6000	12-5-09	12	<ul style="list-style-type: none"> Judicious compensation at market price will be given to affected persons; Agriculture land will be divided in to two portions; Jobs should be provided to local people during construction stage of the project; Non title holders and vulnerable population will be given compensation. 	<ul style="list-style-type: none"> Economic opportunities for the people of area; Employment opportunities for the people of area; Transport Facility will be improved.
2	Chapprian	500	4000	12-5-09	11	<ul style="list-style-type: none"> Underpasses must be provided; Land should be acquired at market price; Compensation must be given prior to the implementation of the project; People will become homeless due to the acquisition of residential 	<ul style="list-style-type: none"> Transport Facility will be improved; National Economy will be improved; Land value will be increased.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						structures	
3	Morian	400	3500	12-5-09	7	<ul style="list-style-type: none"> • In some cases, agricultural land will be divided in to two portions; • Lack of proper compensation process; • Under pass should be constructed and Interchange will be given here. 	<ul style="list-style-type: none"> • Better transport facilities; • Chance of labour work during construction; • Less time consumption during Journey.
4	Aamgah		21000	13-5-09	10	<ul style="list-style-type: none"> • Judicious compensation at market price should be given to affected persons; • Frequency of accidents will be increased; • Lack of underpasses near the population centres. 	<ul style="list-style-type: none"> • Better transport facilities. • Chance of labour work during construction; • Land value will be high.
5	Khoi Dwan			13-5-09	8	<ul style="list-style-type: none"> • Frequency of accidents will increase; • Judicious compensation at market price should be given to affected persons; 	<ul style="list-style-type: none"> • Unemployment will be decreased; • Patients would be able to move easily to big cities.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						<ul style="list-style-type: none"> Flyover must be constructed at required places. 	
6	Shabez Pir	400	3000	13-5-09	10	<ul style="list-style-type: none"> Frequency of accidents chances will increase; Land should be acquired at current market price; Flyover must be constructed; Jobs should be provided to local people on priority basis. 	<ul style="list-style-type: none"> We will enjoy better transport facilities; Business facilities will be generated; National economy will be boosted up.
7	Sari Saleh	600	4200	14-5-09	6	<ul style="list-style-type: none"> People will get the alternative business opportunities; People should get the proper compensation rate of their affected assets; People should get the on time compensation; Labour and landless people will also be included in the compensation package. 	<ul style="list-style-type: none"> We will enjoy better transport facilities; Business opportunities will be generated; Easily reach to destination.
8		200	1400		8	<ul style="list-style-type: none"> The affectees will be 	<ul style="list-style-type: none"> Improved travel facility will

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
	Beri Bandi			14-5-09		<p>compensated with government occupied land preferably to maintain their livelihoods;</p> <ul style="list-style-type: none"> • During construction efforts should be made to less damage to crops and agricultural land; • The alternative option of widening the existing road should be considered seriously; • People should get the proper compensation of their lost assets. 	<p>be available;</p> <ul style="list-style-type: none"> • People will be able to reach big cities easily; • Land value will be increased.
9	Kot Najib Ullah	250	2000	14-5-09	9	<ul style="list-style-type: none"> • Livelihoods of the families will be affected severely due to acquiring agricultural land; • Compensation will be given at par with the market value; • Underpasses may be ignored near settlements to facilitate locals for crossing of road; • The general movement of local residents and in and around the construction area is likely to be 	<ul style="list-style-type: none"> • People will be able to reach big cities easily; • This road will link the people of different cities; • Economy of the area will boast; • Land value will be enhanced.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						hindered; <ul style="list-style-type: none"> Locals may be ignored regarding the provision of job opportunities. 	
10	Mehra Ali Khan	200	1400	15-5-09	31	<ul style="list-style-type: none"> Fair and proper compensation should be given; Compensation must be paid well in time; Agriculture land will be divided in to two portions. 	<ul style="list-style-type: none"> Different type of transport facilities will be available; Different type of industries will be installed; Business facilities will be generated.
11	Rehana			15-10-09	11	<ul style="list-style-type: none"> The local livelihood will be less disturbed due to adoption of alternative option; Locals should be given jobs preferably during the construction stage; Efforts should be made for least damage to existing structures, however proper compensation at market rate should be provided to the affectees; 	<ul style="list-style-type: none"> Business opportunities will be enhanced in better way; Awareness will be developed among community.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						<ul style="list-style-type: none"> • Ensure the proper sprinkling of water during construction stage to control dust pollution; • The project must be replaced with the construction of highway instead of expressway. 	
12	Beri Bandi			15-10-09	7	<ul style="list-style-type: none"> • Small water channels/ watercourses may be abandoned due to non-availability of passages across the road; • The contractor should be required to maintain close liaison with local population for the easy and timely resolving of issues/disputes, if any arise during the construction stage; • Sign board(s) may not be provided along the settlements and school(s); • Compensation should be paid for the whole bifurcating agriculture land; 	<ul style="list-style-type: none"> • Theft and robbery cases will be minimized due to presences of Police services at expressway; • Land value will be increased in future.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						<ul style="list-style-type: none"> • Compensation should be paid at market value; • Under passages should be provided for the local people to cross the Expressway. 	
12	Dingi			15-10-09	14	<ul style="list-style-type: none"> • Local population may be disturbed more due to expanding of construction activities in the night time as well; • Project should be completed timely; • Compensation for the lost land and crops should be paid at market rates; • Movement of the local people should not be disturbed during construction activities of the Project; • Trees to be cut should also be compensated at the market rates. • Under passages should be provided for the local people and 	<ul style="list-style-type: none"> • The project will create better employment opportunities for local community at the implementation stage; • Travel time will be reduced; • It will be more convenient for patients of project area to approach Govt Hospitals in less time.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
						residents to cross the Expressway; <ul style="list-style-type: none"> The efforts should be made to consider the other option rather to implement the propose project. 	
13	Noshera			29-10-09	11	<ul style="list-style-type: none"> Farm income of families will be affected severely due to acquiring agriculture land; Agriculture land will be ruined; Jobs will not be provided to local people during construction stage of the project; Vulnerable population will be totally ignored at the stage of compensation. 	<ul style="list-style-type: none"> Different kind of conveyances will be available; Employment opportunities will be generated in future.
14	Donali			29-10-09	10	<ul style="list-style-type: none"> Noise pollution & Air pollution will be increased during bringing heavy machinery at the stage of construction; Compensation should be paid to the affectees at time and also according to market rate. 	<ul style="list-style-type: none"> Economy of the country will be boosted up; Community will enjoy better and easy transport system.

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
15	Mirpur			29-10-09	10	<ul style="list-style-type: none"> Project should be completed in given time; Trees to be cut should also be compensated at the market rates; Ensure the proper sprinkling of water during construction stage to control dust pollution; Judicious compensation at market price will not be given to affected persons. 	<ul style="list-style-type: none"> It is essential for the betterment of the economy of the country; Price and value of agriculture land will be increased; Education opportunities for especially girls will be created.
16	Mori			30-10-09	12	<ul style="list-style-type: none"> Trees to be cut should also be compensated at the market rates; Movement of the local people should not be disturbed during construction activities of the Project. 	<ul style="list-style-type: none"> Better transport facilities will be available; Access of local community to market will be easy.
17	Banday			30-10-09	11	<ul style="list-style-type: none"> Road accidents will be maximized. Flyovers should be constructed; Jobs must be provided to local people on priority basis. 	<ul style="list-style-type: none"> Improved travel facility will be available; People will be able to reach big cities easily; Land value will be

S. No	Village Name/ Venue	Total House hold	Population	Date	No of Participant	Main Concerns	Expectations
							increased.

Table 9.3
Disclosure Meetings and the Public Concerns (2012)

S. No	Village Name/ Venue	Date	No of Participant	Main Concerns	Concerns Addressed
1	Aamgah	2-7-2012	18	<ul style="list-style-type: none"> Height of the underpass must be high enough to pass the loaded vehicles. 	<ul style="list-style-type: none"> The issue of the height of the underpasses have already been addressed in the design of the project road
				<ul style="list-style-type: none"> Proper embankments should be provided along the underpass. 	<ul style="list-style-type: none"> The provision of the embankments along the underpasses have already been addressed to manage the issue erosion
				<ul style="list-style-type: none"> Service road should be provided 	<ul style="list-style-type: none"> Service road have been provided in the design to provide access to villages

S. No	Village Name/ Venue	Date	No of Participant	Main Concerns	Concerns Addressed
				<ul style="list-style-type: none"> Underpasses should be provided to connect the divided residential colonies. 	<ul style="list-style-type: none"> 24 underpasses have been provided in design
				<ul style="list-style-type: none"> Waste water produced from the construction camps should be properly managed and must not be drained in open agricultural land. 	<ul style="list-style-type: none"> Recommendations for the management of wastewater generated from construction camps have been discussed in Section 6 "Impacts and Mitigation measures"
				<ul style="list-style-type: none"> Water supply shall not be disconnected during construction and shall be restored at the earliest. 	<ul style="list-style-type: none"> Before the construction commencement public utilities will be relocated to avoid inconvenience to the public.
				<ul style="list-style-type: none"> Tree compensation is not satisfactory 	<ul style="list-style-type: none"> The issue has been addressed in LARP
				<ul style="list-style-type: none"> Land compensation is not satisfactory 	<ul style="list-style-type: none"> The issue has been addressed in LARP
				<ul style="list-style-type: none"> Rate of land is low 	<ul style="list-style-type: none"> The issue has been addressed in LARP

S. No	Village Name/ Venue	Date	No of Participant	Main Concerns	Concerns Addressed
				<ul style="list-style-type: none"> Population is scattered, passage along the nullah should be provided for the movement of local people. 	<ul style="list-style-type: none"> Underpasses have been provided for the movement of local people
				<ul style="list-style-type: none"> Underpasses/flyovers should be provided on all the existing roads of the district council 	<ul style="list-style-type: none"> Flyovers have been planned at the crossings of existing roads of the district council
2	Lora Chowk	3-7-2012	50	<ul style="list-style-type: none"> The alignment should change, it crosses through fertile land 	<ul style="list-style-type: none"> Different alternatives have been studied in detailed and most suitable option has been selected.
				<ul style="list-style-type: none"> Underpasses/bridges at all existing nullahs 	<ul style="list-style-type: none"> Underpasses have been provided to maintain the existing flow of nullahs
				<ul style="list-style-type: none"> Water supply for irrigation will be disrupted 	<ul style="list-style-type: none"> Culverts will be provided at appropriate locations
				<ul style="list-style-type: none"> Rates of land are low 	<ul style="list-style-type: none"> The issue has been addressed in LARP
				<ul style="list-style-type: none"> People from local areas should be hired during construction stage 	<ul style="list-style-type: none"> Preference shall be given to local people for jobs at

S. No	Village Name/ Venue	Date	No of Participant	Main Concerns	Concerns Addressed
					construction stage
				<ul style="list-style-type: none"> Lower areas above the hill will be affected due to blasting during construction of the project because the material will return to the lower agricultural land 	<ul style="list-style-type: none"> Blasting Management Plan has been prepared to address this concern.
				<ul style="list-style-type: none"> Land rates are old landuse category is not updated 	<ul style="list-style-type: none"> The issue has been addressed in LARP
				<ul style="list-style-type: none"> Service Road should be provided 	<ul style="list-style-type: none"> Service roads have been provided in design
				<ul style="list-style-type: none"> Route crossings wherever these are required on the existing district council road. 	<ul style="list-style-type: none"> Flyovers have been provided at different route crossings
3	Lora Chowk (with Females)	2-7-2012	4	<ul style="list-style-type: none"> Underpasses shall be provided for access to schools, hospitals and water courses 	<ul style="list-style-type: none"> Provision for the underpasses have been made in the design to facilitate the access to the school, hospitals and water courses

S. No	Village Name/ Venue	Date	No of Participant	Main Concerns	Concerns Addressed
				<ul style="list-style-type: none"> During construction dust, noise and air pollution will occur. 	<ul style="list-style-type: none"> Recommendations have been given to control dust, air and noise pollution during all stages of the project
				<ul style="list-style-type: none"> Tree cutting will result in loss of fruit trees and will affect aesthetic value of the area. 	<ul style="list-style-type: none"> Compensatory plantation with the ratio of 1:7 has been recommended to maintain the fruit production and aesthetics of the area
				<ul style="list-style-type: none"> Construction waste will be produced that needs to be managed adequately 	<ul style="list-style-type: none"> The issue has been addressed in section 6.3.9 c) Waste and Hazardous Waste
				<ul style="list-style-type: none"> local people shall be preferred for the employment during the construction stage 	<ul style="list-style-type: none"> Contractor shall be bound by the contract agreement to employ the local people Section 6.3.6 Construction Camps/Camp Sites discusses employment of local people.

9.6 Future Information Disclosure Plan

After suggesting the possible solutions of the stakeholders' concerns, the EIA Report will be disclosed once again before the stakeholders and general public. EIA report will be accessible to interested parties on request and the report will be available in the nearest library and its summary will be available in stakeholder's mother tongue at the Project Director office Abbotabad.

As the public consultation in the project area has been conducted in year 2009 and again in year 2012. The Supervision Consultant (SC) will conduct public consultation one (01) month prior to the start of the construction of the project to inform the stakeholders in order to avoid any nuisance.

9.7 Public Consultation Regarding Four Lane Expressway to Six Lane Motorway (February 2016)

A fresh public consultation exercise was conducted on February 17, 2016 to share information with the public about the conversion of four lane expressway to six lane motorway. In-depth discussions were held with groups and individuals having particular knowledge and interests about the activity. These included technical specialists, councilors, political representatives, Government representatives, NGOs, specific community groups, affected residents and specific businesses and occupational groups etc. The concerns and observations of the participants are listed below.

PUBLIC CONSULTATION ON PROJECT E35 REGARDING PROJECT CONVERSION FROM 4 LANES TO 6 LANES

Respondents	Village	Concerns , observations and issues
Mr. Amjid Nawaz Mr. Muhammad Nawaz Mr. Iliyas Khan Mr. Omer Khan Mr. Ali Asghar	Chichian	<ul style="list-style-type: none"> Project E35 will bring green revolution in the area with subsequent prosperity and economic well-being of the people. Conversion of expressway with 4 lanes to motorway 6 lanes will be more effective for all user of Pakistan. If NHA and ADB will not convert it into 6 lanes motorway then existing Hazara road was good to improve. NHA have constructed motorway M1 and M2 with 6 lanes. Service road along motorway is important for us. Contractor has provided jobs to locals and further they need to help locals regarding facilities such as

		<p>provision of service road on both sides of motorway and drain is need for proper disposal of water.</p> <ul style="list-style-type: none"> Land prices along motorway are already increased but NHA has purchased our land in low cost but now they need to help us in our access on both sides of motorway.
Conclusion:	Local community has no issue except demand of service road construction. People are happy and requested to convert project to 6 lanes as like existing motorway M1 & M2.	
Mr. Ch. Asif and Mr. Malik Muhammad Afsar	Raj Pur	<ul style="list-style-type: none"> Mr. Chaudhary Asif has land along project alignment and provided it for borrow area at RD 27+300. Mr. Malik Muhammad Afsar has provided land to expressway and he requested that construct better motorway and provide jobs to local people. Mr. Chaudhary Asif requested that contractor has started his land as borrow area and needs to be level as agreed with him. He has no complaint on 6 lanes motorways and he wants to provide more land for borrow purpose. Plantation along motorway is also needed on both sides of motorway. NHA needs to increase underpasses and ensure communication of both sides community. NHA and ADB are requested to speed up work progress.

Respondents	Village	Concerns , observations and Issues
Mr. Chaudhary Aslam Mr. Chaudhary Saleem Mr. Ashraf Zaman Mr. Chaudhary Akbar (farmer) Mr. Asif Rajpur	Rajpur	<ul style="list-style-type: none"> Hazara Motorway will bring big change in the area reading access to major city. Business will be developed. Conversion of expressway with 4 lanes to motorway 6 lanes will be more effective for all user of Pakistan. If motorway is fenced like M1 & M2 then there will be less beneficial for local community and entrance will be only possible through interchanges. Service road along motorway is important for us. Contractor has provided jobs to locals and further they need to help locals regarding facilities such as provision of service road on both sides of motorway and drain is need for proper disposal of water.
Conclusion:	Mostly Project Affected persons have no objection on conversion of 4 lanes expressway to 6 lanes motorway. Easy access to motorway is demand of local community.	
Mr. Amir Khan Mr. Mazhar Ali Mr. Javaid Mr. Walidad Akbar	Der Chattii	<ul style="list-style-type: none"> Motorway has its own importance in development of project area. People around the project have given land on low cost as project is more important for area development. Timely completion of project is required. Storm water may be an issue on motorway and nearby area of motorway as observed on M1 & M2. NHA and Bank are requested to over view on these issues during motorway construction.
Meeting with Mr. Javaid Railway Department Haripur	Haripur	<ul style="list-style-type: none"> Motorway with 6 lanes is important and need to be constructed. In Pakistan Railway Department and Highways and Motorways have its own roles in development of Pakistan. Area/Villages along motorway will developed with time and business will be improved.

Generally, people were found to be satisfied with the progress of NHA and they supported the conversion of four lane to six lane. As this conversion configuration is within ROW of NHA, public has no issue with it. They were happy over this development as they will have better connectivity and access to and from the project area. Local communities demanded that they should be the part of continuous consultative activities along with other stakeholders at different stages of the Project execution. Pictures of the public consultations and list of participants are attached as Annexure-XII.

9.8 Grievance Redress Mechanism (GRM)

In order to receive and facilitate the resolution of affected people' concerns, compliments, and grievance about the project's environmental performance an Environmental Grievance Redress Mechanism (GRM) will be established for each project. The mechanism used for addressing any complaints that arise during the implementation of projects. In addition, the GRM will include a proactive component where by at the commencement of construction of each project (prior to mobilization) the community will be formally advised of project implementation details by NHA (EALS), the design and supervision consultant (DSC) and the contractor (designs, scheduled activities, access constraints etc) so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This project approach with communities will be pursued throughout the implementation of each project.

The GRM will address affected people's 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 affected people at no costs and without retribution. The mechanism will not impede access to the Country's judicial or administrative remedies.

NHA-EALS will establish a Grievance Redress Committee (GRC) and Grievance Focal Persons (GFPs) in each project location prior to the Contractor's mobilization to site. The functions of the GRC and GFPs are to address concerns and grievances of the local communities and affected parties as necessary.

The GRC will comprise representative from local authorities, affected parties, and other well-reputed persons from health or education sectors, as mutually agreed with the local authorities, person and affected persons. It will also comprise the

Contractor's Environmental Specialist, DSC's Environmental Specialist and PIU Safeguards/ Environmental Specialist. The role of the GRC is to address the project related grievance of the affected parties that are unable to be resolved satisfactory through the initial stages of the Grievance Redress Mechanism (GRM).

EA will assist affected communities/villages to identify local representative to act as Grievance Focal Points (GFPs) for each communities/villages.

GFPs are designated personnel from within the community who will be responsible for i) acting as community representatives in formal meetings between the project team (contractor, DSC, PIU) and the local community he/she represents and ii) communicating community members' grievances and concerns to the contractor during project implementation. The number of GFPs to be identified for each project will depend on the number and distribution of affected communities.

9.8.1 Composition of GRC

The GRC will work directly under the supervision of Director Environment (EALS).

The following members are recommended to form a GRC to look into the environmental matters.

- DD Environment (EALS)
- Representative from APs (Grievance Focal Persons-GFP)
- Environmental Engineer of Construction Contractor
- Environmental Engineer of Design Supervision Consultant
- Environmental Specialist Project Implementation Unit

A pre-mobilization public consultation meeting will be convened by the DD Environment (EALS), Environmental Specialist will act as the secretary of the Environmental Committee for each project and the meetings would be attended by GFPs, contractor DSC, NHA-PIU 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 routine (proactive) public relations activities proposed by the project team (contractor, DSC, NHA-PIU) to ensure communities are continually advised of project progress and associated constraints throughout project implementation;
- Identification of members of the Grievance Redress Committee (GRC)
- Elicit and address the immediate concerns of the community based on information provided above

Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown on Figure 9.1.:

- 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 DSC's Environmental Specialist. The DSC's Environment Specialist will then be responsible for coordinating with the Contractor in solving the issue.
- If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).
- The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.
- Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.
- 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 rapid resolution.

- NHA (EALS) will also keep track of the status of all complaints through the Monthly Environmental Monitoring Report submitted by the Contractor to the DSC and will ensure that they are resolved in a timely manner.

The flow chart of the proposed redress mechanism is shown below in **Figure 9.1**.

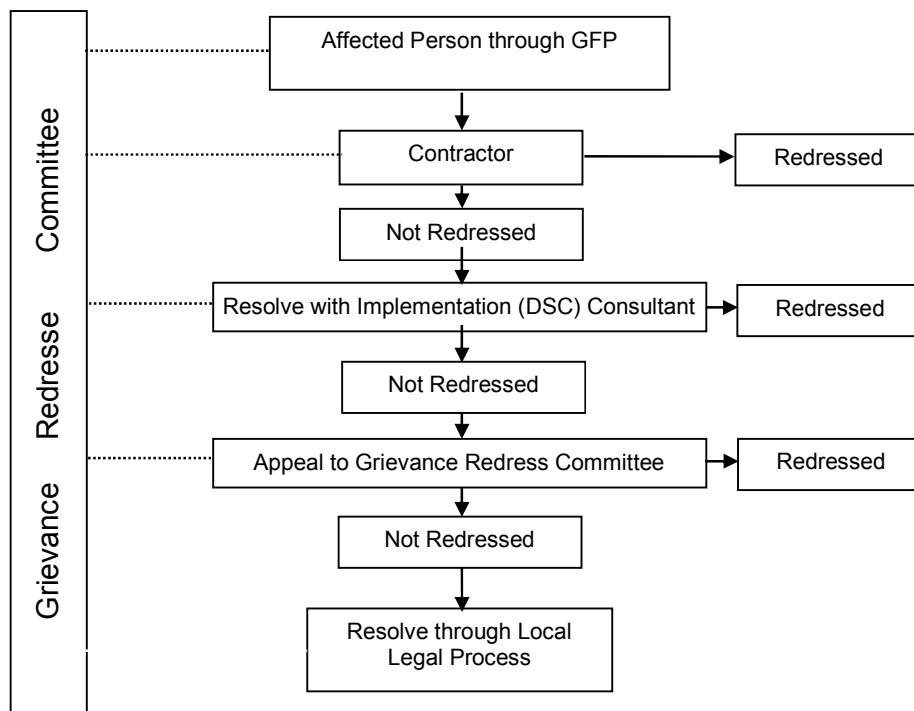


Figure 9.1: Flow Chart of the Proposed Grievance Redress Mechanism

9.8.2 Type of Grievance

The following are some of the environmental issues could be subject for grievance from the affected people, concerned public and NGOs.

- Dust, noise and air pollution from construction activities
- Nuisance
- Intensive schedule of construction activities
- Inappropriate timing of construction vehicle flow
- Traffic Movement
- Water Pollution
- Waste disposal
- Disturbances to flora and fauna

- Health and safety
- Criminal activities
- Failure to comply with standards or legal obligations
- Location of underpasses and culverts

SECTION - 10

CONCLUSIONS

10.0 General

405. This section presents conclusions of the EIA study of Hasanabdal – Havelian section of E-35 Project. The overall objective of the project is that it will provide accessibility to KKH/ Northern areas and China via KKH. The main objective of NHA for planning this expressway is to provide a safe, congestion free and high speed facility to commuters of the project area as well as to tourists. Six lane Expressway will improve the communication network between the Province Punjab and Northern Areas of Province Khyber Pakhtunkhwa and also boost the land trade with China.

406. Total length of Proposed Project is about 60 Km starting from Burhan Interchange of Islamabad-Peshawar Motorway (M-1) and ends at Havelian near Hazara University, Havelian Campus. The existing/under construction section of E-35 consist of a two-lane dual carriageway with 3.65 m width of each lane and New Jersey barrier in median, while the proposed one lane with 3.65 m on each side. The Right of Way (ROW) of the proposed Project will be 80 meters including area reserved for plantation on either sides of the road.

407. The conclusions mentioned below are based on the findings of detailed environmental assessment, which has been carried out as per requirement of Federal EPA.

10.1 Identification of the Main Issues and Concerns

408. During the field surveys, significant efforts were made to identify the main social, cultural and environmental issues related to the construction of the proposed Expressway. Various government departments and agencies were also contacted for obtaining salient information along with area resident/ 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 operating of construction machinery during construction phase of the Project;

- Solid waste generation during construction;
- Oil spillages from construction machinery, resulting in soil and groundwater contamination; and
- Surface water body (Haro River and Dor River) contamination by the soil erosion and construction activities.

Table 10.1 summarizes the environmental impacts of the project.

Table 10.1: Summary of Environmental Impacts

Sr. No.	Resources	Envisaged Impacts	Construction Phase	Operational Phase
1.	Physical Resources	i) Land Acquisition ii) Dismantling of Structures iii) Relocation of Existing Utilities iv) Change of Landuse v) Soil Erosion vi) Disposal of Spoil vii) Surface and Groundwater viii) Air Pollution ix) Dust x) Noise xi) Topography xii) Disposal of Mucking Material xiii) Borrow/Open Pits	Permanent & Major Negative Permanent & Major Negative Temporary & Minor negative Permanent & Moderate negative Temporary & Minor Negative Temporary & Minor negative Moderate negative Moderate negative Moderate negative Moderate negative Minor negative Temporary & Minor negative Temporary & Minor negative	x x x Permanent & Moderate negative x x Minor negative Minor Negative x Minor negative x x x
2.	Ecological Resources	i) Loss of vegetation	Permanent & Moderate negative	Major positive
3.	Social & Cultural Resources	i) Relocation of Population	Permanent & Major Negative	x
		ii) Disturbance to People	Temporary & Moderate negative	Minor Negative
		iii) Disruption of Existing Utilities	Minor negative	x
		iv) Traffic Management	Minor negative	Major positive
		v) Health & Safety of workers and Public	Temporary & Moderate negative	Minor Negative
		vi) Economic Activity	Major positive	Major positive

X = No impact

10.2 Conclusions

409. After the construction of the proposed Expressway, people living in the project area and the road user/ 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 national wide markets;
- During the construction phase, local labour will be accommodated in the construction activities;
- To provide sustainable delivery of a productive and efficient national highway system contributing to decrease the transportation cost;
- To provide the livelihood and to educate the poor people of the project area;
- Traffic load on KKH will be reduced;
- It will also act as a trade link between Pakistan and China.

410. 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 will be reduced by proper and judicious compensation to the affectees and by implementing an appropriate tree plantation plan. This plantation along either sides of the road will enhance the aesthetics as well as the environmental conditions of the project area.

ANNEXURE-I

Pakistan Environmental Protection Act, 1997

Pakistan Environmental Protection Act

(PEPA), 1997

The Pakistan Environmental Protection Act 1997 was passed by the National Assembly of Pakistan on September 3, 1997, and by the Senate of Pakistan on November 7, 1997. The Act received the assent of the President of Pakistan on December 3, 1997.

The text of the Environmental Protection Act 1997 is as follows:

Act No. XXXIV of 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development.

Whereas it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development and for matters connected therewith and incidental thereto;

It is hereby enacted as follows:

1) Short Title, Extent and Commencement

- (1) This Act may be called the Environmental Protection Act 1997.
- (2) It extends to the whole of Pakistan.
- (3) It shall come into force at once.

2) Definitions

In this Act, unless there is anything repugnant in the subject or context:

- (i) "**adverse environmental effect**" means impairment of, or damage to, the environment and includes:
 - (a) impairment of, or damage to, human health and safety or to biodiversity or property;

- (b) pollution; and
- (c) any adverse environmental effect as may be specified in the regulation.

(ii) "**agricultural waste**" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry, residues from the use of fertilizers, pesticides and other farm chemicals;

(iii) "**air pollutant**" means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(iv) "**biodiversity**" or "**biological diversity**" means the variability among living organizations from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems;

(v) "**council**" means the Pakistan Environmental Protection Council established under section 3;

(vi) "**discharge**" means spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "**ecosystem**" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "**effluent**" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "**emission standards**" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(x) "**environment**" means-

- (a) air, water and land;
- (b) all layers of the atmosphere;
- (c) all organic and inorganic matter and living organisms;
- (d) the ecosystem and ecological relationships;
- (e) buildings, structures, roads, facilities and works;
- (f) all social and economic conditions affecting community life; and
- (g) the inter-relationships between any of the factors in sub-clauses (a) to (f)

(xi) "**environmental impact assessment**" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xii) "**Environmental Magistrate**" means the Magistrate of the First Class appointed under section 24;

(xiii) "**Environmental Tribunal**" means the Environmental Tribunal constituted under section 20;

(xiv) "**Exclusive Economic Zone**" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xv) "**factory**" means any premises in which industrial activity is being undertaken;

(xvi) "**Federal Agency**" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

(xvii) "**Government Agency**" includes-

- (a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;
- (b) a development or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government;
- (c) a Provincial Environmental Protection Agency; and
- (d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government;

(xviii) "**hazardous substance**" means-

- (a) a substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and
- (b) any substance which may be prescribed as a hazardous substance;

(xix) "**hazardous waste**" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;

(xx) "**historic waters**" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xxi) "**hospital waste**" includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

(xxii) "**industrial activity**" means any operation or process for manufacturing, making, formulating, synthesizing, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

(xxiii) "**industrial waste**" means waste resulting from an industrial activity;

(xxiv) "**initial environmental examination**" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment;

(xxv) "**local authority**" means any agency set-up or designated by the Federal Government or a Provincial Government by notification in the official Gazette to be a local authority for the purposes of this Act;

(xxvi) "**local council**" means a local council constituted or established under a law relating to local government;

(xxvii) "**motor vehicle**" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxviii) "**municipal waste**" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxix) "**National Environmental Quality Standards**" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4;

(xxx) "**noise**" means the intensity, duration and character from all sources, and includes vibrations;

(xxxi) "**nuclear waste**" means waste from any nuclear reactor or nuclear or other nuclear energy system, whether or not such waste is radioactive;

(xxxii) "**person**" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxiii) "**pollution**" means the contamination of air, land or water by the discharge or emission or effluents or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xxxiv) "**prescribed**" means prescribed by rules made under this Act;

(xxxv) "**project**" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes;

- (a) construction or use of buildings or other works;
- (b) construction or use of roads or other transport systems;
- (c) construction or operation of factories or other installations;

- (d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;
- (e) any change of land use or water use; and
- (f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems; factories or other installations;

(xxxvi) "**proponent**" means the person who proposes or intends to undertake a project;

(xxxvii) "**Provincial Agency**" means a Provincial Environmental Protection Agency established under section 8;

(xxxviii) "**regulations**" means regulations made under this Act;

(xxxix) "**rules**" means rules made under this Act;

(xl) "**sewage**" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xli) "**standards**" means qualitative and quantitative standards for discharge of effluents and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations made thereunder;

(xlii) "**sustainable development**" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(xliii) "**territorial waters**" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xliv) "vessel" includes anything made for the conveyance by water of human beings or of goods; and

(xlv) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3) Establishment of the Pakistan Environmental Protection Council-

(1) The Federal Government shall, by notification in the official Gazette, establish a Council to be known as the Pakistan Environmental Protection Council consisting of;

(i) Prime Minister or such other person as the Prime Minister may nominate in this behalf.	Chairperson
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(ii) Minister Incharge of the Ministry or Division dealing with the subject of environment.	Vice Chairperson
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(iii) Chief Ministers of the Provinces.	Members
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(iv) Ministers Incharge of the subject of environment in the provinces.	Members
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(v) Such other persons not exceeding thirty-five as the Federal Government may appoint, of which at least twenty shall be non-official including five representatives of the Chambers of Commerce and Industry and Industrial Associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educationists.	Members
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(vi) Secretary to the Government of Pakistan, in-charge of the Ministry or Division dealing with the subject of environment	Member/Secretary
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(2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of three years.

- (3) The Council shall frame its own rules of procedure.
- (4) The Council shall hold meetings as and when necessary, but not less than two meetings shall be held in a year.
- (5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.
- (6) The Council or any of its committees may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4) Function and Powers of the Council

- (1) The Council shall-
 - (a) co-ordinate and supervise enforcement of the provisions of this Act;
 - (b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;
 - (c) approve the National Environmental Quality Standards;
 - (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
 - (e) coordinate integration of the principles and concerns of sustainable development into national development plans and policies; and
 - (f) consider the National Environment Report and give appropriate directions thereon.
- (2) The Council may, either itself or on the request of any person or organization, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any specified aspect of environment.

5) Establishment of the Pakistan Environmental Protection Agency

- (1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency, to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.
- (2) The Federal Agency shall be headed by a Director General, who shall be appointed by the Federal Government on such terms and conditions as it may determine.
- (3) The Federal Agency shall have such administrative, technical and legal staff as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.
- (4) The powers and function of the Federal Agency shall be exercised and performed by the Director General.
- (5) The Director General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3)
- (6) For assisting the Federal Agency in the discharge of its functions, the Federal Government shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6) Functions of the Federal Agency

- (1) The Federal Agency shall-
- (a) administer and implement the provisions of this Act and the rules and regulations made thereunder;
 - (b) prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;
 - (c) take all necessary measures for the implementation of the national environmental policies approved by the Council;
 - (d) prepare and publish an annual National Environment Report on the state of the environment;

- (e) prepare or revise, and establish the National Environment Quality Standards with approval of the Council; Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure;
- (f) ensure enforcement of the National Environmental Quality Standards;
- (g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette, in consultation with the Provincial Agency concerned;
- Provided that
- (i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;
 - (ii) where standards are less stringent than the National Environmental Quality Standards, prior approval of the Council shall be obtained;
 - (iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;
- (h) co-ordinate environmental policies and programmes nationally and internationally;
- (i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- (j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
- (k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation, for the purposes of this Act;
- (l) identify the needs for, and initiate legislation in various sectors of the environment;
- (m) render advice and assistance in environmental matters, including such information and data available with it as may be required for carrying out the purposes of this Act;

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

- (n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
- (o) provide information and guidance to the public on environmental matters;
- (p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
- (q) promote public education and awareness of environmental issues through mass media and other means, including seminars and workshops;
- (r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
- (s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
- (t) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
- (u) perform any function which the Council may assign to it.

(2) The Federal Agency may-

- (a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;
- (b) request any person to furnish any information or data relevant to its functions;
- (c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
- (d) recommend to the Federal Government the adoption of financial and fiscal programmes,

schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including:

- (i) incentives, prizes, awards, subsidies, tax exemptions, rebates and depreciation allowances; and
 - (ii) taxes, duties, cesses and other levies;
- (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
- (f) provide or arrange, in accordance with such procedures as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7) Powers of the Federal Agency

Subject to the provisions of this Act, the Federal Agency may-

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations made thereunder;
- (d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
- (g) enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;

(h) take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;

(i) arrange for test and analysis of the samples at a certified laboratory;

(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (i) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate; and

(k) establish a National Environmental Coordination Committee comprising the Director-General as its chairman and the Director-Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter-provincial co-ordination in environmental policies;

8) Establishment, Powers and Functions of the Provincial Environmental Protection Agencies

(1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the Provincial Government on such terms and conditions as it may determine.

(3) The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Provincial Agency shall be exercised and performed by the Director-General.

(5) The Director-General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).

(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9) Establishment of the Provincial Sustainable Development Funds

- (1) There shall be established in each Province a Sustainable Development Fund.
- (2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely;
 - (a) grants made or loans advanced by the Federal Government or the Provincial Governments;
 - (b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and
 - (c) contributions from private organizations, and other persons.
- (3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for:
 - (a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of environment; and
 - (b) any other purpose which in the opinion of the Board will help achieve environmental objectives and the purpose of this Act.

10) Management of the Provincial Sustainable Development Fund

- (1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of:
 - i) Chairman, Planning and Development Board/Additional **Chairperson**
Chief Secretary Planning and Development Department.

(ii) such officers of the Provincial Governments not exceeding six as the Provincial Government may appoint, including Secretaries in charge of the Finance, Industries and Environment Departments.

Members

(iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non-governmental organizations, and major donors.

Members

(iv) Director-General of the Provincial Agency.

Member/Secretary

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to:

- (a) sanction financial assistance for eligible projects;
- (b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings schemes and securities as it may deem suitable; and
- (c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of project financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts, and performance evaluation based on the progress reports.

11) Prohibition of Certain Discharges or Emissions

(1) Subject to the provisions of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government levy a pollution charge on any person who contravenes or fails to comply with the provisions

of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12) Initial Environmental Examination and Environmental Impact

Assessment

(1) No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof.

(2) The Federal Agency shall;

(a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to:

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director-General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

(ii) international relations, national security or maintenance of law and order, except with the

consent of the Federal Government; or

(iii) matters covered by legal professional privilege.

(4) The Federal Agency shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

(5) Subject to sub-section (4) the Federal Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-section (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Federal Agency shall maintain separate Registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

13) Prohibition of Import of Hazardous Waste

No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.

14) Handling of Hazardous Substances

Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except;

(a) under a licence issued by the Federal Agency and in such manner as may be prescribed;

or

(b) in accordance with the provisions of any other law for the time being in force, or of any

international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15) Regulation of Motor Vehicles

(1) Subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the Federal Agency under sub-section (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16) Environmental Protection Order

(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring or has occurred in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include:

(a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental

effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceeding initiated against him under this Act or the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary, and may recover the costs of taking such measures from such person as arrears of land revenue.

17) Penalties

(1) Whoever contravenes or fails to comply with the provisions of section 11, 12, 13, or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues: Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction issued by the Council or by the Federal Agency or Provincial Agency shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention, or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-section (1) and (2), the Environmental Tribunal and Environmental Magistrate shall, in passing sentence, take into

account the extent and duration of the contravention or failure constituting the offence, and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Tribunal is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Tribunal may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-section (1) or sub-section (2), and had been previously convicted for any contravention under this act, the Environmental Tribunal or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder:

(a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;

(b) sentence him to imprisonment for a term which may extend upto two years;

(c) order the closure of the factory;

(d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act; Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste.

(e) order, such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and

(f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorized by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of the is Act.

18) Offences by Bodies Corporate

Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance or, is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation:

For the purpose of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19) Offences by Government Agencies, Local Authorities or Local Councils

Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of the Head or any other

officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention alongwith the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20) Environmental Tribunals

- (1) The Federal Government may, by notification in the official Gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.
- (2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed.
- (3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.
- (4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the chairperson.
- (5) An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.
- (6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.
- (7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution of, the Environmental Tribunal.
- (8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21) Jurisdiction and Powers of Environmental Tribunals

(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by:

(a) the Federal Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Federal Agency or the Provincial Agency concerned of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in the Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorized in this behalf by the Director-General of the Federal Agency or Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists of his having been involved in contravention punishable under sub-section (1) of section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal

Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant, he shall be released from custody, failing which he shall be taken or sent without delay to the officer-in-charge of the nearest police station.

- (8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purposes of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).
- (9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.
- (10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22) Appeals to the Environmental Tribunal

- (1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act and rules or regulations made thereunder may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.
- (2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23) Appeals from Orders of the Environmental Tribunal

- (1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.
- (2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24) Jurisdiction of Environmental Magistrates

- (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all

contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An environmental Magistrate shall be competent to impose any punishment specified in sub-section (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by:

- (a) the Federal Agency, Provincial Agency, or Government Agency or local council; and
- (b) any aggrieved person.

25) Appeals from Orders of Environmental Magistrates

Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions, whose decision thereon shall be final.

26) Power to Delegate

(1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations made thereunder to any Provincial Government, any Government Agency, local council or local authority.

(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations made thereunder to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27) Power to give Directions

In the performance of their function under this Act:

- (a) the Federal Agency and Provincial Agencies shall be bound by the directions give to them in writing by the Federal Government; and

(b) a Provincial Agency shall be bound by the directions give to it in writing by the Provincial Government.

28) Indemnity

No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Councils, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisors, committees or consultants of the Federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29) Dues Recoverable as Arrears of Land Revenues

Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations made thereunder shall be recoverable as arrears of land revenue.

30) Act to Override Other Laws

The provisions of the Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31) Power to Make Rules

The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental agreements, specified in the Schedule to this Act.

32) Power to Amend the Schedule

The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

33) Power to Make Regulations

- (1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.
- (2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for:
- (a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;
 - (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
 - (c) appointment of officers, advisors, experts, consultants and employees;
 - (d) levy of fees, rates and charged in respect of services rendered, actions taken and schemes implemented;
 - (e) monitoring and measurement of discharges and emissions;
 - (f) categorization of projects to which, and the manner in which, section 12 applies;
 - (g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;
 - (h) providing procedures for handling hazardous substances; and
 - (i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34) Repeal, Savings and Succession

- (1) The Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983) is hereby repealed.
- (2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, order passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired, liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

- (2) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE

(See Section 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), Paris, 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio De Janiero, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janiero, 1992

ANNEXURE-II

Pakistan Environmental Protection Agency (Review of IEE and 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 non-refundable 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.

- (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.

- (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 sub-section (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 sub-regulation (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 under 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 assessment 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

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

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

D. Transport

1. Airports
2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction 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

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

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	<u>Available</u> Yes/No Yes/No Yes/No Yes/No	<u>Measured</u> Yes/No Yes/No Yes/No Yes/No
9.	Have estimates of the following been reported?	Water balance Solid waste disposal Liquid waste treatment	<u>Estimated</u> Yes/No Yes/No Yes/No	<u>Reported</u> 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)

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)

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)

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) _____

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 completeness	
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-III

National Environmental Quality Standards (NEQS), 2000

The Gazette



of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABD, THURSDAY, AUGUST 10, 2000

PART-II

Statutory Notification (S.R.O)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT, LOCAL GOVERNMENT AND
RURAL DEVELOPMENT

NOTIFICATION

Islamabad, the 8th August 2000

S.R.O. 549 (I)/2000.___ In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan environmental Protection Act. 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to direct that the following further amendments shall be made in its Notification No. S.R.O. 742(I)/93, dated the 24th August, 1993, namely: ___

In the aforesaid Notification, in paragraph 2._____

(1289)

[4138(2000)/Ex.GAZ]

Price : Rs. 5.00

(1) for Annex, I the following shall be substituted, namely:_____

Annex-I

**“NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND
LIQUID INDUSTRIAL EFFLUENTS (mg/l,
UNLESS OTHERWISE DEFINED)**

<u>S. No.</u>	<u>Parameter</u>	Existing Standards	<u>Revised Standards</u> Into Inland Waters	Into Sewage Treatment ⁽⁵⁾	Into Sea ⁽¹⁾
1	2	3	4	5	6
1.	Temperature or Temperature Increase *	40 ⁰ C	≤3 ⁰ C	≤3 ⁰ C	≤3 ⁰ C
2.	pH value (H ⁺) .	6-10	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) ₅ at 20 ⁰ C ⁽¹⁾	80	80	250	80**
4.	Chemical Oxygen Demand (COD) ⁽¹⁾	150	150	400	400
5.	Total Suspended Solids (TSS)	150	200	400	200
6.	Total Dissolved Solids (TDS)	3500	3500	3500	3500
7.	Oil and Grease	10	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.1	0.3	0.3
9.	Chloride (as Cl ⁻)	1000	1000	1000	SC***
10.	Fluoride (as F ⁻)	20	10	10	10
11.	Cyanide (as CN ⁻) total ..	2	1.0	1.0	1.0
12.	An-ionic detergents (as MBAS) ⁽²⁾	20	20	20	20
13.	Sulphate (SO ₄ ²⁻)	600	600	1000	SC***
14.	Sulphide (S ²⁻)	1.0	1.0	1.0	1.0
15.	Ammonia (NH ₃)	40	40	40	40
16.	Pesticides ⁽³⁾	0.15	0.15	0.15	0.15

1	2	3	4	5	6
17.	Cadmium ⁽⁴⁾	0.1	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent ⁽⁴⁾	1.0	1.0	1.0	1.0
19.	Cooper ⁽⁴⁾	1.0	1.0	1.0	1.0
20.	Lead ⁽⁴⁾	0.5	0.5	0.5	0.5
21.	Mercury ⁽⁴⁾	0.01	0.01	0.01	0.01
22.	Selenium ⁽⁴⁾	0.5	0.5	0.5	0.5
23.	Nickel ⁽⁴⁾	1.0	1.0	1.0	1.0
24.	Silver ⁽⁴⁾	1.0	1.0	1.0	1.0
25.	Total toxic metals	2.0	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0	5.0
27.	Arsenic ⁽⁴⁾	1.0	1.0	1.0	1.0
28.	Barium ⁽⁴⁾	1.5	1.5	1.5	1.5
29.	Iron	2.0	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5	1.5
31.	Boron ⁽⁴⁾	6.0	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0	1.0

Explanations:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Methylene Blue Active Substances; assuming surfactant as biodegradable.
3. Pesticides include herbicides, fungicides, and insecticides.
4. Subject to total toxic metals discharge should not exceed level given at S. N. 25.
5. Applicable only when and where sewage treatment is operational and BOD₅=80mg/l is achieved by the sewage treatment system.

6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.
- * The effluent should not result in temperature increase of more than 3⁰C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.
- ** The value for industry is 200 mg/l
- *** Discharge concentration at or below sea concentration (SC).

Note:_____ 1. Dilution of liquid effluents to bring them to the NEQS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.

2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the NEQS limits” and

(2) for Annex-II the following shall be substituted, namely:_____

Annex-II

“NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm³, UNLESS OTHERWISE DEFINED).”

S. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
1	2	3	4	5
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann Scale	40% or 2 Ringlemann Scale or equivalent smoke number
2.	Particulate matter	(a) Boilers and Furnaces		
	(1)	(i) Oil fired	300	300
		(ii) Coal fired	500	500
		(iii) Cement Kilns	200	300
		(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500	500
3.	Hydrogen Chloride	Any	400	400

1	2	3	4	5
4.	Chlorine	Any	150	150
5.	Hydrogen Fluoride	Any	150	150
6.	Hydrogen Sulphide	Any	10	10
7.	Sulphur Oxides ^{(2) (3)}	Sulfuric acid/Sulphonic acid plants		
		Other Plants except power Plants operating on oil and coal	400	1700
8.	Carbon Monoxide	Any	800	800
9.	Lead	Any	50	50
10.	Mercury	Any	10	10
11.	Cadmium	Any	20	20
12.	Arsenic	Any	20	20
13.	Copper	Any	50	50
14.	Antimony	Any	20	20
15.	Zinc	Any	200	200
16.	Oxides of Nitrogen	Nitric acid manufacturing unit.	400	3000
	(3)	Other plants except power plants operating on oil or coal:		
		Gas fired	400	400
		Oil fired	-	600
		Coal fired	-	1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent Sulphur content in fuel oil. Higher content of Sulphur will case standards to be pro-rated.
3. In respect of emissions of Sulphur dioxide and Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards:-

A. Sulphur Dioxide

Sulphur Dioxide Background levels Micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$) Standards.

Background Air Quality (SO_2 Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO_2 Emission (Tons per Day Per Plant)	Criterion II Max. Allowable ground level increment to ambient ($\mu\text{g}/\text{m}^3$) (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100 $\mu\text{g}/\text{m}^3$ linear interpolations should be used.

** No projects with Sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of Nitrogen oxides, expressed as NO_x should not be exceed the following:-

Annual Arithmetic Mean	100 $\mu\text{g}/\text{m}^3$ (0.05 ppm)
------------------------	--

Emission level for stationary source discharge before missing with the atmosphere, should be maintained as follows:-

For fuel fired steam generators as Nanogram (10^0 -gram) per joule of heat input:

Liquid fossil fuel	..	..	..	130
Solid fossil fuel ..	..	..	..	300
Lignite fossil fuel	..	..	..	260

Note:- Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible through excess air mixing blowing before emitting into the environment.

[File No. 14(3)/98-TO-PEPC.]

HAFIZ ABDULAH AWAN
DEPUTY SECRETARY (ADMN)

ANNEXURE-IV

Quarry Area Management Guidelines/Plan

QUARRY MANAGEMENT PLAN

The contractor is responsible for extraction of resources for the construction aggregate from quarry area is required to prepare and implement a Quarry Management Plan (QMP). The overall objective of the QMP is to manage the extraction and processing of a valuable aggregate resource while avoiding, remedying or mitigating adverse effects on the environment and enhancing environmental performance wherever practicable.

The activities conducted in quarry areas are carried out under license or a mining lease under the Punjab Mining Concession, Rule 2002. The lease is issued based on open bidding. The lease is granted for a period not exceeding five years. The leased area may be re-auctioned within three months before its expiry but if the auction or the grant of lease is delayed due to the certain reason, the licensing authority may extend the period of previous lease upto the date of next grant.

The Licensing Authority of the Mine and Mineral Department shall inspect the lessee during the operation. If on inspection or otherwise, the licensing authority is of the opinion that lessee is working in a manner contrary to the conservation of mineral property or safety of workers and other people, the licensing Authority require the lessee, in writing, to remove the defects or amend the method of mining within the period, not exceeding two months, as is determined by the Licensing Authority. If the lessee fails to comply with the instruction within the specified period, the licensing authority shall have the power to stop the work of extraction of mineral in whole or in any part of the area demised under lease till such time that the defects are removed to the satisfaction of the Licensing Authority and if the defects are not removed or the method of mining are not amended to the satisfaction of the licensing authority within two months from the date of stoppage of work the lease shall be cancelled and bid money already paid shall be forfeited. Inspectorate of mines will ensure the safe mining practices, authorized mining and worker health and safety. Environmental Protection Department (EPD) also plays vital role in environmental monitoring of the criteria pollutant at the Quarry area.

1.1 Key Quarry Activities

The Key activities identified in extraction of material from quarry are discussed as under:

A) Pre Operation

Pre Operation includes Land clearing and Overburden stripping

B) Quarry Operation

Quarry Operation includes:

- Excavation of rock
- Loading and transportation of rock
- Crushing and stockpiling
- Asphalt manufacturing
- Water supply
- Transportation to the construction site.

C) Rehabilitation

- Reclamation activities are conducted after the completion of quarrying activities to restore or rehabilitate the site.

1.2 Environmental Considerations

Quarrying has the potential to have a range of adverse environmental effects. This QMP identifies these effects and suggests measures to mitigate or minimize these impacts.

1.2.1 Vegetation Removal

During land clearance and vegetation removal the following shall be considered:

- Minimize the amount of vegetation removal; and
- Allow timber and other useful resources to go to the local communities.

1.2.2 Overburden Clearance

During overburden clearance the following shall be considered:

- No direct discharge of sediment laden water without treatment.
- Earthworks and land clearance should be minimized and phased.
- Provide treatment to achieve a reduction in suspended solids prior to discharge to a natural water course.
- Any discharges to rivers should occur during high flow to dilute the unavoidable discharges;

- Stockpiling should be at least 10m from a water course;
- Waste rock or overburden should be placed in properly designed dump sites, which are located and shaped to blend in with the surrounding landscape;
- Compaction and re-vegetation of exposed areas as soon as practicable;
- Earthworks control measures should be inspected and maintained in efficient operating condition;
- Existing drainage channels should be kept free of overburden.
- Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil.

1.2.3 Noise

To keep noise generated due to the different activities, to an acceptable level following measures shall be adopted:

- Managing the time and location of particularly noisy operations around the site to ensure minimum disturbance to the localities;
- The majority of fixed processing plant, excluding conveyors will be housed within structures that reduce the noise level at the boundary of the quarry;
- Machinery shall be regularly maintained to ensure that noise produced from machinery is kept minimal; and
- Monitoring of noise levels shall be done.

1.2.4 Excavation and Blasting

To keep vibration and air overpressure due to excavation and blasting to an acceptable level following practices shall be adopted:

- Removing rock, where practicable, with an excavator by free digging or ripping instead of blasting.
- A comprehensive blasting management plan shall be prepared and implemented addressing the following concerns:
 - i. Control of blasting area
 - ii. Time schedule
 - iii. Training of personnel
 - iv. Announcement/ Communication

- v. Traffic management
- vi. Hazardous material handling and storage
- vii. Waste disposal
- viii. Post blast re entry
- ix. Health and safety of worker

1.2.5 Traffic

To avoid, remedy or mitigate the adverse effects associated with quarry traffic following measures shall be adopted:

- All the vehicles used shall be regularly maintained and checked to ensure that appropriate noise suppression devices are installed and being operated effectively.
- All trucks leaving the quarry shall be checked for overloading to avoid risk of quarry products being spilled on public roads.
- Loader drivers shall be appropriately trained to help ensure that container/trucks are loaded securely.
- A wheel wash shall be used to spray truck wheels as they leave the quarry site. This will help reduce the risk of dust being carried onto public roads by trucks.
- To ensure the safety and convenience of local traffic, a Traffic Control Plan is required to be communicated that ensures minimised traffic stoppage times.

1.2.6 Dust (Air quality)

Dust emissions have the greatest potential for off-site effects. However, provided the operation site is well controlled and the activities well managed, dust emissions can be reduced by adopting the following measures:

- Locating the fixed processing plant away from quarry boundaries;
- The fixed processing plant is covered in areas where dust generation could become a nuisance;
- Potential dust generating conveyors are covered where practicable to contain dust;
- Water sprays to suppress dust emissions wherever practicable;
- Blasting will be restricted if windy conditions are likely to carry visible dust emissions beyond the quarry boundary where they could create a nuisance;

- Minimising dust emissions from blasting by sequential firing and using minimum force;
- Revegetating areas that will not be further disturbed as soon as possible;
- Proper maintenance and tuning of the vehicles and equipment also shall also be considered in avoiding any off-site effects; and
- Good blasting practice, including using waterproof explosives in areas where groundwater levels are high, to avoid the degradation of the explosive, will minimise incomplete combustion and any associated NOx emissions.

1.2.7 Altering Water Flow

Quarries and pits can affect ground-water and surface-water systems by lowering of local ground-water and surface-water levels from mining operations and mine dewatering, changes in turbidity levels in ground water due to blasting and quarry operations, interruption of ground-water conduit flow paths by rock removal and temperature change (thermal impacts) in springs and surface-water streams. To avoid reduced water flow from springs to water ways and irrigation / drinking water schemes, changes in water flow direction and increased storm water run off, following mitigation measures shall be adopted:

- Create temporary ponds to treat sediment and reduce runoff speed of surface water flow especially during high rainfall.
- Create a channel from the settling ponds to the nearest river.
- Create a special water channel for citizens to source clean water from springs.
- Divert groundwater and surface water around the quarry area.

1.2.8 Landscape

Following shall be considered in order to minimize impacts to the landscape;

- Vegetation and landscape plan for the site shall be devised and followed by the contractor that gives a comprehensive description of all measures that will be taken on site to protect the landscape and visual characteristics of the site;
- Provide earth mounding and vegetation screening to mitigate visual effects of quarry operations and on-site truck routes where practical.

1.2.9 Hazardous Substances

To deal with issues relating to the release of hazardous substances from storage facilities or during their use, transport or disposal within the quarry site, the following shall be considered:

- Ensure that only the imminent operational requirements are stored on the site.
- Explosives and detonators shall not be stored for long time on site.
- Fuel, lubricant and waste oil storage, dispensing and operating facilities are designed and operated in such a way that contamination of soil and water is avoided as far as practicable.
- Rain run off carrying fuel, lubricant and waste oil shall be directed to an oil separator before entering the stormwater drainage system. Oil separators are cleaned out on a regular basis.
- All transport, storage and operating conditions meet the requirements of licences under the Section 14 of PEPA 1997, Handling of Hazardous Substances.

1.2.10 Rehabilitation of the site

Restoration of the former quarry areas may be done using the overburden and fertilizers to restore soil stability and soil fertility.

- Remove all stockpiles.
- The use of imported fill shall be minimized.
- Plant local plant species and productive vegetation as part of the restoration plan.
- Stabilize all slopes and unstable areas.

1.2.11 Worker Health and Safety

To ensure worker health and safety the following shall be adopted on or near the project site;

- Restrict the access to the quarry areas for unconcerned persons;
- All personnel shall be provided (and wear) Personal Protective Equipment (PPE), such as safety helmets, safety shoes, vests, dust masks, goggles, and a high visibility vest;
- Providing radio communications equipment to facilitate coordination in the field;
- Conducting periodic monitoring of heavy vehicles and equipment for safety risks;
- Limiting the hours of operation of heavy vehicles and equipment, to minimize risks relating to staff fatigue;

- Conduct inspections of the access point to the location of transport because of the steepness of the route;
- In case of accidents or emergencies, basic medical facility shall be provided;
- The team shall be able to handle emergency situations and the possible emergency services shall be notified in advance; and
- No damage occurs to people, property, livestock or power lines.

1.2.12 General Prohibitions

Following General prohibitions shall be adopted in and around the quarry area:

- Cutting of trees for any reason outside the quarry;
- Hunting, fishing, wildlife capture and poaching, or plant collection;
- Buying of wild animals or their meat for food or any other purposes;
- Disturbance to anything with architectural or historical value;
- Use of firearms (except authorized security guards);
- Washing car or machinery in streams or creeks;
- Doing maintenance (change of oils and filters) of equipment outside authorized areas;
- Littering of the site and disposing trash in unauthorized places;
- Workers driving motorbikes without wearing helmets;
- Control construction plants or vehicles by unauthorized person;
- Driving at speeds exceeding limits;
- Having caged wild animals (especially birds) in camps;
- Working without safety equipment (including gloves, boots and masks);
- Creating nuisances and disturbances in or near communities;
- Disrespecting local customs and traditions;
- The use of welding equipment, oxy-acetylene torches and other bare flames where fires constitute a hazard;
- Indiscriminate disposal of rubbish or construction wastes or rubble;
- Spillage of potential pollutants, such as petroleum products;
- The storage and use of explosives;
- Collection of firewood; and
- Burning of wastes and/or cleared vegetation.

ANNEXURE-V

Detailed Soil (Subgrade) Analysis along the Proposed Alignment

Annexure-V

Detailed Analysis of Subgrade (Soil) along Proposed Project (Hasanabdal to Havelian Expressway)

Sr. No.	Location	Sieve Analysis (Passing Percentage)										AASHTO Soil Classification
		3"	2½"	2"	1"	¾"	⅜"	#4	#10	#40	#200	
1	1+600	-	-	100	97.0	-	94.6	90.8	90.8	85.4	74.1	A-4
2	11+500	100	92.5	88.1	81.0	76.7	79.4	30.4	30.4	15.2	12.2	A-2-4
3	14+000	-	-	-	-	100	96.9	89.2	89.2	83.0	72.5	A-4
4	18+000	-	-	-	-	-	100	93.2	93.2	84.3	82.4	A-4
5	24+000	-	-	-	-	-	100	97.8	97.8	97.2	95.0	A-4
6	28+400	-	-	-	-	-	100	96.9	96.9	94.1	84.0	A-4
7	29+300	-	-	-	-	100	97.6	92.4	92.4	90.6	88.4	A-4
8	31+000	-	-	-	-	100	99.4	96.2	96.2	92.9	90.1	A-4
9	38+000	-	-	-	-	100	98.8	89.6	89.6	82.8	73.9	A-4
10	39+400	-	-	100	85.3	78.0	57.1	31.2	31.2	23.6	19.1	A-1-b
11	42+000	-	-	-	-	-	-	100	99.7	98.8	97.1	A-4
12	45+000	-	-	95.6	87.0	-	-	28.8	19.4	13.6	8.7	A-1-a
13	48+000	-	-	100	77.5	-	-	22.4	10.9	4.6	2.6	A-1-a
14	51+000	-	-	100	83.8	-	-	30.0	23.7	13.0	3.6	A-1-a
15	54+000	-	-	100	62.5	-	-	34.0	27.3	18.2	8.8	A-1-a
16	57+000	-	-	-	-	-	-	72.5	69.0	64.5	59.5	A-4
17	60+000	-	-	100	51.3	-	-	10.0	5.1	2.3	1.7	A-1-a

ANNEXURE-VI

Environmental Monitoring Results (Ground & Surface Water, Air Quality & Noise)

NESPAK (PVT) LTD.

DRAFT REPORT

ON

**ENVIRONMENTAL BASELINE STUDIES FROM
HASANABDAL TO HAWALIAN**

OCTOBER, 2007

PREPARED BY:

**ENVIRONMENTAL SERVICES
SGS PAKISTAN (PVT) LTD.**



CONTENTS

Introduction	03
Methodology of Sampling and Analysis	06
Results and Discussion	14
Metrological Data	16
Ambient Air Quality Data	20
Noise Level Monitoring	30
Water Analysis	37
Photographs	47
National Environmental Quality Standards (NEQS)	52
USEPA Standards for Ambient Air Quality	56
Drinking Water Guidelines	58

Section 1

Introduction



Introduction:

NESPAK (Pvt.) Ltd. nominated SGS Pakistan (Pvt.) Ltd. to conduct the Environmental baseline study from Hasanabdal to Hawalian. A comprehensive environmental assessment was conducted at advised sampling points. The environmental assessment includes the monitoring of ambient air quality, weather conditions, noise level monitoring, sampling and analysis of ground and surface water.

Scope of Study:

In accordance to the instructions received from the client we attended the site on September 18 to September 21, 2007 for field monitoring and sampling followed by the analysis of field collected samples in the SGS Chemical lab. The scope of monitoring was finalized after discussion with the NESPAK (Pvt.) Ltd. team. The scope is as follows;

▪ Ambient Air Quality

The ambient air quality was monitored for priority pollutants at three locations. The duration of monitoring was 24 hours at individual site. Followings are the sampling locations selected for the ambient air quality monitoring and weather data.

- Wah Madel Town Phase III Hasanabdal (Point#1)
- Near Haro River Shahia Stop (Point#2)
- Changi Bandi Village Near Sraay Salay (Point#3)

▪ Noise Level Monitoring

The noise level was monitored with the help of Digital Sound meter (with data logging) continuously for 24 hours at the advised sampling points with interval of 1 second and hourly average data was reported. The sampling points are as follows:

- Wah Madel Town Phase III Hasanabdal (Point#1)
- Near Haro River Shahia Stop (Point#2)
- Changi Bandi Village Near Sraay Salay (Point#3)



- **Potable Water Analysis**

Potable water sample (ground water) was collected from the advised sampling points. The collected samples were analyzed for both microbiological and chemical parameters as per contract.

- **Surface Water Analysis**

Surface Water sample was collected from the advised sampling point. The collected sample was analyzed for parameters as per contract.

Section 2

Methodology of Sampling and Analysis



Methodology of Sampling and Analysis

Sampling Locations and Schedule:

Sampling points were selected after discussion with NESPAK (Pvt.) Ltd. team. The schedule of monitoring along with the duration is as follows;

Sr. No.	Date	Scope of Services	Location	Duration
1	18-09-07	Site visit for selection of monitoring points	<ul style="list-style-type: none"> ○ Wah Madel Town Phase III Hasanabdal (Point#1) ○ Near Haro River Shahia Stop (Point#2) ○ Changi Bandi Village Near Sraay Salay (Point#3) 	--
2	18-09-07 to 21-09-07	Metrological conditions	Same as Above	24 hours
3	18-09-07 to 21-09-07	Ambient air quality monitoring	Same as Above	24 hours
4	18-09-07 to 21-09-07	Noise level monitoring	Same as Above	24 hours
5	19-09-07 to 20-09-07	Water Analysis	Ground Water Sample: <ul style="list-style-type: none"> ○ Total Filling Station Near Model Town Phase III (Point#1) ○ Near Lub Village (Point#2) ○ Changi Bandi Village (Point#3) Surface Water Sample : <ul style="list-style-type: none"> ○ Bahay Wala Soka Nala (Point#3) 	Grab Sampling

Sampling Schedule



AMBIENT AIR QUALITY

Parameters for Monitoring

Ambient air quality was continuously monitored for 24 hours at selected sampling points. Ambient air quality was monitored for the following parameters.

- Carbon Monoxide (CO)
- Sulfur Dioxide (SO₂)
- Nitrogen Dioxide (NO₂)
- Ambient Particulate Matter (PM₁₀)

Weather Data

In addition to advised parameters for ambient air quality, the weather data was also recorded continuously for 24 hours with the help of portable weather station. The parameters monitored as follows;

- Temperature
- Humidity
- Wind Direction
- Wind Velocity
- Barometric Pressure

Selection of sampling Points

Selection of sampling points was made considering the wind direction at the advised sampling site.

Sampling and Analysis

The summary of the sampling methodology is given in Table – 2. The detail of individual parameters is as follows:

Air Pollutant	Monitoring Technique	Method	Measurement Range	Lowest Detection Limit	Sampling Duration
Carbon monoxide (CO)	Automatic Potable Analyzer	40 CFR 50, App. C (US-EPA)	1 – 100 ppm	1 ppm	Continuous data was recorded and hourly average is reported
Sulfur Dioxide (SO ₂)	Calorimetric Improved West & Gaeke (Sod. Tetrachloro Mercurate) Method	40 CFR 50, App. A (US-EPA)	0.01– 0.4 ppm 25 µg/m ³ to 1000 µg/m ³	0.01 ppm	24 hours
Nitrogen Dioxide (NO ₂)	Griess Saltzman Method	ISO 6768	0.01– 0.4 ppm 25 µg/m ³ to 1000 µg/m ³	0.01 ppm	24 hours
Particulate Matter (PM ₁₀)	High Volume PM ₁₀ Sampler	40 CFR 50, App. J (US-EPA)	2 – 750 µg/m ³	2 µg/m ³	24 hours

Table 2. Sampling Methodology of Ambient Air

Sample Preservation:

A shipping container (Ice box with eutectic cold packs instead of ice) with maintained temperature of 4° C ±5 °C was used for transporting the sample from the collection site to the analytical laboratory. For particulate matter the samples were collected on fiberglass filters properly stored and placed in the vacuum desiccators transported to SGS Lab for analysis.

NOISE LEVEL MONITORING

Noise level was monitored at the advised sampling points for 24 hours with interval of 1 second and hourly average data is reported. The sound level was monitored with the help of potable Digital sound meter (RION, Model NL – 31, IEC60051 TYPE 1 IE60804 TYPE 1 JIS C 1505)



WATER QUALITY

The ground water samples were collected from the advised sampling points in accordance to standard method for collection of water samples. The analysis on water samples were conducted on the following advised parameters:

Ground Water Sample

Microbiological Analysis:

- Total Coliforms
- Fecal E. Coli
- Total Colonial Count
- Fecal Enterococci

Chemical Analysis:

- pH Value
- Total Dissolved Solids (TDS)
- Total Hardness
- Chloride
- Sodium
- Turbidity
- Fluoride
- Nitrate
- Nitrite
- Arsenic
- Color
- Odor
- Taste

Surface Water Sample

Microbiological Analysis:

- Total Coliforms
- Fecal E. Coli
- Total Colonial Count
- Fecal Enterococci

Chemical Analysis:

- pH Value
- Dissolved Oxygen(DO)
- Total Suspended Solids(TSS)
- Alkalinity
- BOD₅
- COD
- Turbidity
- Total Hardness
- Conductivity
- Chloride
- Flouride
- Nitrate
- Nitrite
- Sodium

Water Sampling and Analysis**Sample Collection:**

The water samples were collected in accordance to the SOP based on the methods of United State Environmental Protection Agency USEPA and American Public Health Administration (APHA) methods for water sampling and Analysis.

Sample Container and Preservation

The water samples were collected and preserved in appropriate container as per APHA guidelines.

Sample Identification:

The collected samples were labeled and assigned a unique sample identification number and all the relevant information (sample location, time of collection, sample identification, temp., pH, collected by, preservation techniques etc) are recorded on the specific filed forms and signed by Field Analyst.



SUMMARY OF SPECIAL HANDLING REQUIREMENTS

DETERMINATION	CONTAINER	MINIMUM SAMPLE SIZE (ml)	PRESERVATION	MAXIMUM STORAGE RECOMMENDED/ REGULATORY
HARDNESS	P, G	100	ADD HNO ₃ TO pH , 2 C	06 / 06 MON
METALS, GENERAL	P (A), G (A)	-	FOR DISSOLVED METALS FILTER IMMEDIATELY	06 / 06 MON
pH	P, G	-	ANALYZE IMMEDIATELY	02 HRS/ 02 HRS
TURBIDITY	P, G	-	ANALYZE SAME DAY, STORE IN DARK UP TO 24 HRS.	48 HRS/ 48 HRS
COLOUR	P, G	500	REFRIGERATE	48 HRS / 48 HRS
BOD	P, G	1000	REFRIGERATE	06 HRS / 48 DAYS
COD	P, G	100	ANALYZE ASAP OR ADD H ₂ SO ₄ TO pH < 2	07 DAYS / 28 DAYS

P: Plastic Container, G: Glass Bottle

Table 3. Sample Handling and Preservation

Methods of Analysis:

Temperature, pH, conductivity dissolved oxygen were recorded immediately, and filed during sample collection exercise, while the remaining parameters were analyzed in the lab. All the parameters were analyzed in accordance to SOP based on recognized methods of ASTM, USEPA or APHA methods Annexed as table – 4.



S.N	PARAMETER	METHOD / TECHNIQUE	REFERENCE METHOD
1	Temperature	Thermometer	-
2	pH	pH meter with 2 point calibration	APHA-4500H ⁺ B
3	Arsenic	AAS (Hydride generation)	ASTM
4	Total Dissolved Solids (TDS)	Wet chemistry/Digital determinator	APHA-2540 C
5	Chloride	Wet chemistry	APHA-4500Cl ⁻ B
6	Hardness	Wet chemistry	APHA-2340 C
7	Sodium	AAS	APHA-3500Na B
8	Nitrates	Ion Selective	APHA-4500NO ₃ B

Table – 4: Methods of Analysis

Section 3

Results and Discussion

RESULTS AND DISCUSSION

A baseline environmental monitoring was conducted from Hasanabdal to Hawalian at client's advised sampling points. The scope of monitoring covered ambient air quality monitoring, Weather Conditions, Noise level, Ground and Surface water samples. The results obtained are tabulated as Annexure I to IV.

The ambient air quality was monitored at three locations. The ambient air quality was monitored for priority pollutants (Carbon monoxide, Nitrogen dioxide, Sulfur dioxide and particulate matter PM_{10}). The monitoring period was 24 hours at individual sampling point. The results obtained are tabulated as Annexure II. In absence of National Ambient Air Quality Standards, the data could be compared with some internationally recognized standards as reference. The most widely accepted standards are USEPA. The copy of USEPA ambient air quality standards are attached as Annexure – VII.

The carbon monoxide, nitrogen dioxide and sulfur dioxide values at the locations were very low and well within Limits specified by USEPA. The 24 hours ground level CO was 1.20, 1.20 and 0.95 ppm at three locations. Similarly, maximum concentration of NO_2 and SO_2 was 0.02 ppm and 0.02 ppm respectively which were found very well within limits specified by USEPA. The ambient particulate matter PM_{10} was 285,144 and 243 $\mu g/m^3$ at three locations

Noise level was monitored at same locations where the ambient air quality was monitored. The results are tabulated Annexure - III. The noise level was found in range of 59.3 – 78.8 dB (L_{eq}).

Four water samples (three ground water and one surface water) were collected and analyzed for microbiological and chemical parameters. The results are tabulated as Annexure – IV.

Annexure – I

Metrological Data

Metrological Data

Sampling Point : Wah Model Town Phase-III
Hasanabdal (Point # 1)
Date of Intervention : September 18 – 19, 2007

Date	Time	Temp °C	Wind Dir	Wind Speed m/s	Hum %	Pressure mm/Hg
18/09/07	08:00	29	SE	2.7	59	741.2
	09:00	31	SE	3.1	48	741.4
	10:00	33	S	0.9	43	741.9
	11:00	34	SE	2.7	40	742.5
	12:00	35	SE	4.0	39	742.9
	13:00	35	SE	3.1	38	742.1
	14:00	35	SEE	0.4	40	741.4
	15:00	36	SEE	0.9	41	741.3
	16:00	35	SE	0.4	45	741.4
	17:00	31	S	2.1	44	741.6
	18:00	30	SE	4.0	45	741.9
	19:00	29	SE	3.1	47	742.0
	20:00	29	SE	2.7	48	742.3
	21:00	28	SE	2.7	52	742.4
	22:00	26	S	0.9	55	742.4
	23:00	25	SE	2.7	56	742.5
	24:00	24	SE	2.9	58	742.3
	01:00	22	SE	3.1	60	742.2
	02:00	22	S	0.9	62	741.9
	03:00	22	SE	2.1	68	741.7
	04:00	21	SE	0.7	79	741.9
	05:00	23	S	2.1	75	742.1
	06:00	23	SE	2.7	66	742.2
	07:00	23	SE	2.0	69	742.3

Metrological Data

Sampling Point : Near Haro River Shahia Stop (Point # 2)
Date of Intervention : September 20 - 21, 2007

Date	Time	Temp °C	Wind Dir	Wind Speed m/s	Hum %	Pressure mm/Hg
20/09/2007	08:00	21	WNW	2.7	88	740.5
	09:00	22	NW	3.1	90	740.7
	10:00	22	W	4.5	90	740.8
	11:00	22	W	3.1	85	740.6
	12:00	21	NW	2.2	88	741.2
	13:00	23	NW	2.1	82	741.2
	14:00	24	NW	2.7	81	741.4
	15:00	25	NW	2.1	79	741.5
	16:00	24	NW	2.7	78	741.6
	17:00	24	W	3.1	75	741.3
	18:00	23	NW	4.5	74	741.2
	19:00	22	NW	3.2	76	740.1
	20:00	22	W	3.1	76	740.1
	21:00	21	NW	0.9	77	740.3
	22:00	21	NW	0.9	78	740.8
	23:00	21	NW	2.1	78	741.0
	24:00	20	NW	3.1	79	741.1
21/09/07	01:00	21	W	2.7	79	741.2
	02:00	21	W	2.9	80	741.3
	03:00	21	NW	3.1	81	741.5
	04:00	21	NW	2.7	82	741.7
	05:00	21	NW	2.7	86	741.7
	06:00	23	NW	3.1	86	741.9
	07:00	24	NW	2.9	85	741.8

Metrological Data

Sampling Point : Changi Bandi Village
Near Sraay Salay (Point # 3)
Date of Intervention : September 19- 20, 2007

Date	Time	Temp °C	Wind Dir	Wind Speed m/s	Hum %	Pressure mm/Hg
19/09/07	08:00	28	SE	4.2	55	742.3
	09:00	30	S	3.7	56	742.7
	10:00	30	S	5.0	54	742.0
	11:00	31	S	2.7	52	741.8
	12:00	33	SE	3.6	47	742.7
	13:00	33	S	1.8	48	741.9
	14:00	33	E	0.9	44	740.7
	15:00	33	SE	3.6	43	741.2
	16:00	34	SE	3.2	40	741.3
	17:00	34	SE	4.7	40	741.5
	18:00	32	E	5.6	41	741.7
	19:00	31	SE	3.1	47	741.9
	20:00	31	W	2.2	49	742.0
	21:00	29	NW	2.2	51	742.0
	22:00	24	SE	2.7	65	742.3
	23:00	24	S	1.9	69	742.3
	24:00	23	S	0.9	75	742.5
20/09/07	01:00	21	S	0.5	77	742.9
	02:00	21	S	2.2	79	742.7
	03:00	21	S	1.7	79	742.6
	04:00	22	S	2.7	78	742.8
	05:00	23	SE	1.5	75	742.2
	06:00	23	SE	2.8	70	742.2
	07:00	23	SE	1.6	72	742.2

Annexure – II

Ambient Air Quality Data

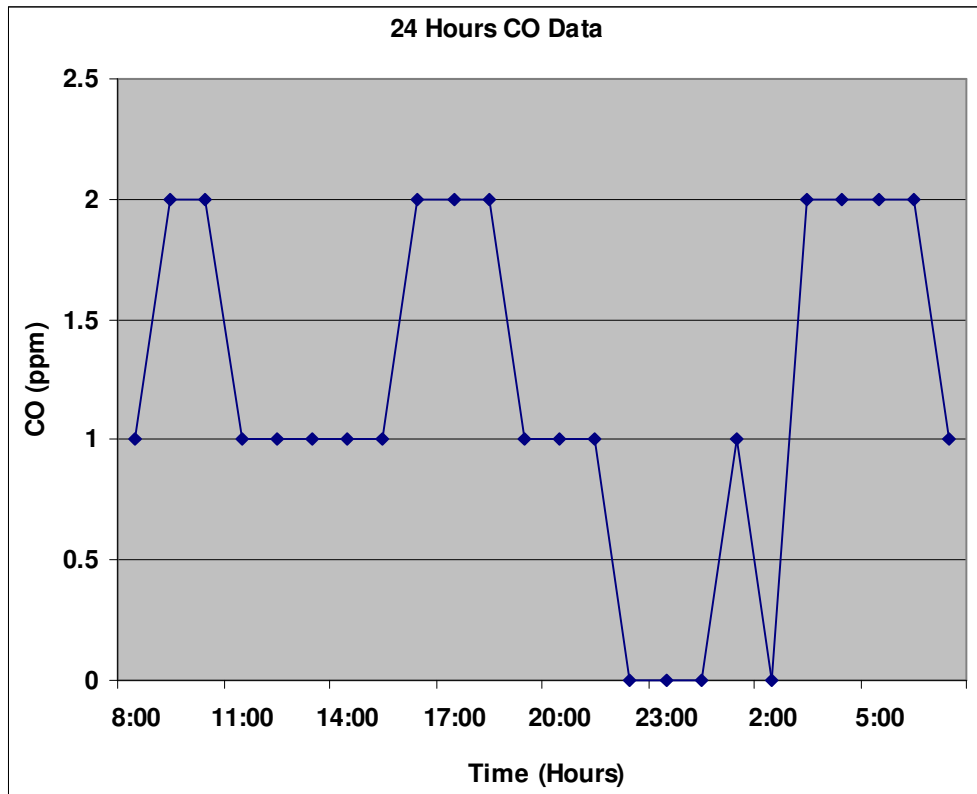


Ambient Air Quality

Sampling Point : Wah Model Town Phase -III
Hasanabdal (Point # 1)
Date of Intervention : September 18-19, 2007

S. No.	Date	Time	CO (ppm)
1	18-09-07	08:00	1
2		09:00	2
3		10:00	2
4		11:00	1
5		12:00	1
6		13:00	1
7		14:00	1
8		15:00	1
9		16:00	2
10		17:00	2
11		18:00	2
12		19:00	1
13		20:00	1
14		21:00	1
15		22:00	BDL
16		23:00	BDL
17		24:00	BDL
18	19-07-07	01:00	1
19		02:00	BDL
20		03:00	2
21		04:00	2
22		05:00	2
23		06:00	2
24		07:00	1
24 Hours Average			1.20

BDL: Below Detection Limit



Graph 1: Variation of CO with Time



Ambient Air Quality

Sampling Point : Wah Model Town Phase-III
Hasanabdal (Point # 1)
Date of Intervention: September 18-19, 2007

Parameter	Unit	Duration	Concentration
Nitrogen Dioxide (NO ₂)	ppm	24Hours	0.02
Sulfur Dioxide (SO ₂)	ppm	24 Hours	0.02
PM ₁₀	µg/m ³	24 Hours	285.5

Remarks:

ND: Not Detected
ppm: parts per million
µg/m³: micrograms per cubic meter

Lowest Detection Limit

CO: 1 ppm
SO₂: 0.01 ppm
NO₂: 0.01 ppm
PM₁₀: 2 µg/m³

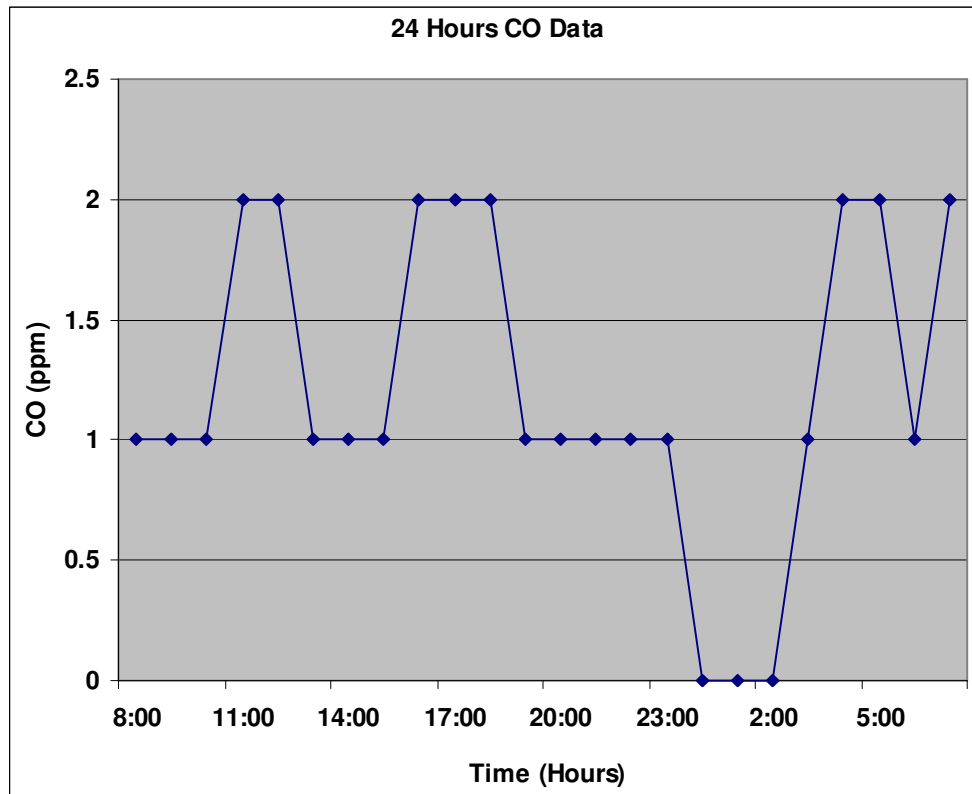


Ambient Air Quality

Sampling Point : Near Haro River Shahia Stop (Point#2)
Date of Intervention : September 20-21, 2007

S. No.	Date	Time	CO (ppm)
1	20-09-07	08:00	1
2		09:00	1
3		10:00	1
4		11:00	2
5		12:00	2
6		13:00	1
7		14:00	1
8		15:00	1
9		16:00	2
10		17:00	2
11		18:00	2
12		19:00	1
13		20:00	1
14		21:00	1
15		22:00	1
16		23:00	1
17		24:00	BDL
18	21-09-07	01:00	BDL
19		02:00	BDL
20		03:00	1
21		04:00	2
22		05:00	2
23		06:00	1
24		07:00	2
24 Hours Average			1.20

BDL: Below Detection Limit



Graph 2: Variation of CO with Time



Ambient Air Quality

Sampling Point : Near Haro River Shahia Stop (Point # 2)
Date of Intervention: September 20-21, 2007

Parameter	Unit	Duration	Concentration
Nitrogen Dioxide (NO ₂)	ppm	24Hours	0.01
Sulfur Dioxide (SO ₂)	ppm	24 Hours	<0.01
PM ₁₀	µg/m ³	24 Hours	144.8

Remarks:

ND: Not Detected
ppm: parts per million
µg/m³: micrograms per cubic meter

Lowest Detection Limit

CO: 1 ppm
SO₂: 0.01 ppm
NO₂: 0.01 ppm
PM₁₀: 2 µg/m³

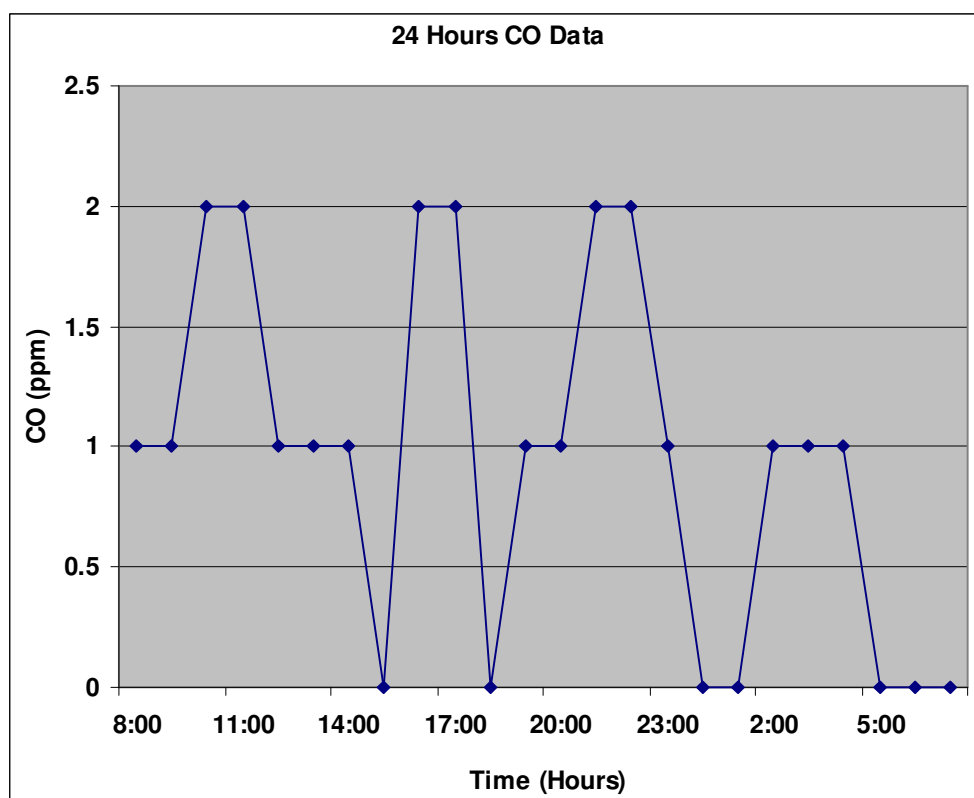


Ambient Air Quality

Sampling Point : **Changi Bandi Village
Near Sraay Salay (Point # 3)**
Date of Intervention : **September 19-20, 2007**

S. No.	Date	Time	CO (ppm)
1	19-09-07	08:00	1
2		09:00	1
3		10:00	2
4		11:00	2
5		12:00	1
6		13:00	1
7		14:00	1
8		15:00	BDL
9		16:00	2
10		17:00	2
11		18:00	BDL
12		19:00	1
13		20:00	1
14		21:00	2
15		22:00	2
16		23:00	1
17		24:00	BDL
18	20-09-07	01:00	BDL
19		02:00	1
20		03:00	1
21		04:00	1
22		05:00	BDL
23		06:00	BDL
24		07:00	BDL
24 Hours Average			0.95

BDL: Below Detection Limit



Graph 3: Variation of CO with Time



Ambient Air Quality

Sampling Point : **Changi Bandi Village
Near Sraay Salay (Point#3)**
Date of Intervention: **September 19-20, 2007**

Parameter	Unit	Duration	Concentration
Nitrogen Dioxide (NO ₂)	ppm	24Hours	0.01
Sulfur Dioxide (SO ₂)	ppm	24 Hours	0.01
PM ₁₀	µg/m ³	24 Hours	243.8

Remarks:

ND: Not Detected

ppm: parts per million

µg/m³: micrograms per cubic meter

Lowest Detection Limit

CO: 1 ppm

SO₂: 0.01 ppm

NO₂: 0.01 ppm

PM₁₀: 2 µg/m³

Annexure – III

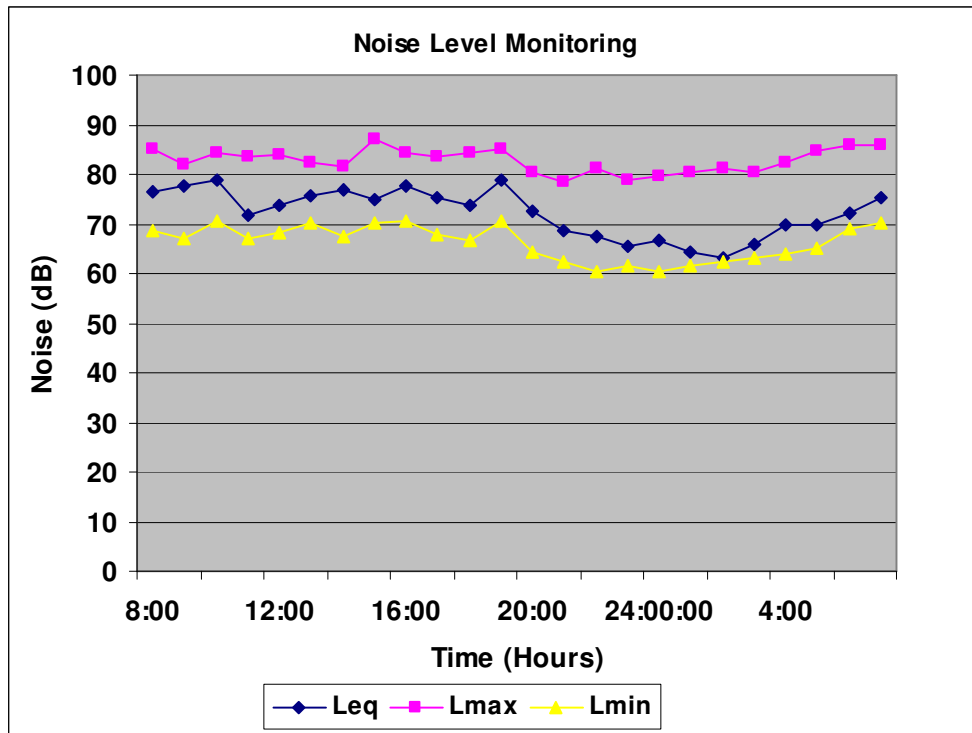
Noise Level Monitoring



Noise Level Monitoring

Sampling Point : **Wah Model Town Phase-III**
Hasanabdal (Point # 1)
Date of Intervention : **September 18 – 19, 2007**

S. No.	Date	Time	Leq	Lmax	Lmin
1	18-09-07	08:00	76.6	85.0	68.8
2		09:00	77.8	81.9	66.9
3		10:00	78.8	84.4	70.6
4		11:00	71.9	83.7	67.1
5		12:00	73.7	83.9	68.2
6		13:00	75.6	82.4	70.2
7		14:00	76.8	81.5	67.3
8		15:00	74.9	86.9	70.1
9		16:00	77.8	84.4	70.6
10		17:00	75.2	83.7	67.8
11		18:00	73.8	84.5	66.8
12		19:00	78.8	85.0	70.7
13		20:00	72.4	80.2	64.5
14		21:00	68.8	78.4	62.2
15		22:00	67.3	81.3	60.3
16		23:00	65.5	78.8	61.4
17		24:00	66.7	79.7	60.3
18	19-09-07	01:00	64.2	80.4	61.4
19		02:00	63.1	81.3	62.2
20		03:00	65.8	80.2	63.1
21		04:00	69.9	82.4	64.0
22		05:00	69.8	84.6	65.2
23		06:00	72.2	85.9	69.2
24		07:00	75.4	85.7	70.1



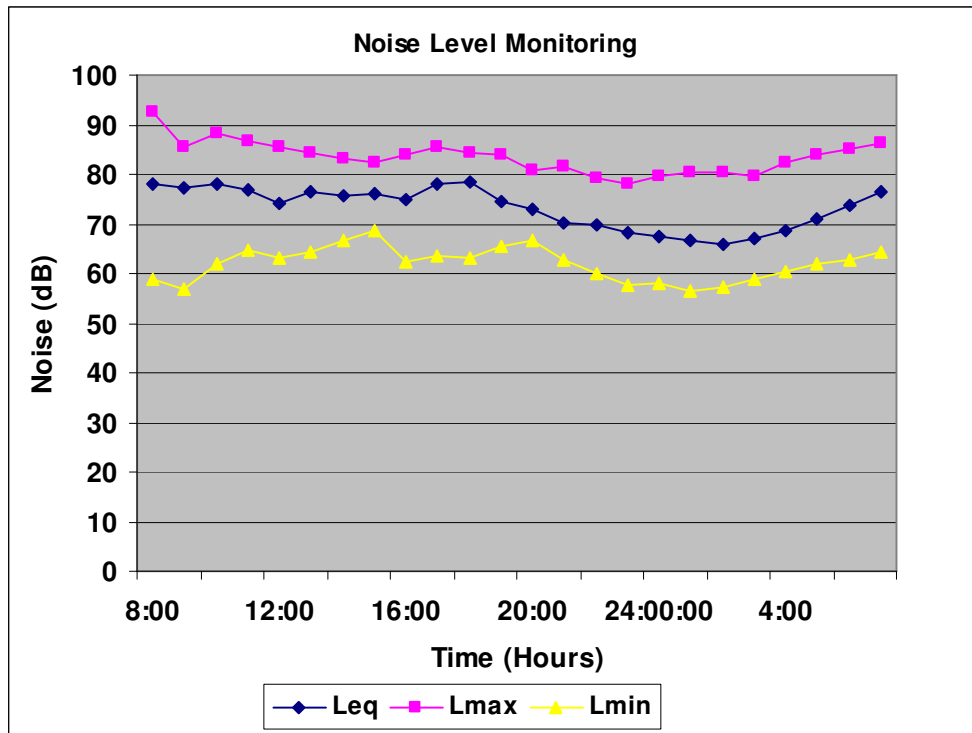
Graph 1: Variation of Noise with Time



Noise Level Monitoring

Sampling Point : Near Haro River Shahia Stop (Point # 2)
Date of Intervention : September 20 – 21, 2007

S. No.	Date	Time	Leq	Lmax	Lmin
1	20-09-07	08:00	78.0	92.6	59.0
2		09:00	77.4	85.3	57.0
3		10:00	78.2	88.4	61.8
4		11:00	76.8	86.8	64.6
5		12:00	74.3	85.3	63.3
6		13:00	76.4	84.2	64.4
7		14:00	75.6	83.1	66.6
8		15:00	76.2	82.5	68.5
9		16:00	74.8	83.8	62.4
10		17:00	77.9	85.3	63.4
11		18:00	78.3	84.4	63.3
12		19:00	74.4	83.9	65.6
13		20:00	73.1	80.8	66.8
14		21:00	70.3	81.7	62.9
15		22:00	69.8	79.1	59.9
16		23:00	68.3	78.2	57.8
17		24:00	67.4	79.8	58.2
18	21-09-07	01:00	66.5	80.3	56.3
19		02:00	65.7	80.5	57.4
20		03:00	66.9	79.8	58.7
21		04:00	68.7	82.2	60.5
22		05:00	70.9	84.1	61.8
23		06:00	73.8	85.2	62.9
24		07:00	76.3	86.3	64.2



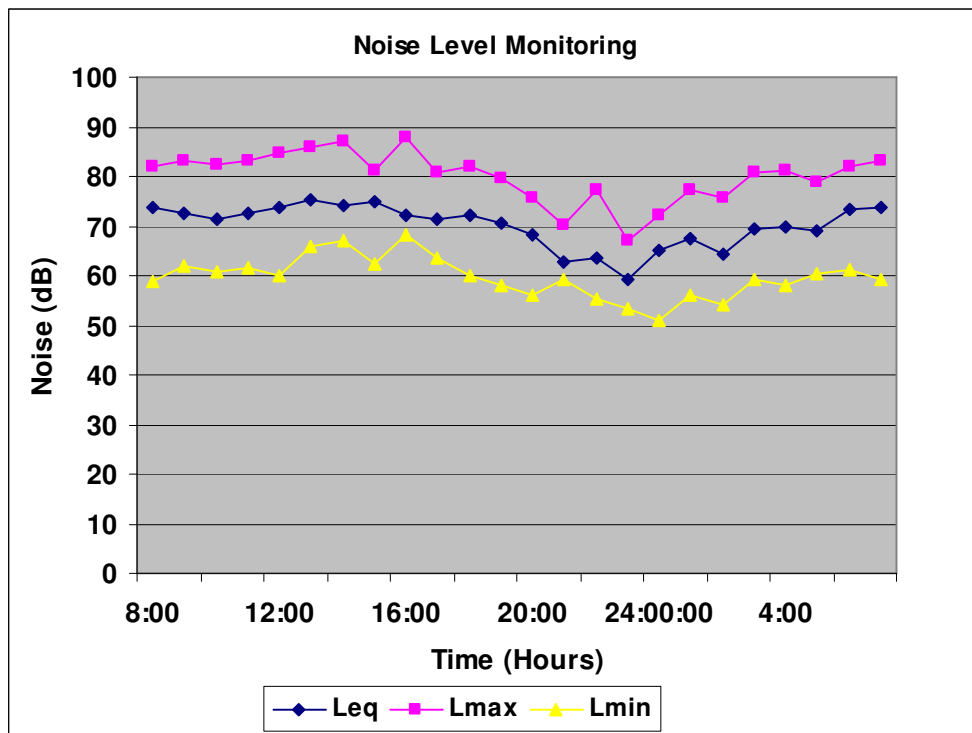
Graph 2: Variation of Noise with Time



Noise Level Monitoring

Sampling Point : **Changi Bandi Village
Near Sraay Salay (Point # 3)**
Date of Intervention : **September 19 – 20, 2007**

S. No.	Date	Time	Leq	Lmax	Lmin
1	19-09-07	08:00	73.7	82.1	58.8
2		09:00	72.5	83.3	61.8
3		10:00	71.3	82.3	60.6
4		11:00	72.4	83.2	61.5
5		12:00	73.6	84.8	59.9
6		13:00	75.2	85.9	65.8
7		14:00	74.1	87.1	67.1
8		15:00	75.0	81.3	62.3
9		16:00	72.2	88.0	68.2
10		17:00	71.4	80.9	63.7
11		18:00	72.0	82.0	60.0
12		19:00	70.7	79.7	57.9
13		20:00	68.4	75.5	56.1
14		21:00	62.7	70.2	59.3
15		22:00	63.5	77.3	55.3
16		23:00	59.3	67.1	53.2
17		24:00	65.1	72.0	51.0
18	20-09-07	01:00	67.3	77.4	56.0
19		02:00	64.5	75.7	54.1
20		03:00	69.3	80.9	59.2
21		04:00	70.0	81.2	58.1
22		05:00	69.0	79.0	60.5
23		06:00	73.2	82.1	61.3
24		07:00	73.9	83.3	59.1



Graph 3: Variation of Noise with Time

Annexure – IV

Water Analysis Report

MICROBIOLOGICAL ANALYSIS REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : TOTAL FILLING STATION
 NEAR MODEL TOWN
 PHASE III (POINT#1)
SAMPLE DESCRIPTION : GROUND WATER
SAMPLE COLLECTION DATE : SEPTEMBER 20, 2007

RESULTS

S/No	PARAMETERS	PROCEDURE	PERMISSIBLE LIMITS	RESULTS
01	Total Colony Count	APHA	< 500 cfu / ml	140 / ml
02	Total Coli forms	APHA:9222 B	0 / 100ml	Absent / 100ml
03	Faecal Coli forms(E.Coli)	APHA:9222 B	0 / 100ml	Absent / 100ml
04	Faecal Streptococci/ Enterococci	APHA: 9230 C	0 / 100ml	Absent / 100ml

NOTE:

WHO/USEPA Guidelines for Drinking Water states that Total or Faecal Coli forms must be absent and are not tolerated in Potable water.

REMARKS:

cfu: **colony forming unit**

MICROBIOLOGICAL ANALYSIS REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : NEAR LUB VILLAGE (POINT#2)
SAMPLE DESCRIPTION : GROUND WATER
SAMPLE COLLECTION DATE : SEPTEMBER 20, 2007

RESULTS

S/No	PARAMETERS	PROCEDURE	PERMISSIBLE LIMITS	RESULTS
01	Total Colony Count	APHA	< 500 cfu / ml	895 / ml
02	Total Coli forms	APHA:9222 B	0 / 100ml	Absent / 100ml
03	Faecal Coli forms(E.Coli)	APHA:9222 B	0 / 100ml	Absent / 100ml
04	Faecal Streptococci/Enterococci	APHA: 9230 C	0 / 100ml	Absent / 100ml

NOTE:

WHO/USEPA Guidelines for Drinking Water states that Total or Faecal Coli forms must be absent and are not tolerated in Potable water.

REMARKS:

cfu: colony forming unit



MICROBIOLOGICAL ANALYSIS REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : CHANGI BANDI VILLAGE
(POINT#3)
SAMPLE DESCRIPTION : GROUND WATER
(90 FEET DEPTH)
SAMPLE COLLECTION DATE : SEPTEMBER 19, 2007

RESULTS

S/No	PARAMETERS	PROCEDURE	PERMISSIBLE LIMITS	RESULTS
01	Total Colony Count	APHA	< 500 cfu / ml	353 / ml
02	Total Coli forms	APHA:9222 B	0 / 100ml	Absent / 100ml
03	Faecal Coli forms(E.Coli)	APHA:9222 B	0 / 100ml	Absent / 100ml
04	Faecal Streptococci/ Enterococci	APHA: 9230 C	0 / 100ml	Absent / 100ml

NOTE:

WHO/USEPA Guidelines for Drinking Water states that Total or Faecal Coli forms must be absent and are not tolerated in Potable water.

REMARKS:

cfu: colony forming unit



MICROBIOLOGICAL ANALYSIS REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : BAHAY WALA SOKA NALA
(POINT # 3)
SAMPLE DESCRIPTION : SURFACE WATER
SAMPLE COLLECTION DATE : SEPTEMBER 19, 2007

RESULTS

S/No	PARAMETERS	PROCEDURE	PERMISSIBLE LIMITS	RESULTS
01	Total Colony Count	APHA	< 500 cfu / ml	TNTC / ml
02	Total Coli forms	APHA:9222 B	0 / 100ml	Absent / 100ml
03	Faecal Coli forms(E.Coli)	APHA:9222 B	0 / 100ml	Absent / 100ml
04	Faecal Streptococci/ Enterococci	APHA: 9230 C	0 / 100ml	Absent / 100ml

NOTE:

WHO/USEPA Guidelines for Drinking Water states that Total or Faecal Coli forms must be absent and are not tolerated in Potable water.

REMARKS:

TNTC: Too Numerous Too Count
cfu: colony forming unit



CHEMICAL LABORATORY TEST REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : TOTAL FILLING STATION
 NEAR MODEL TOWN
 PHASE III (POINT#1)
SAMPLE DESCRIPTION : GROUND WATER
SAMPLE COLLECTION DATE : SEPTEMBER 20, 2007

SR. #	PARAMETERS	METHOD	UNIT	LDL	TEST RESULTS	WHO GUIDELINES
01	Color	APHA-2120 B/C	CU	-	Colorless	15
02	Taste	-	-	-	Tasteless	-
03	Odor	APHA-2150 B	-	-	Odorless	-
04	pH	APHA-4500H ⁺ B	-	-	6.99	6.5 – 8.5
05	Total dissolved solids (TDS)	APHA-2540 C	mg/L	5.0	664	1000
06	Chloride (Cl)	APHA-4500Cl ⁻ B	mg/L	5.0	51	250
07	Hardness	APHA-2340 C	mg/L	5.0	422	-
08	Nitrates (NO ₃) ⁻	APHA-4500NO ₃ B	mg/L	0.1	ND	50
09	Sodium	APHA-3500Na B	mg/L	1.0	81	200
10	Turbidity	APHA-2130 B	NTU	-	ND	5
11	Fluoride (F)	APHA - F ⁻ C	mg/L	0.01	0.37	1.5
12	Nitrites (NO ₂) ⁻	APHA-4500NO ₂ B	mg/L	-	ND	3
13	Arsenic (As)	APHA-3500 As B	mg/L	0.01	ND	0.01

ND: NOT DETECTED.
-: NOT DEFINED
LDL: LOWEST DETECTION LIMIT



CHEMICAL LABORATORY

TEST REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : NEAR LUB VILLAGE (POINT#2)
SAMPLE DESCRIPTION : GROUND WATER
SAMPLE COLLECTION DATE : SEPTEMBER 20, 2007

SR. #	PARAMETERS	METHOD	UNIT	LDL	TEST RESULTS	WHO GUIDELINES
01	Color	APHA-2120 B/C	CU	-	Colorless	15
02	Taste	-	-	-	Tasteless	-
03	Odor	APHA-2150 B	-	-	Odorless	-
04	pH	APHA-4500H ⁺ B	-	-	7.0	6.5 – 8.5
05	Total dissolved solids (TDS)	APHA-2540 C	mg/L	5.0	550	1000
06	Chloride (Cl)	APHA-4500Cl ⁻ B	mg/L	5.0	14	250
07	Hardness	APHA-2340 C	mg/L	5.0	378	-
08	Nitrates (NO ₃) ⁻	APHA-4500NO ₃ B	mg/L	0.1	ND	50
09	Sodium	APHA-3500Na B	mg/L	1.0	20.3	200
10	Turbidity	APHA-2130 B	NTU	-	ND	5
11	Fluoride (F)	APHA - F ⁻ C	mg/L	0.01	0.42	1.5
12	Nitrites (NO ₂) ⁻	APHA-4500NO ₂ B	mg/L	-	ND	3
13	Arsenic (As)	APHA-3500 As B	mg/L	0.01	ND	0.01

ND: NOT DETECTED.
-: NOT DEFINED
LDL: LOWEST DETECTION LIMIT



CHEMICAL LABORATORY TEST REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : CHANGI BANDI VILLAGE
 (POINT#3)
SAMPLE DESCRIPTION : GROUND WATER
 (90 FEET DEPTH)
SAMPLE COLLECTION DATE : SEPTEMBER 19, 2007

SR. #	PARAMETERS	METHOD	UNIT	LDL	TEST RESULTS	WHO GUIDELINES
01	Color	APHA-2120 B/C	CU	-	Colorless	15
02	Taste	-	-	-	Tasteless	-
03	Odor	APHA-2150 B	-	-	Odorless	-
04	pH	APHA-4500H ⁺ B	-	-	6.85	6.5 – 8.5
05	Total dissolved solids (TDS)	APHA-2540 C	mg/L	5.0	444	1000
06	Chloride (Cl)	APHA-4500Cl ⁻ B	mg/L	5.0	19	250
07	Hardness	APHA-2340 C	mg/L	5.0	335	-
08	Nitrates (NO ₃) ⁻	APHA-4500NO ₃ B	mg/L	0.1	ND	50
09	Sodium	APHA-3500Na B	mg/L	1.0	12.7	200
10	Turbidity	APHA-2130 B	NTU	-	ND	5
11	Fluoride (F)	APHA - F ⁻ C	mg/L	0.01	0.30	1.5
12	Nitrites (NO ₂) ⁻	APHA-4500NO ₂ B	mg/L	-	ND	3
13	Arsenic (As)	APHA-3500 As B	mg/L	0.01	ND	0.01

ND: NOT DETECTED.
-: NOT DEFINED
LDL: LOWEST DETECTION LIMIT



CHEMICAL LABORATORY TEST REPORT

JOB NO. : ENV-LHR-0224 / 2007
CLIENT : NESPAK (PVT) LTD.
SAMPLING SITE : BAHAY WALA SOKA NALA
 (POINT # 3)
SAMPLE DESCRIPTION : SURFACE WATER
SAMPLE COLLECTION DATE : SEPTEMBER 19, 2007

SR. #	PARAMETERS	METHOD	UNIT	LDL	TEST RESULTS	LIMITS AS PER NEQS
01	pH	APHA-4500H ⁺ B	-	-	7.47	06 – 09
02	Biochemical Oxygen Demand (BOD ₅)	ASTM 5210	mg/L	-	7	80.00
03	Chemical Oxygen Demand (COD)	APHA-5220 D	mg/L	5.0	16	150.00
04	Total suspended solids (TSS)	APHA-2540 D	mg/L	5.0	ND	200.00
05	Chloride (Cl)	APHA-4500Cl ⁻ B	mg/L	5.0	12.5	1000.00
06	Fluoride (F)	APHA - F ⁻ C	mg/L	0.01	0.31	10.00
07	Dissolved Oxygen (DO)	APHA-4500O ₂ C/G	mg/L	-	6.8	-
08	Conductivity	APHA – 2510 - B	μS	-	536	-



SR. #	PARAMETERS	METHOD	UNIT	LDL	TEST RESULTS	LIMITS AS PER NEQS
09	Nitrates (NO ₃) ⁻	APHA-4500NO ₃ B	mg/L	0.1	ND	-
10	Nitrites (NO ₂) ⁻	APHA-4500NO ₂ B	mg/L	-	ND	-
11	Sodium	APHA-3500Na B	mg/L	1.0	14.9	-
12	Total Alkalinity	APHA-2320 B	mg/L	-	145	-
13	Turbidity	APHA-2130 B	NTU	-	ND	-
14	Hardness	APHA-2340 C	mg/L	-	228	-

ND: NOT DETECTED.
-: NOT DEFINED
LDL: LOWEST DETECTION LIMIT

Annexure – V

Photographs



Fig 1: Ambient Air Quality Monitoring at Wah Model Town Phase -III



Fig 2: Ambient Air Quality Monitoring Near Haro River (Shahia Stop)



Fig 3: Ambient Air Quality Monitoring at Changi Bandi Village



Fig 4: Ground Water sampling from a Mosque near Wah Model Town Phase-III



Fig 5: Ground Water sampling at Shahia Stop (Near Haro River)



Fig 6: Ground Water sampling at Changi Bandi Village



Fig 7: Surface Water sampling at Changi Bandi Village

Annexure – VI

National Environnemental Quality Standards (NEQS)

Annex I (amended)

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l, UNLESS OTHERWISE DEFINED)

S.No.	Parameter	Existing Standards	Industrial Wastes	Revised Standards Into Sewage Treatment ⁽¹⁾	Into Sea ⁽²⁾
1.	Temperature or Temperature Increase*	40°C	≤3°C	≤3°C	≤3°C
2.	pH value	6-10	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) ₅ at 20°C ⁽³⁾	80	80	250	80**
4.	Chemical Oxygen Demand (COD) ⁽³⁾	150	150	400	400
5.	Total suspended solids (TSS)	150	200	400	200
6.	Total dissolved solids (TDS)	3500	3500	3500	3500
7.	Grease and oil	10	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.1	0.3	0.3
9.	Chloride (as Cl ⁻)	1000	1000	1000	50***
10.	Fluoride (as F ⁻)	20	10	10	10
11.	Cyanide (as CN ⁻) total	2	1.0	1.0	1.0
12.	Anionic detergents (as MRA ₃) ⁽⁴⁾	20	20	20	20
13.	Sulphate (SO ₄) ⁽²⁾	600	600	1000	50***
14.	Sulphide (S ²⁻)	1.0	1.0	1.0	1.0
15.	Ammonia (NH ₃)	40	40	40	40
16.	Pesticides ⁽⁵⁾	0.15	0.15	0.15	0.15
17.	Cadmium ⁽⁶⁾	0.1	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent) ⁽⁶⁾	1.0	1.0	1.0	1.0
19.	Copper ⁽⁷⁾	1.0	1.0	1.0	1.0
20.	Lead ⁽⁸⁾	0.5	0.5	0.5	0.5
21.	Mercury ⁽⁹⁾	0.05	0.05	0.05	0.05
22.	Selenium ⁽¹⁰⁾	0.5	0.5	0.5	0.5
23.	Nickel ⁽¹⁰⁾	1.0	1.0	1.0	1.0
24.	Silver ⁽¹⁰⁾	1.0	1.0	1.0	1.0
25.	Total Toxic metals	2.0	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0	5.0
27.	Arsenic ⁽¹⁰⁾	1.0	1.0	1.0	1.0
28.	Barium ⁽¹⁰⁾	1.5	1.5	1.5	1.5
29.	Iron	2.0	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5	1.5
31.	Boron ⁽¹⁰⁾	6.0	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0	1.0

Explanations:

- Assessing minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example, that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
- Modified Benzene Alkyl Sulphate; assuming surfactant as biodegradable.
- Pesticides include herbicides, fungicides, and insecticides.
- Subject to total toxic metals discharge should not exceed level given at S.No.25.
- Applicable only when and where sewage treatment is operational and BOD₅-80 mg/l is achieved by the sewage treatment system.
- Provided that size is not at shore and not within 10 miles of mangrove or other important estuaries.

* The effluent should not result in temperature increase of more than 2°C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.

** The value for industry is 200 mg/l

*** Discharge concentration at or below sea concentration (SC)

Note 1: Dilution of liquid effluents to bring them to the NEQS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.

2: The concentration of pollutants in water being used will be subtracted from the effluent for calculating the NEQS limits.

Annex II (amended)

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm³, UNLESS OTHERWISE DEFINED)

S.No. Parameter	Source Of Pollution	Existing Standards	Revised Standards
1. Smoke	Smoke opacity not to exceed	40% or 2 Ringelmann Scale	40% or 2 Ringelmann Scale or equivalent smoke number
2. Particulate matter ⁽¹⁾	(a) Boilers and furnaces: (i) Oil fired (ii) Coal fired (iii) Cement Kilns (b) Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500 500 200 500	500 500 500 500
3. Hydrogen Chloride	Any	400	400
4. Chlorine	Any	150	150
5. Hydrogen fluoride	Any	150	150
6. Hydrogen sulphide	Any	10	10
7. Sulphur Oxides ^(2,3)	Sulphuric acid/Sulphonic acid plants Other Plants except power Plants operating on oil and coal	400 400	5000 1700
8. Carbon Monoxide	Any	800	800
9. Lead	Any	50	50
10. Mercury	Any	10	10
11. Cadmium	Any	20	20
12. Arsenic	Any	20	20
13. Copper	Any	50	50
14. Antimony	Any	20	20

15.	Zinc	Any	200	200
16.	Oxides of Nitrogen ⁽²⁾	Nitric acid manufacturing unit	400	3800
		Other plants except power plants operating on oil or coal:		
		Gas fired	400	400
		Oil fired	-	500
		Coal fired	-	1200

Explanations:

- ⁽¹⁾ Based on the assumption that the size of the particulate is 10 micron or more.
- ⁽²⁾ Based on 1% sulphur content in fuel oil. Higher content of sulphur will cause sulphate to be produced.
- ⁽³⁾ In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel should in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards:-

A. Sulphur Dioxide

Sulphur Dioxide Background levels Micro-gram per cubic meter (µg/m ³):				Standards
Background Air Quality (SO ₂ Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO ₂ Emission (Tons per Day Per plant)	Criterion II Max. allowable ground level concentration to ambient (µg/m ³) (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted [*]				
Low	50	200	500	50
High	100	400	100	10
Very Polluted ^{**}	>100	>400	100	10

- ^{*} For intermediate values between 50 and 100 µg/m³ linear interpolations should be used.
- ^{**} No projects with sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of nitrogen oxides, expressed as NO₂, should not be exceed the following:-

Annual Arithmetic Mean 100 µg/m³
(0.05 ppm)

Emission levels for stationary source discharges, before mixing with the atmosphere, should be maintained as follows:-

For fuel fired steam generators, as Nanogram (10⁻⁹ gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	200

Note: Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible through excess air mixing/blowing before emitting into the atmosphere.

Annexure – VII

US EPA Ambient Air Quality Standards

USEPA NATIONAL AMBIENT AIR QUALITY STANDARD

Following are the limits specified in NAAQS for primary as well as secondary pollutants.

POLLUTANT	STANDARD VALUE *		STANDARD TYPE
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m ³)	Primary
1-hour Average	35 ppm	(40 mg/m ³)	Primary
Nitrogen Dioxide (NO₂)			
Annual Arithmetic Mean	0.053 ppm	(100 µg/m ³)	Primary & Secondary
Ozone (O₃)			
1-hour Average	0.12 ppm	(235 µg/m ³)	Primary & Secondary
8-hour Average	0.08 ppm	(157 µg/m ³)	Primary & Secondary
Lead (Pb)			
Quarterly Average	1.5 µg/m ³		Primary & Secondary
Particulate (PM 10)	<i>Particles with diameters of 10 micrometers or less</i>		
Annual Arithmetic Mean	50 µg/m ³		Primary & Secondary
24-hour Average	150 µg/m ³		Primary & Secondary
Particulate (PM 2.5)	<i>Particles with diameters of 2.5 micrometers or less</i>		
Annual Arithmetic Mean	15 µg/m ³		Primary & Secondary
24-hour Average	65 µg/m ³		Primary & Secondary
Sulfur Dioxide (SO₂)			
Annual Arithmetic Mean	0.030 ppm	(80 µg/m ³)	Primary
24-hour Average	0.14 ppm	(365 µg/m ³)	Primary
3-hour Average	0.50 ppm	(1300 µg/m ³)	Secondary

Annexure – VIII

Drinking Water Guidelines



Drinking Water Guidelines

Maximum permissible limits as defined by Various Countries

S/No	Parametric Tests *	EEC	Canada	USEPA	WHO
1	Aluminum	0.2	NS	0.05 - 0.20	0.2
2	Ammonium	0.5	NS	NS	1.5
3	Antimony	0.01	NS	0.006	0.005
4	Arsenic	0.05	0.025	0.05	0.01
5	Barium	NS	1.0	2.0	0.7
6	Boron	NS	5.0	NS	0.3
7	Cadmium	0.005	0.005	0.005	0.003
8	Chloride	25	250	250	250
9	Chromium	0.05	0.05	0.1	0.05
10	Coliforms, total /100ml	0	0	0	0
11	Coliforms,E.Coli/100ml	0	0	0	0
12	Color	20 Pt-Co	15cu	15cu	15cu
13	Copper	NS	1.0	1.0	1 - 2
14	Cyanide	0.05	0.2	0.2	0.07
15	Fluoride	0.7 - 1.5	1.5	2.0-4.0	1.5
16	Hardness	50	NS	NS	NS
17	Iron	0.2	0.3	0.3	0.3
18	Lead	0.05	0.01	0.015	0.01
19	Manganese	0.2	0.05	0.05	0.1- 0.5
20	Mercury	0.001	0.001	0.002	0.001
21	Molybdenum	NS	NS	NS	0.07
22	Nickel	0.05	NS	0.1	0.02
23	Nitrate/Nitrite, total	NS	NS	10.0 as N	NS
24	Nitrates(NO ₃) ⁻	50	10 as N	10.0 as N	50
25	Nitrites(NO ₂) ⁻	0.1	3.2	1.0 as N	3
26	Odor	NS	NS	3 TON	NS
27	pH	6.2 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5
28	Phosphorous	5.0	NS	NS	NS
29	Phenols	0.0005	0.002	NS	NS
30	Potassium	12	NS	NS	NS
31	Selenium	0.01	0.01	0.05	0.01
32	Silica Dioxide(SiO ₂)	10	NS	NS	NS
33	Silver	0.01	0.05	0.1	NS
34	Solids, Total dissolved	NS	500	500	1000
35	Sodium	75 -150	NS	20	200
36	Sulfate	NS	500	250	250
37	Turbidity(Non-microbial)	4 JTU	1 NTU	0.5 - 5.0 NTU	5 NTU
38	Zinc	NS	5.0	5.0	3.0

Abbreviations/Explanations:

NS=No Standards | JTU=Jackson Turbidity Units | NTU=Nephelometric Turbidity Units
 cu=Color Units | MPN Coliforms, Total or E.Coli/100ml | Pt-Co = Platinum Cobalt Standards | EEC=European Economic Community for Environmental Legislation
 USEPA= United States Environmental Protection Agency | TON=Threshold Odor Number
 *mg/l (milligrams per litre) except where notified.



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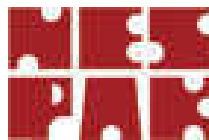


Monitoring Report

Environmental Monitoring at Hassanabdal-Havelian Express Way

Our Ref.: ENV – LHR –200/ 2012
Monitoring Date: April 02-05, 2012

For



NATIONAL ENGINEERING SERVICES OF PAKISTAN

By

Environmental Services
SGS Pakistan (Pvt) Ltd.



Contents

1.	Introduction.....	1
1.1.	Study Objectives	1
1.2.	Scope of Services	1
1.2.1.	Ambient Air Quality Monitoring.....	1
1.2.2.	Noise Level Monitoring.....	2
1.3.	Schedule	2
2.	Methodology	3
2.1.	Ambient Air Quality	3
2.1.1.	Carbon Monoxide	3
2.1.2.	Nitrogen Dioxide.....	3
2.1.3.	Sulphur Dioxide	3
2.1.4.	Sampling and Analysis of Particulate Matter	4
2.2.	Meteorological Conditions	4
2.3.	Noise Level Monitoring.....	4
3.	Results and Discussion	5



List of Tables

Table 1: Schedule	2
Table 2: Methodology of Ambient Air Quality Monitoring	4
Table3: Average Obtained Concentrations of Priority Pollutants	5



Annexes

- Annexure I: Meteorological Data
- Annexure II: Ambient Air Quality Monitoring Data
- Annexure III: Noise Level Monitoring Data
- Annexure IV: Standards
- Annexure V: Photographs



1. Introduction

NESPAK (Pvt.) Ltd. nominated SGS Pakistan (Pvt.) Ltd. to conduct the Environmental Assessment of Hassanabdal-Havelian Express Way. SGS Pakistan (Pvt.) Ltd. conducted a comprehensive environmental assessment of advised sampling point. The environmental assessment included the monitoring of ambient air quality, metrological conditions and noise level monitoring,.

In accordance to the instruction received from the client SGS team attended the site from April 02-05, 2012 for field monitoring and sampling followed by the analysis of field collected samples in the SGS Chemical lab. The scope of monitoring was finalized after discussion with the NESPAK team

1.1 Study Objectives

Followings were the main objectives of the study:

- To assess the impact of facility operations on the quality of environment.
- To develop the strategies for improvement of environmental performance in the areas where it is exceeding local and international standards.

1.2 Scope of Services

Scope of services covered following main components:

- Ambient Air Quality Monitoring
- Weather Conditions
- Noise Level Monitoring

1.2.1. Ambient Air Quality Monitoring

In accordance to USEPA National Ambient Air Quality standards (NAAQS) the following priority pollutants were monitored in the ambient air.

- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)
- Sulphur Dioxide (SO₂)
- Particulate Matter (PM₁₀)

In addition to above mentioned parameters, the weather conditions were also monitored in order to interpret ambient air quality. For the purpose following parameters would be monitored:

- Ambient Temperature
- Relative Humidity
- Barometric Pressure
- Wind Direction
- Wind Velocity

1.2.2. Noise Level Monitoring

Noise level using portable digital sound meter was monitored at same location where the ambient air quality was monitored. The duration of monitoring was 24 hours at individual sampling point.

1.3 Schedule

In order to cover the above scope of work following schedule was planned and followed

Table 1: Schedule

Sr #	Intervention Date	Activity	Monitoring and Sampling Point		
			In front of boys Primary School	In front of Al-Mehria Public School	Ammgah Village
1	April 02-03, 2012	Noise, Weather & Ambient Air Quality Monitoring			
2	April 03-04, , 2012	Noise, Weather & Ambient Air Quality Monitoring			
3	April 04-05, , 2012	Noise, Weather & Ambient Air Quality Monitoring			



2. Methodology

Following is the brief description of methodology adopted for this environmental assessment:

2.1 Ambient Air Quality

Ambient air quality was monitored with the help of Mobile Air Quality Station equipped with the state of the art ambient air analyzers. Selection of sampling points was made considering the wind direction at the advised sampling sites. Following pollutants were measured during monitoring:

- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)
- Sulphur Dioxide (SO₂)
- Particulate Matter (PM₁₀)

2.1.1. Carbon Monoxide

Carbon monoxide monitoring was carried out using gas filter Correlation CO analyzer. Measurement range of the analyzer is 0-100 ppm. Continuous data was recorded for duration of 24 hrs and hourly average is reported.

2.1.2. Oxides of Nitrogen

Oxides Nitrogen at the project site was measured using chemiluminescent analyzer. Measurement range of the analyzer is 0-50 ppb and 0-1000 ppm. Reference method used for detection of NO_x is USEPA Method RFNA-1289-074.

2.1.3. Sulphur Dioxide

Concentration of Sulphur dioxide in ambient air of the project site is measured by using Pulsed Fluorescent Analyzer. Measurement range of the analyzer is 0-50 ppb and 0-1000 ppm. USEPA Designated Method EQSA-0486-060 was used to measure SO₂ concentrations.

Table 2: Methodology of Ambient Air Quality Monitoring

Air Pollutant	Monitoring Technique	Method	Lowest Detection Limit
Carbon Monoxide (CO)	Gas Filter Correlation CO Analyzer	USEPA Designated Method RFCA-0981-054	0 – 100 mg/m ³
Sulphur Dioxide (SO ₂)	Pulsed Fluorescent Analyzer	USEPA Designated Method EQSA-0486-060	0 – 1000 µg/m ³
Oxides of Nitrogen (NO _x)	Chemiluminescent Analyzer	USEPA Designated Method RFNA-1289-074	0 – 1000 µg/m ³
Particulate Matter (PM ₁₀)	High Volume Sampler	40 CFR 50, App. J (US-EPA)	02 – 750 µg/m ³

2.1.4. Sampling and Analysis of Particulate Matter PM₁₀

Particulate matter concentration in terms of PM₁₀ was monitored in the ambient air with the help of high Volume PM₁₀ Sampler. Reference method used for PM₁₀ determination in ambient air is 40 CFR Part 50, Appendix J (USEPA).

Air sample for detection of PM₁₀ concentration was drawn on fibre glass filter paper and then the collected sample was preserved in protective holder which was transported to SGS lab for further analysis under standard environmental conditions.

2.2 Meteorological Conditions

In addition to the advised parameters for ambient air quality, weather conditions were also monitored continuously for 24 hours with the help of mobile weather station. Selection of sampling points was made considering the wind direction at the advised sampling site.

2.3 Noise Level Monitoring

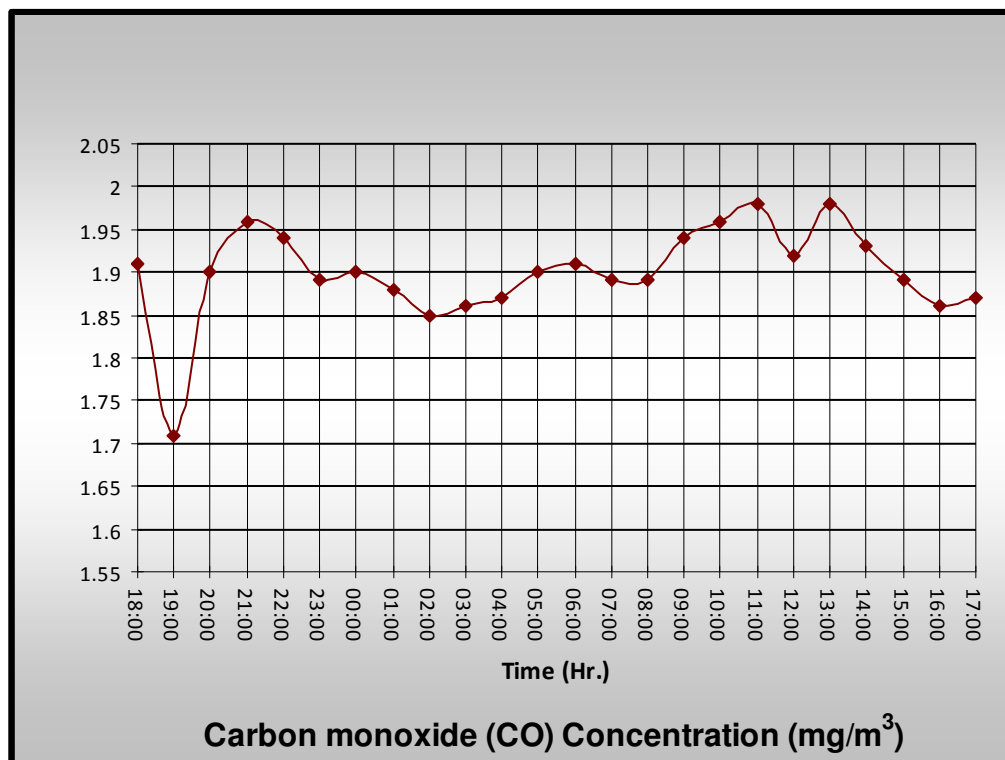
Noise level using portable digital sound meter was monitored at same location where the ambient air quality was monitored. Noise level measurement was performed according to standard operating procedures and obtained results were attached as **Annexure-III** of the report.

3. Results and Discussion

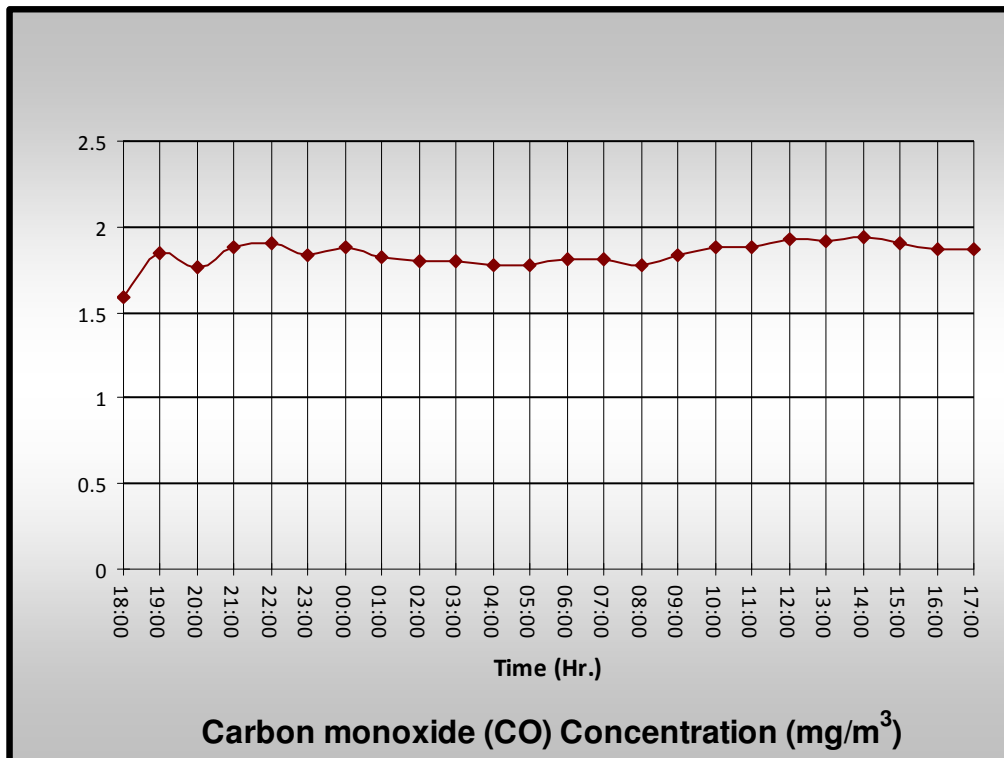
SGS Pakistan (Pvt.) Ltd. conducted a comprehensive environmental monitoring at client's advised sampling point. Scope of this assessment covered monitoring of ambient air quality, weather conditions and noise level monitoring at advised sampling points. The monitoring and analysis results are given as **Annexure I to III**.

The results of ambient air quality monitored for 24 hrs are given in **Annexure-II** of the report. National Environmental Quality Standards (NEQS) for Ambient Air are used for comparison.

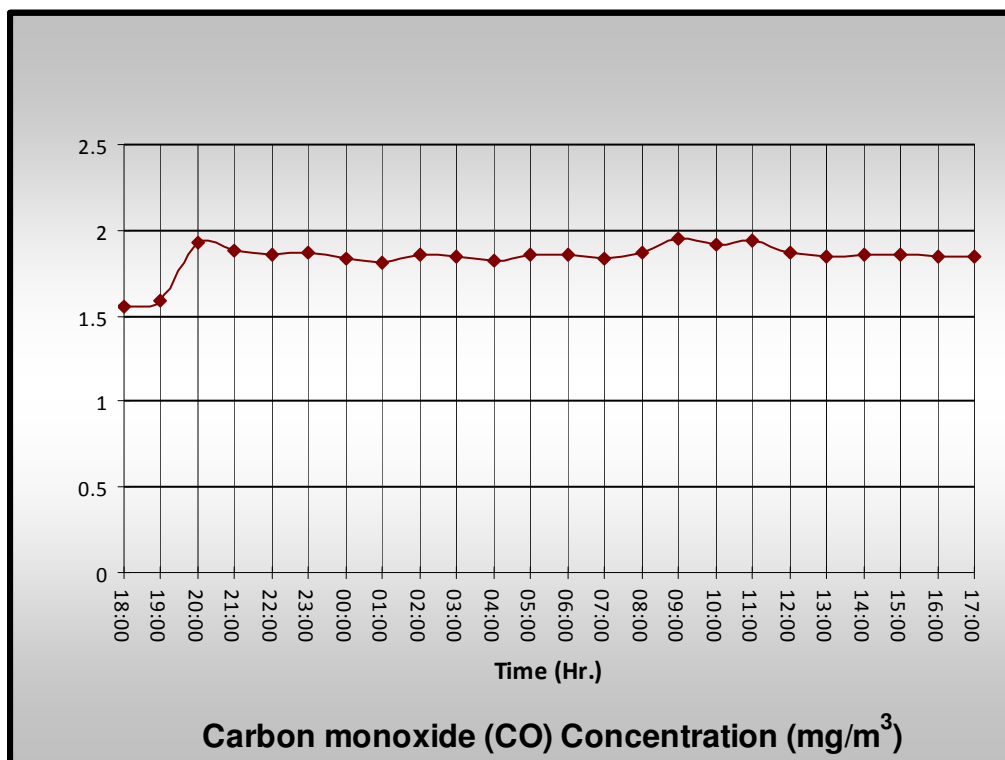
The average concentration of carbon monoxide (CO) for 08 hrs according to the National Environmental Quality Standards (NEQS) for Ambient Air should not exceed from 5.0 mg/m^3 . The values obtained at monitoring sites were 1.90, 1.84 and 1.84 mg/m^3 In front of boys Primary School, In front of Al-Mehria Public School and at Ammgah Village respectively. Followings Graphs show prevailing concentrations of CO in mg/m^3 at project sites during 24 hrs of monitoring.



Graph 1: CO Concentration during 24 Hrs. Monitoring In front of boys Primary School



Graph 2: CO Concentration during 24 Hrs. Monitoring In front of Al-Mehria Public School



Graph 3: CO Concentration during 24 Hrs. Monitoring at Ammgah Village

Average annual arithmetic mean mentioned in Environmental Quality Standards (NEQS) for Ambient Air for Oxides of Nitrogen (NO_x) is $120 \mu\text{g}/\text{m}^3$ and average concentrations of Oxides of Nitrogen (NO_x) measured during 24 hrs monitoring were found 11.72, 21.36 and $15.66 \mu\text{g}/\text{m}^3$ In front of boys Primary School, In front of Al-Mehria Public School and at Ammgah Village respectively. According to standard the 24 hrs concentration of Sulphur Dioxide (SO_2) in ambient air should not exceed from $120 \mu\text{g}/\text{m}^3$ while concentrations obtained during 24 hrs monitoring were found at 4.08, 6.05 and $5.05 \mu\text{g}/\text{m}^3$ respectively. The concentrations of all parameters in ambient air were found within the limits defined in Environmental Quality Standards (NEQS) for ambient air. The ambient particulate matter PM_{10} was found in the range of 101.01, 117.84 and $108.11 \mu\text{g}/\text{m}^3$ from In front of boys Primary School, In front of Al-Mehria Public School and at Ammgah Village respectively against standards value of $250 \mu\text{g}/\text{m}^3$.

Table 3: Average Obtained Concentrations of Priority Pollutants

Parameter	Unit	Average Concentration (24 hrs. Duration)		
		In front of boys Primary School	In front of Al-Mehria Public School	Ammgah Village
Oxides of Nitrogen (NO_x)	$\mu\text{g}/\text{m}^3$	11.72	21.36	15.66
Sulphur Dioxide (SO_2)	$\mu\text{g}/\text{m}^3$	4.08	6.05	5.05
Carbon Monoxide (CO)	mg/m^3	1.90	1.84	1.84
Particulate Matter (PM_{10})	$\mu\text{g}/\text{m}^3$	101.01	117.84	108.11

Noise level monitoring was conducted at the same locations where the ambient air quality was monitored. Results are attached as **Annexure-III** of the report.



Annexure – I

Meteorological Data

Meteorological Data

Client : National Engineering Services of Pakistan
Sampling Point : Infront of Boys Primary School (Rajpur Haripur)
Date of Intervention : April 04-05, 2012

Time	Temperature	Wind Direction	Wind Speed	Humidity	Pressure (mm of Hg)
	°C		m/s	%	
18:00	29	N	2.2	37	750.6
19:00	24	NE	0.4	57	750.7
20:00	21	NE	0.9	65	750.9
21:00	19	N	0.9	68	750.9
22:00	18	N	0.9	71	750.7
23:00	16	N	0.4	76	750.7
24:00	16	N	0.9	77	750.3
01:00	20	SW	1.8	51	749.8
02:00	19	SW	2.2	54	749.5
03:00	21	SW	3.6	48	749.3
04:00	17	SW	3.6	63	749.5
05:00	16	SW	0.9	67	749.6
06:00	15	SW	1.8	72	749.9
07:00	14	SW	0.4	79	750.7
08:00	21	SW	0.9	52	750.9
09:00	26	SW	2.7	38	751.0
10:00	28	SW	4.5	34	751.2
11:00	31	SW	4.0	29	751.0
12:00	32	E	3.6	28	750.4
13:00	33	NE	4.0	27	749.3
14:00	33	E	5.4	26	749.2
15:00	33	E	4.8	26	750.4
16:00	32	E	4.0	25	751.3
17:00	30	E	3.8	29	751.2

Meteorological Data

Client : National Engineering Services of Pakistan
Sampling Point : Infront of Al Meharia Public School Dingi Tube Well
Date of Intervention : April 03-04, 2012

Time	Temperature	Wind Direction	Wind Speed	Humidity	Pressure (mm of Hg)
	°C		m/s	%	
18:00	29	N	0.4	39	756.6
19:00	26	NW	0.9	49	757.4
20:00	24	NW	1.8	53	757.4
21:00	21	NE	0.9	67	757.9
22:00	20	N	0.9	68	757.9
23:00	19	N	1.8	72	757.7
24:00	21	NW	2.7	61	757.5
01:00	20	NW	2.7	62	757.3
02:00	19	NW	3.1	61	757.2
03:00	20	N	2.7	58	757.1
04:00	18	NW	3.1	67	757.3
05:00	17	W	2.7	65	757.2
06:00	19	NW	3.6	55	757.4
07:00	19	NW	4.0	58	757.5
08:00	23	N	3.6	51	757.8
09:00	27	NW	4.0	44	757.9
10:00	29	W	4.5	37	757.6
11:00	31	SW	3.1	33	757.6
12:00	33	SW	2.7	28	756.8
13:00	33	SE	4.5	29	756.4
14:00	35	SE	3.6	27	755.8
15:00	32	SW	4.9	31	755.2
16:00	32	S	4.5	33	754.6
17:00	30	S	4.0	32	754.0

Meteorological Data

Client : National Engineering Services of Pakistan
Sampling Point : Ammgah Village
Date of Intervention : April 02-03, 2012

Time	Temperature	Wind Direction	Wind Speed	Humidity	Pressure (mm of Hg)
	°C		m/s	%	
18:00	26	NW	9.8	50	760.8
19:00	25	NW	10.4	51	760.3
20:00	23	W	10.3	54	755.8
21:00	22	W	8.5	56	757.6
22:00	21	NW	9.2	64	757.7
23:00	20	N	9.5	66	757.4
24:00	19	N	7.6	71	757.0
01:00	19	N	5.1	73	757.3
02:00	18	NW	5.4	74	757.3
03:00	17	NW	5.0	76	756.8
04:00	18	NW	3.2	75	756.3
05:00	18	NW	2.5	74	756.3
06:00	19	NW	2.2	69	756.3
07:00	19	SW	1.8	67	757.2
08:00	23	S	2.2	53	757.8
09:00	24	NE	2.7	52	757.7
10:00	27	NW	3.7	44	757.5
11:00	29	S	6.7	36	757.5
12:00	31	SW	8.0	33	756.9
13:00	31	S	8.9	33	756.4
14:00	31	S	9.8	33	755.5
15:00	32	SE	9.4	32	754.2
16:00	32	SE	10.3	32	753.7
17:00	30	S	9.8	37	753.9



Annexure – II

Ambient Air Quality Monitoring Data

Ambient Air Quality

Client : National Engineering Services Pakistan Pvt Ltd
Sampling Point : In front of boys Primary School (Rajpur-Haripur)
Date of Intervention : April 04-05, 2012

Sr. #	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1.	18:00	1.91	0.25	9.31	9.56	0.81
2.	19:00	1.71	34.60	4.95	39.55	5.63
3.	20:00	1.90	2.29	16.74	19.03	4.71
4.	21:00	1.96	0.20	13.77	13.97	2.27
5.	22:00	1.94	0.46	11.56	12.02	2.15
6.	23:00	1.89	0.56	10.73	11.29	4.56
7.	00:00	1.90	0.21	8.86	9.07	5.12
8.	01:00	1.88	0.65	6.36	7.01	2.76
9.	02:00	1.85	0.67	6.00	6.67	0.93
10.	03:00	1.86	0.70	5.89	6.59	22.28
11.	04:00	1.87	0.62	6.65	7.27	6.77
12.	05:00	1.90	0.63	6.34	6.97	0.72
13.	06:00	1.91	0.46	8.25	8.71	3.98
14.	07:00	1.89	0.19	11.70	11.89	3.87
15.	08:00	1.89	0.06	10.21	10.27	3.63
16.	09:00	1.94	0.24	7.37	7.61	3.30
17.	10:00	1.96	0.51	6.56	7.07	0.59
18.	11:00	1.98	0.51	7.26	7.77	0.49
19.	12:00	1.92	2.79	9.54	12.33	1.40
20.	13:00	1.98	4.13	13.26	17.39	5.08
21.	14:00	1.93	1.39	17.37	18.76	5.41
22.	15:00	1.89	0.19	12.62	12.81	6.44
23.	16:00	1.86	0.09	10.04	10.13	1.92
24.	17:00	1.87	0.24	7.37	7.61	2.99
Average Concentration		1.90	2.19	9.53	11.72	4.08



Ambient Air Quality

Client : National Engineering Services Pakistan Pvt Ltd

Sampling Point : In front of Al-Mehria Public School (Dingi Tube well)

Date of Intervention : April 03-04, 2012

Sr. #	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1.	18:00	1.59	56.17	20.37	76.54	8.67
2.	19:00	1.84	50.26	11.41	61.67	10.18
3.	20:00	1.76	6.19	27.76	33.95	10.41
4.	21:00	1.88	21.15	32.88	54.03	12.94
5.	22:00	1.90	17.19	29.47	46.66	13.45
6.	23:00	1.83	3.59	17.32	20.91	10.35
7.	00:00	1.88	2.92	12.44	15.36	8.78
8.	01:00	1.82	1.44	12.53	13.97	8.41
9.	02:00	1.80	1.19	10.57	11.76	7.17
10.	03:00	1.80	0.30	9.34	9.64	7.06
11.	04:00	1.77	1.66	11.91	13.57	7.43
12.	05:00	1.78	1.77	11.62	13.39	8.44
13.	06:00	1.81	0.78	8.66	9.44	6.49
14.	07:00	1.81	1.11	11.80	12.91	7.29
15.	08:00	1.77	1.16	10.79	11.95	5.03
16.	09:00	1.83	3.96	11.70	15.66	2.94
17.	10:00	1.88	4.90	12.16	17.06	1.83
18.	11:00	1.88	2.25	11.27	13.52	1.85
19.	12:00	1.93	1.93	9.22	11.15	0.69
20.	13:00	1.92	0.79	7.74	8.53	1.91
21.	14:00	1.94	0.20	7.20	7.40	0.67
22.	15:00	1.91	3.16	9.08	12.24	0.46
23.	16:00	1.87	0.24	9.31	9.55	1.75
24.	17:00	1.90	2.12	9.66	11.78	0.89
Average Concentration		1.84	7.77	13.59	21.36	6.05



Ambient Air Quality

Client : National Engineering Services Pakistan Pvt Ltd

Sampling Point : Ammgah Village

Date of Intervention : April 02-03, 2012

Sr. #	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1.	18:00	1.55	51.86	13.56	65.42	7.31
2.	19:00	1.59	49.86	25.56	76.42	7.36
3.	20:00	1.93	24.22	7.25	31.47	3.76
4.	21:00	1.88	0.51	9.67	10.18	3.63
5.	22:00	1.86	2.36	8.48	10.84	4.83
6.	23:00	1.87	3.18	9.94	13.12	3.13
7.	00:00	1.83	0.62	5.43	6.05	2.59
8.	01:00	1.81	3.44	7.61	11.05	2.70
9.	02:00	1.86	2.17	11.36	13.53	4.29
10.	03:00	1.85	0.18	10.51	10.69	4.70
11.	04:00	1.82	0.18	7.84	8.02	6.03
12.	05:00	1.86	1.47	11.64	13.11	8.73
13.	06:00	1.86	0.48	9.47	9.95	9.34
14.	07:00	1.83	0.05	12.79	12.84	14.64
15.	08:00	1.87	0.03	10.35	10.38	17.29
16.	09:00	1.95	0.42	10.67	11.09	6.92
17.	10:00	1.92	0.13	9.97	10.10	6.12
18.	11:00	1.94	0.58	7.44	8.02	2.21
19.	12:00	1.87	2.93	8.20	11.13	1.18
20.	13:00	1.84	0.42	5.47	5.89	1.05
21.	14:00	1.86	0.52	6.87	7.39	1.13
22.	15:00	1.86	0.09	6.37	6.46	0.74
23.	16:00	1.85	0.48	5.7	6.18	0.68
24.	17:00	1.84	0.42	6.01	6.43	0.78
Average Concentration		1.84	6.11	9.51	15.66	5.05



Annexure – III

Noise Level Monitoring Data

Noise Level Monitoring

Client : National Engineering Services Pakistan Pvt Ltd
Sampling Point : In Front of Boys Primary School (Rajpur-Haripur)
Date of Intervention : April 04-05, 2012

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1.	18:00	49.8	50.1	50.2
2.	19:00	51.2	51.3	51.4
3.	20:00	52.7	52.8	52.9
4.	21:00	54.1	54.2	54.4
5.	22:00	50.0	50.3	50.3
6.	23:00	51.5	51.6	51.9
7.	00:00	50.6	50.9	51.2
8.	01:00	52.4	52.5	52.6
9.	02:00	51.0	51.1	51.2
10.	03:00	50.9	51.0	51.3
11.	04:00	51.4	51.8	52.0
12.	05:00	50.5	50.6	50.7
13.	06:00	53.7	53.8	53.9
14.	07:00	52.2	52.3	52.4
15.	08:00	54.0	54.4	54.5
16.	09:00	51.3	52.0	52.1
17.	10:00	56.0	56.3	56.4
18.	11:00	54.3	54.9	55.0
19.	12:00	52.1	52.4	52.9
20.	13:00	54.7	55.2	55.5
21.	14:00	56.3	56.8	57.2
22.	15:00	53.0	53.6	53.8
23.	16:00	50.6	50.9	51.5
24.	17:00	52.6	52.7	53.1

Noise Level Monitoring

Client : National Engineering Services Pakistan Pvt Ltd
Sampling Point : In Front of Al-Mehria Public School (Dingi Tube Well)
Date of Intervention : April 03-04, 2012

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1.	18:00	55.5	55.9	56.2
2.	19:00	50.3	51.4	52.7
3.	20:00	58.0	58.5	58.9
4.	21:00	56.2	56.8	57.0
5.	22:00	54.8	55.2	55.6
6.	23:00	54.1	54.3	54.3
7.	00:00	52.3	52.9	53.8
8.	01:00	50.8	51.6	52.4
9.	02:00	50.9	51.0	51.8
10.	03:00	54.7	55.2	55.6
11.	04:00	56.2	56.8	57.2
12.	05:00	53.1	53.7	54.0
13.	06:00	55.2	55.9	56.3
14.	07:00	58.5	59.2	59.6
15.	08:00	56.9	57.5	58.1
16.	09:00	53.0	53.4	53.8
17.	10:00	50.6	51.8	52.0
18.	11:00	52.1	52.6	53.4
19.	12:00	55.2	55.9	56.7
20.	13:00	53.5	53.5	53.8
21.	14:00	57.2	57.8	58.2
22.	15:00	54.9	55.6	57.8
23.	16:00	51.2	51.4	51.7
24.	17:00	53.8	54.3	54.9

Noise Level Monitoring

Client : National Engineering Services Pakistan Pvt Ltd
Sampling Point : Ammgah Village
Date of Intervention : April 02-03, 2012

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1.	18:00	58.5	58.9	58.9
2.	19:00	59.3	59.4	59.6
3.	20:00	60.8	60.9	61.4
4.	21:00	57.4	57.6	57.7
5.	22:00	55.1	55.2	55.3
6.	23:00	57.3	57.5	57.6
7.	00:00	56.7	56.8	57.0
8.	01:00	58.2	58.5	58.9
9.	02:00	53.0	53.4	53.8
10.	03:00	52.4	52.5	52.9
11.	04:00	50.7	50.8	50.9
12.	05:00	50.3	50.4	50.7
13.	06:00	56.1	55.9	55.9
14.	07:00	55.7	55.8	55.9
15.	08:00	56.6	56.4	56.4
16.	09:00	57.7	57.8	57.9
17.	10:00	50.3	50.4	50.6
18.	11:00	51.7	51.8	51.8
19.	12:00	53.6	53.7	53.9
20.	13:00	55.0	55.3	55.4
21.	14:00	52.4	52.5	52.7
22.	15:00	51.0	51.3	51.4
23.	16:00	50.7	50.8	50.9
24.	17:00	50.3	50.5	50.5



Annexure – IV

Standards

National Environmental Quality Standards (NEQS) for Ambient Air

Concentration in Ambient Air				
Pollutants	Time- Weighted Average	Effective from 1 st July 2010	Effective from 1 st January 2013	Method of measurement
SO ₂	Annual Average*	80 µg/m ³	80 µg/m ³	-Ultraviolet Fluorescence Method
	24 hrs**	120 µg/m ³	120 µg/m ³	
NO	Annual Average*	40 µg/m ³	40 µg/m ³	Gas Phase Chemiluminescence
	24 hrs**	40 µg/m ³	40 µg/m ³	
NO ₂	Annual Average*	40 µg/m ³	40 µg/m ³	Gas Phase Chemiluminescence
	24 hrs**	80 µg/m ³	80 µg/m ³	
O ₃	1 hr	180 µg/m ³	130 µg/m ³	Non Dispersive UV Absorption Method
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m ³	360 µg/m ³	High Volume Sampling (average flow rate not less than 1.1 m ³ /minute)
	24 hrs**	550 µg/m ³	500 µg/m ³	
Respirable Particulate Matter (PM ₁₀)	Annual Average*	200 µg/m ³	120 µg/m ³	-β Ray Absorption Method
	24 hrs**	250 µg/m ³	150 µg/m ³	
Respirable Particulate Matter (PM _{2.5})	Annual Average*	25 µg/m ³	15 µg/m ³	-β Ray Absorption Method
	24 hrs**	40 µg/m ³	35 µg/m ³	
	1 hr	25 µg/m ³	15 µg/m ³	

Lead (Pb)	Annual Average*	1.5 µg/m ³	1 µg/m ³	ASS Method after sampling using EPM 2060 or equivalent Filter paper
	24 hrs**	2 µg/m ³	1.5 µg/m ³	
Carbon Monoxide (CO)	8hrs**	5 mg/m ³	5 mg/m ³	Non Dispersive Infra Red (NDIR) Method
	1 hr	10 mg/m ³	10 mg/m ³	

*Annual arithmetic mean of minimum 104 measurements in a year, taken twice a week 24 hourly at uniform interval.

**24 hourly/ 8 hourly values should be met 98% of the in a year. 2% of the time. It may exceed but not on two consecutive days.

National Environmental quality Standards (NEQS) for Noise

Sr. No.	Category of Area/Zone	Effective from 1st July 2010		Effective from 1st July 2012	
		Limit in dB(A) Leq			
		Day Time	Night Time	Day Time	Night Time
1	Residential Area (A)	65	50	55	45
2	Commercial Area (B)	70	60	65	55
3	Industrial Area (C)	80	75	75	65
4	Silence Zones (D)	55	45	50	45



Annexure – V

Photographs



Noise Level Monitoring



Noise Level Monitoring



Ambient Air Monitoring



Ambient Particulate Matter Monitoring

ANNEXURE-VII

Borrow Pit Plan

Plan for Rehabilitation Borrow Areas

The objective of the rehabilitation programme is to return the borrow pit sites to a safe and secure area, which the general public should be able to safely enter and enjoy. Securing borrow pits sites in a stable condition should be a fundamental requirement of the rehabilitation process. This could be achieved by filling the borrow pit floor to approximately the access road level.

They can vary considerably in size, depending on the quantity of material taken and the borrow pits' reserve body of remaining material. The excavation and closure of borrow pits shall consider the following recommendations:

- Before extraction commences, licenses and permits should be checked and limits of disturbance and/or clearing must be clearly marked out on the site before any ground disturbing activity takes place;
- All run-on surface water must be intercepted and diverted around the area to be excavated;
- As a concurrent operation all available topsoil must be removed and stockpiled as low, flat windrows around the top and sides of the area to be developed. These windrows may augment the run-on surface water management system;
- At the completion of extraction, the borrow pit must be made stable and safe. This usually requires the sides of the pit to be reshaped with gentle safe grades (e.g. 1:6 grade);
- All disturbed areas associated with borrow pits must be retopsoiled, seeded, fertilized and mulched (if appropriate) as part of the restoration plan;
- Surface water must be intercepted and diverted around or through the proposed site;
- Windrows, rills of graded topsoil and stacked rock containment structures can be formed up to make effective temporary diversion banks to restrict sediment and/or contaminant movement off-site;

- Borrow pits will be backfilled with rejected construction wastes and will be given a vegetative cover after abandonment. If this is not possible, then slopes will be smoothed and depression will be filled in such a way that it looks more or less like the original ground surface;
- Appropriate plant species for the planting programme have to be selected in consultation with ecological consultant and local forest department. Depending on the limitations on the availability of appropriate plant material, harsh growing conditions (lack of irrigation and hot summer) and ongoing quarry rehabilitation operations there may be substantial loss of plantation and the planting programme may have to be continued for over 3–5 years. As plantings are progressively established they should be monitored before undertaking the next stage to ensure maximum plant survival rates; and
- The borrow pit immediate surroundings should be developed as a low maintenance reserve, with significant areas of native trees and shrubs and areas of longer grass and tussocks forming the open spaces. Walkways around the borrow site may be constructed. Provision for a future drive-in picnic area and car parking area may be developed.

ANNEXURE-VIII

Blasting Management Plan

BLASTING MANAGEMENT PLAN

1.0 General:

This document presents Blasting Management Plan (BMP)¹ for construction of Hassanabdal – Havellian Expressway section of E-35. It outlines safety and operational procedures that must be followed in blasting events to ensure safe practices to accomplish the task.

1.1 Rationale for the Blasting Management Plan:

The Blasting Management Plan is prepared in accordance with the following criteria:

1.1.1 Air blast Overpressure Criteria:

The Air blast overpressure level from blasting operations carried out in or on the premises must not exceed at any residence or other noise sensitive receiver:

- (a) 115 dB (Linear Peak) for more than 5% of the total number of blasts during each reporting period; and
- (b) 120 dB (Linear Peak) at any time.

1.1.2 Ground vibration Criteria:

The ground vibration Peak Particle Velocity (ppv) from blasting operations carried out in or on the premises must not exceed at any residence or other noise sensitive receiver:

- (a) 2 mm/s for more than 5% of the total number of blasts carried out in or on the premises during each reporting period; and
- (b) Exceed 10 mm/s at any time

1.2 Blasting/Vibration Management Plans:

The blasting activity is not only required in the right of way of the Project Road, but it may also be required for material extraction at the quarry area. The Blasting Plan for the project is given below that caters the following major considerations:

¹ Ashton Coal Operations Pty Limited (ACOL) (2006), Ashton Coal Mine, Blasting/ Vibration Management Plan, Part 2, New South Wales

- i. Control of blasting area
- ii. Time schedule
- iii. Training
- iv. Announcement/ Communication
- v. Traffic management
- vi. Hazardous material handling and storage
- vii. Waste disposal
- viii. Post blast re entry
- ix. Health and safety

1.2.1 Control of blasting area:

Three zones of responsibility are established around every blast to mitigate risks and control hazards (see figure 1).

The blasting area shall be restricted into three different zones; the identified zones are as follows:

- i. Blast zone
- ii. Exclusion zone
- iii. Community zone

The blast zone is a 300 m zone around the blast area that is controlled by the shot firer. The exclusion zone is a 700 m radius zone around the blast area that is controlled by the construction team. Prior to blasting we will ensure the exclusion zone has been cleared of people. A community zone has been established and represents all sensitive receivers as well as our community interface outside of the exclusion zone. Zones around the blasting area are defined in general and will be updated upon confirmation of the point of blasting, if any.

1.2.2 Time schedule:

The time schedule is devised taking into consideration the general population density of the area, the frequency of road usage and the routine of the community around the blasting area. The most appropriate time for blasting is suggested is in afternoon between 12:00 p.m to 3:00 p.m.

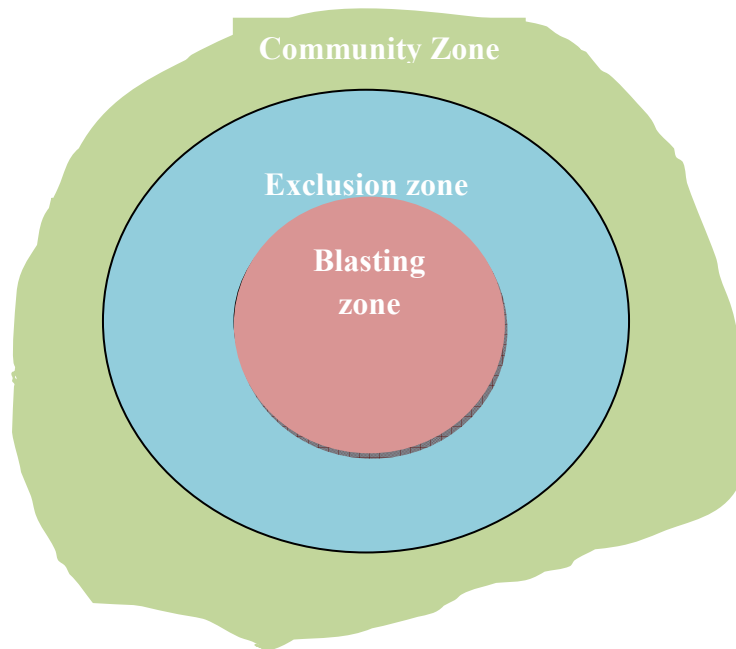


Figure 1: Zones of Responsibility during Blasting in Project Area

1.2.3 Training

The personnel involved in blasting and related activities shall be trained to minimize and manage the possible hazards. The training shall include the following:

- i. Safe Blasting procedures
- ii. Material handling
- iii. Personnel protection
- iv. Community and ecosystem protection
- v. Communication with in the team and community

1.2.4 Announcement/ communication

The size of the community zone has the potential to increase with intensity of each blast and current weather conditions. The planned schedule of the blasting shall be announced to the community through media and announcements in mosques and madrassas/schools. Signage around the area shall be updated, and information shall be posted at least Twenty-four hours prior to a blast, and notify Emergency Services in the locality. Prior to blasting firing shall be done to clear the area of any possible faunal species.

1.2.5 Traffic management

To ensure the safety of local traffic, a Traffic Control Plan is required to be communicated before blasting that ensures minimized traffic stoppage times, as road closures are only in effect immediately prior to and during the blasting operations until the all clear is given (approximately 15-20 minutes). Traffic controllers shall ensure all vehicles have exited- the exclusion zone. Notification to the commuters shall be provided by signage located at the outer limits of the exclusion zone.

1.2.6 Hazardous material handling and storage

Safe handling of hazardous material shall be taken into consideration. The storage of hazardous material shall be on cemented floor with proper drainage and the access of unconcerned/untrained people shall be restricted. The blasting contractor shall provide and maintain, on site, all required and necessary Material Safety Data Sheets for inspection and use in the event of an emergency. Ensure that the site is secure for workers after blasting and any unexploded or misfired blasting material left over (fuse, detonator etc.) should be handled safely. The site shall be clear of the risk involving land slides or rock instability. The transporting, handling, storage, and use of explosives, blasting agents, and blasting equipment shall be directed and supervised by a qualified Blast Officer.

1.2.7 Waste disposal

Waste involving explosives from the blasting site shall be safely handled, neutralized, and disposed of. An individual trained in the proper techniques for handling, neutralizing and disposing of the explosives in a safe manner shall be designated.

1.2.8 Post blast re-entry

Post blast reentry shall be allowed only to the authorized person (Blast officer) after the smoke, fumes and dust have cleared. The blaster-in-charge shall authorize the "All Clear" signal to be sounded, only after the area is deemed safe-to-enter.

1.2.9 Health and safety

The activities of blasting shall adhere to the considerations minimizing risks of health and safety of the workers, community and the ecosystem. Following shall be considered to the minimum:

- Road closures and evacuations occur within the zone of exclusion.
- Blast monitoring stations are operational.
- Required levels of ground vibration are not exceeded.
- Required levels of noise are not exceeded.
- Required levels of air blast are not exceeded.
- No fly rock is emitted beyond zone of exclusion.
- No visible emissions of dust/fumes from site.
- Interruptions to road are minimized.
- A safe area is evacuated around all blasts.
- All blasts are monitored.
- No damage occurs to people, property, livestock or power lines.
- Personal Protective Equipments shall be provided and worn by the personnel involved in blasting operations.
- First aid kit shall be available at easily accessible location.
- The team shall be able to handle emergency situations and the possible emergency services shall be notified in advance.
- All complaints are recorded and responded to in a timely and professional manner.
- The Blast Record shall be maintained containing all the information required to re-create the blast site, locate blast holes and shot/loading details.

1.3 Implementation of BMP:

The blasting management plan shall be thoroughly inspected for proper implementation by the contractor and must be monitored by SC.

1.4 Conclusion:

The blasting management plan presents the protocol for the management of various impacts resulting from blasting activities. It ensures the compliance with regulatory requirements; minimize hazards to surrounding residents, property, livestock and other infrastructure, respond to the emergencies and complaints in a timely and professional manner.

ANNEXURE-IX

Chance Find Procedures

CHANCE FIND PROCEDURES

Project involves deep excavation; therefore possibility of chance find is envisaged. However, in case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antiques or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and Cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserved those antiques and sensitive remains

In case of any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitable incorporated during taking the preventive measures to conserved the antique, artifact and Cultural (religious) properties
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Archeology Department is given below:

Archeology and Museum Department
1st Floor, Block-4, Sitara Market,
G-7 Markaz, Islamabad

Tel: 051-9206236
051-2201385

E-Mail: doam@cyber.net.pk

ANNEXURE-X

Construction Noise Modeling for Different Sensitive Receptors

Predicted Noise Level for Sensitive Receptors Located at the Distance of 20 meters

Activity	Source	Typical Peak Sound Level in Work Cycle (Lm)	Typical Minimum Sound Level in Work Cycle (Lb)	Lm-Lb	Fraction of time spent at peak in work Cycle (Ta/T)	Equivalency Factor (E.f)	Noise level emissions Leq (h)=E.L =Lj+EF	Estimated Distance from Equipment to Observer (D) E	Usage Factor (UF)	Equipment Leq(h) at Receptor (dbA) Leq (h)	Leq(h) Site at Receptor db(A)
Clearing,earthwork, foundation, piling, super structure etc.	Wheel Loader	90	83	7	1	0	90	20	0.4	84	107
	Grader	90	82	8	1	0	90	20	0.4	84	
	Vibration roller	86	82	4	1	0	86	20	0.4	80	
	2-wheel vibration roller	81	85	-4	1	0	81	20	0.4	75	
	3-wheel roller	81	85	-4	1	0	81	20	0.4	75	
	Tire roller	76	85	-9	1	0	76	20	0.6	71	
	Bulldozer	86	85	1	1	0	86	20	0.5	81	
	Tire Pen-dredger	84	85	-1	1	0	84	20	0.3	76	
	Sprayer	87	80	7	1	0	87	20	0.4	81	
	Power Generator	98	85	13	1	0	98	20	0.2	89	
	Impact drill	87	85	2	1	0	87	20	0.2	78	
	Impact piling	112	80	32	1	0	112	20	0.5	107	
	Concrete Mixer	92	85	7	1	0	92	20	0.2	83	
	Truck	91	55	36	1	0	91	20	0.4	85	
	Concrete Pump	85	84	1	1	0	85	20	0.4	79	
	Mobile Lift	96	84	12	1	0	96	20	0.4	90	
	Pneumatic Hammer	98	84	14	1	0	98	20	0.4	92	
	Breaker	84	80	4	1	0	84	20	0.4	78	
	Pneumatic Spanner	95	85	10	1	0	95	20	0.3	87	
	Steel Cutting Machine	85	85	0	1	0	85	20	0.4	79	
	Steel Bending Machine	80	80	0	1	0	80	20	0.5	75	
	Water Bowzer	80	80	0	1	0	80	20	0.2	71	
	Fuel Pump	82	82	0	1	0	82	20	0.4	76	
	Dumpers	70	82	-12	1	0	70	20	0.4	64	
	Excavator	70	72	-2	1	0	70	20	0.4	64	
	Dewatering Pump (Diesel)	77	77	0	1	0	77	20	0.5	72	
	Drills	80	77	3	1	0	80	20	0.5	75	
	Trailer	84	84	0	1	0	84	20	0.6	79	

Predicted Noise Level for Sensitive Receptors Located at the Distance of 40 meters

Activity	Source	Typical Peak Sound Level in Work Cycle (Lm)	Typical Minimum Sound Level in Work Cycle (Lb)	Lm-Lb	Fraction of time spent at peak in work Cycle (Ta/T)	Equivalency Factor (E.f)	Noise level emissions Leq (h)=E.L =Lj+EF	Estimated Distance from Equipment to Observer (D) E	Usage Factor (UF)	Equipment Leq(h) at Receptor (dbA) Leq (h)	Leq(h) Site at Receptor db(A)
Clearing,earthwork, foundation, piling, super structure etc.	Wheel Loader	90	83	7	1	0	90	40	0.4	78	101
	Grader	90	82	8	1	0	90	40	0.4	78	
	Vibration roller	86	82	4	1	0	86	40	0.4	74	
	2-wheel vibration roller	81	85	-4	1	0	81	40	0.4	69	
	3-wheel roller	81	85	-4	1	0	81	40	0.4	69	
	Tire roller	76	85	-9	1	0	76	40	0.6	65	
	Bulldozer	86	85	1	1	0	86	40	0.5	75	
	Tire Pen-dredger	84	85	-1	1	0	84	40	0.3	70	
	Sprayer	87	80	7	1	0	87	40	0.4	75	
	Power Generator	98	85	13	1	0	98	40	0.2	83	
	Impact drill	87	85	2	1	0	87	40	0.2	72	
	Impact piling	112	80	32	1	0	112	40	0.5	101	
	Concrete Mixer	92	85	7	1	0	92	40	0.2	77	
	Truck	91	55	36	1	0	91	40	0.4	79	
	Concrete Pump	85	84	1	1	0	85	40	0.4	73	
	Mobile Lift	96	84	12	1	0	96	40	0.4	84	
	Pneumatic Hammer	98	84	14	1	0	98	40	0.4	86	
	Breaker	84	80	4	1	0	84	40	0.4	72	
	Pneumatic Spanner	95	85	10	1	0	95	40	0.3	81	
	Steel Cutting Machine	85	85	0	1	0	85	40	0.4	73	
	Steel Bending Machine	80	80	0	1	0	80	40	0.5	69	
	Water Bowzer	80	80	0	1	0	80	40	0.2	65	
	Fuel Pump	82	82	0	1	0	82	40	0.4	70	
	Dumpers	70	82	-12	1	0	70	40	0.4	58	
	Excavator	70	72	-2	1	0	70	40	0.4	58	
	Dewatering Pump (Diesel)	77	77	0	1	0	77	40	0.5	66	
	Drills	80	77	3	1	0	80	40	0.5	69	
	Trailer	84	84	0	1	0	84	40	0.6	73	

Predicted Noise Level for Sensitive Receptors Located at the Distance of 60 meters

Activity	Source	Typical Peak Sound Level in Work Cycle (Lm)	Typical Minimum Sound Level in Work Cycle (Lb)	Lm-Lb	Fraction of time spent at peak in work Cycle (Ta/T)	Equivalency Factor (E.f)	Noise level emissions Leq (h)=E.L =Lj+EF	Estimated Distance from Equipment to Observer (D) E	Usage Factor (UF)	Equipment Leq(h) at Receptor (dbA) Leq (h)	Leq(h) Site at Receptor db(A)
Clearing,earthwork, foundation, piling, super structure etc.	Wheel Loader	90	83	7	1	0	90	60	0.4	74	98
	Grader	90	82	8	1	0	90	60	0.4	74	
	Vibration roller	86	82	4	1	0	86	60	0.4	70	
	2-wheel vibration roller	81	85	-4	1	0	81	60	0.4	65	
	3-wheel roller	81	85	-4	1	0	81	60	0.4	65	
	Tire roller	76	85	-9	1	0	76	60	0.6	62	
	Bulldozer	86	85	1	1	0	86	60	0.5	71	
	Tire Pen-dredger	84	85	-1	1	0	84	60	0.3	67	
	Sprayer	87	80	7	1	0	87	60	0.4	71	
	Power Generator	98	85	13	1	0	98	60	0.2	79	
	Impact drill	87	85	2	1	0	87	60	0.2	68	
	Impact piling	112	80	32	1	0	112	60	0.5	97	
	Concrete Mixer	92	85	7	1	0	92	60	0.2	73	
	Truck	91	55	36	1	0	91	60	0.4	75	
	Concrete Pump	85	84	1	1	0	85	60	0.4	69	
	Mobile Lift	96	84	12	1	0	96	60	0.4	80	
	Pneumatic Hammer	98	84	14	1	0	98	60	0.4	82	
	Breaker	84	80	4	1	0	84	60	0.4	68	
	Pneumatic Spanner	95	85	10	1	0	95	60	0.3	78	
	Steel Cutting Machine	85	85	0	1	0	85	60	0.4	69	
	Steel Bending Machine	80	80	0	1	0	80	60	0.5	65	
	Water Bowzer	80	80	0	1	0	80	60	0.2	61	
	Fuel Pump	82	82	0	1	0	82	60	0.4	66	
	Dumpers	70	82	-12	1	0	70	60	0.4	54	
	Excavator	70	72	-2	1	0	70	60	0.4	54	
	Dewatering Pump (Diesel)	77	77	0	1	0	77	60	0.5	62	
	Drills	80	77	3	1	0	80	60	0.5	65	
	Trailer	84	84	0	1	0	84	60	0.6	70	

Predicted Noise Level for Sensitive Receptors Located at the Distance of 80 meters

Activity	Source	Typical Peak Sound Level in Work Cycle (Lm)	Typical Minimum Sound Level in Work Cycle (Lb)	Lm-Lb	Fraction of time spent at peak in work Cycle (Ta/T)	Equivalency Factor (E.f)	Noise level emissions Leq (h)=E.L =Lj+EF	Estimated Distance from Equipment to Observer (D) E	Usage Factor (UF)	Equipment Leq(h) at Receptor (dbA) Leq (h)	Leq(h) Site at Receptor db(A)
Clearing,earthwork, foundation, piling, super structure etc.	Wheel Loader	90	83	7	1	0	90	80	0.4	72	95
	Grader	90	82	8	1	0	90	80	0.4	72	
	Vibration roller	86	82	4	1	0	86	80	0.4	68	
	2-wheel vibration roller	81	85	-4	1	0	81	80	0.4	63	
	3-wheel roller	81	85	-4	1	0	81	80	0.4	63	
	Tire roller	76	85	-9	1	0	76	80	0.6	59	
	Bulldozer	86	85	1	1	0	86	80	0.5	69	
	Tire Pen-dredger	84	85	-1	1	0	84	80	0.3	64	
	Sprayer	87	80	7	1	0	87	80	0.4	69	
	Power Generator	98	85	13	1	0	98	80	0.2	77	
	Impact drill	87	85	2	1	0	87	80	0.2	66	
	Impact piling	112	80	32	1	0	112	80	0.5	95	
	Concrete Mixer	92	85	7	1	0	92	80	0.2	71	
	Truck	91	55	36	1	0	91	80	0.4	73	
	Concrete Pump	85	84	1	1	0	85	80	0.4	67	
	Mobile Lift	96	84	12	1	0	96	80	0.4	78	
	Pneumatic Hammer	98	84	14	1	0	98	80	0.4	80	
	Breaker	84	80	4	1	0	84	80	0.4	66	
	Pneumatic Spanner	95	85	10	1	0	95	80	0.3	75	
	Steel Cutting Machine	85	85	0	1	0	85	80	0.4	67	
	Steel Bending Machine	80	80	0	1	0	80	80	0.5	63	
	Water Bowzer	80	80	0	1	0	80	80	0.2	59	
	Fuel Pump	82	82	0	1	0	82	80	0.4	64	
	Dumpers	70	82	-12	1	0	70	80	0.4	52	
	Excavator	70	72	-2	1	0	70	80	0.4	52	
	Dewatering Pump (Diesel)	77	77	0	1	0	77	80	0.5	60	
	Drills	80	77	3	1	0	80	80	0.5	63	
	Trailer	84	84	0	1	0	84	80	0.6	67	

Predicted Noise Level for Sensitive Receptors Located at the Distance of 100 meters

Activity	Source	Typical Peak Sound Level in Work Cycle (Lm)	Typical Minimum Sound Level in Work Cycle (Lb)	Lm-Lb	Fraction of time spent at peak in work Cycle (Ta/T)	Equivalency Factor (E.f)	Noise level emissions Leq (h)=E.L =Lj+EF	Estimated Distance from Equipment to Observer (D) E	Usage Factor (UF)	Equipment Leq(h) at Receptor (dbA) Leq (h)	Leq(h) Site at Receptor db(A)
Clearing,earthwork, foundation, piling, super structure etc.	Wheel Loader	90	83	7	1	0	90	100	0.4	70	93
	Grader	90	82	8	1	0	90	100	0.4	70	
	Vibration roller	86	82	4	1	0	86	100	0.4	66	
	2-wheel vibration roller	81	85	-4	1	0	81	100	0.4	61	
	3-wheel roller	81	85	-4	1	0	81	100	0.4	61	
	Tire roller	76	85	-9	1	0	76	100	0.6	57	
	Bulldozer	86	85	1	1	0	86	100	0.5	67	
	Tire Pen-dredger	84	85	-1	1	0	84	100	0.3	62	
	Sprayer	87	80	7	1	0	87	100	0.4	67	
	Power Generator	98	85	13	1	0	98	100	0.2	75	
	Impact drill	87	85	2	1	0	87	100	0.2	64	
	Impact piling	112	80	32	1	0	112	100	0.5	93	
	Concrete Mixer	92	85	7	1	0	92	100	0.2	69	
	Truck	91	55	36	1	0	91	100	0.4	71	
	Concrete Pump	85	84	1	1	0	85	100	0.4	65	
	Mobile Lift	96	84	12	1	0	96	100	0.4	76	
	Pneumatic Hammer	98	84	14	1	0	98	100	0.4	78	
	Breaker	84	80	4	1	0	84	100	0.4	64	
	Pneumatic Spanner	95	85	10	1	0	95	100	0.3	73	
	Steel Cutting Machine	85	85	0	1	0	85	100	0.4	65	
	Steel Bending Machine	80	80	0	1	0	80	100	0.5	61	
	Water Bowzer	80	80	0	1	0	80	100	0.2	57	
	Fuel Pump	82	82	0	1	0	82	100	0.4	62	
	Dumpers	70	82	-12	1	0	70	100	0.4	50	
	Excavator	70	72	-2	1	0	70	100	0.4	50	
	Dewatering Pump (Diesel)	77	77	0	1	0	77	100	0.5	58	
	Drills	80	77	3	1	0	80	100	0.5	61	
	Trailer	84	84	0	1	0	84	100	0.6	65	

ANNEXURE-XI

Lab Test 2015

**RESULTS OF INSTRUMENTAL MONITORING
PACKAGE 1**

**PM10, PM2.5, Water Quality of Camps, Batching
Plants, Noise
Levels and Oxide of C, N and S**



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name: CGGC-GRC JV Site Location: E-35 Project Package I Khanpur Road
Monitoring Point: Base Camp, RD Chachiansoka Rajpur Haripur
Monitoring Time: 1 Hour Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Monitoring By: SEAL
Reference No.: SEAL/CGGC/GRC/15/02AA

Results:

Sr. No.	Parameter	Unit	Results	NEQS	Remarks
1	PM ₁₀	($\mu\text{g}/\text{m}^3$)	140	150	All values found in compliance with NEQS
2	PM _{2.5}	($\mu\text{g}/\text{m}^3$)	12	15	
3	CO	(mg/m^3)	1.3	10	
4	NO _x	($\mu\text{g}/\text{m}^3$)	5.7	80	
5	SO _x	($\mu\text{g}/\text{m}^3$)	2.4	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.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor:

Chief Environmentalist with Seal:

ALEEM BUTT
Chief Environmentalist
SEAL

Signature of Chief Environmentalist:

Date: 07-12-2015



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name: CGGC- GRC JV Site Location: E-35 Project Package IKhanpur Road
Monitoring Point: Camp RD 1+000 Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Time Duration of Monitoring: 1 Hour Monitoring By: SEAL
Reference No.: SEAL/CGGC/GRC/15/01AA

Results:

Sr. No.	Parameter	Unit	Results	NEQS	Remarks
1	PM ₁₀	($\mu\text{g}/\text{m}^3$)	160	150	All values found in compliance with NEQS expect PM ₁₀ for which appropriate mitigation should be taken as recommended in EIA
2	PM _{2.5}	($\mu\text{g}/\text{m}^3$)	11.2	15	
3	CO	(mg/m^3)	1.6	10	
4	NO _x	($\mu\text{g}/\text{m}^3$)	4.1	80	
5	SO _x	($\mu\text{g}/\text{m}^3$)	3.6	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.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor:

[Signature]
ALEEM BUTT
Chief Environmentalist with Seal
SEAL

Signature of Chief Environmentalist:

Date: 07-12-2015



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

DRINKING WATER ANALYSIS REPORT

Client Name: CGGC-GRC JV

Address:

E-35 Project Package I, Base Camp
RD 51260

Sampling Point: Tub Water

Nature of Sample: Drinking Water

Sampling Date: 03-12-2015

Date of

07-12-2015

Sampling By: SEAL-Lahore

Completion:

Reference No.: SEAL/CGGCGR/15/002 DW

Results:

Sr. No.	Parameter	Unit	Result	WHO Guideline
1	Temperature	°C	20.0	----
2	Ph	--	8.22	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	367	1000
4	Total Suspended Solids (TSS)	mg/l	21	---
5	Chloride	mg/l	65	250
6	Fluoride	mg/l	0.3	1.5
7	Taste	Object/unobj	Unobject.	Unobject
8	Odour	Object/unobj	Unobject.	Unobject.
9	Colour	TCU	0	15
10	Iron	mg/l	0.01	0.3
11	Sodium	mg/l	35	200
12	Nitrate (as NO ₃ -)	mg/l	1.3	50
13	Nitrite (as NO ₂ -)	mg/l	BDL	3
14	Ammonia	mg/l	0	1.5
15	Hydrogen Sulphide (H ₂ S)	mg/l	BDL	0.05
16	Sulphate	mg/l	65	250
17	Lead	mg/l	BDL	0.10
18	Total Hardness as CaCO ₃	mg/l	146	500
19	Turbidity	NTU	0	5
20	Zinc	mg/l	0.2	3
21	Manganese	mg/l	BDL	0.1
22	Benzene	mg/l	BDL	10-120
23	Aluminum	mg/l	BDL	0.2
24	Molybdenum	mg/l	BDL	0.070
25	Chromium	mg/l	0.01	0.050
26	Cadmium	mg/l	BDL	0.003
27	Boron	mg/l	BDL	0.300



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-GRC JV

Address:

B-35 Project Package I, Base Camp
RD 5+260

Sampling Point: Tap Water

Nature of Sample: Drinking Water

Sampling Date: 03-12-2015

Date of

Sampling By: SEAT-Lahore

Completion:

Reference No.: SEAL/CGGCGR/15/002 DW

Sr. No.	Parameter	Unit	Result	WHO Guideline
28	Barium	mg/l	BDL	0.700
29	Antimony	mg/l	BDL	0.005
30	Arsenic	mg/l	BDL	0.010
31	Cyanide	mg/l	BDL	0.070
32	Mercury	mg/l	BDL	0.001
33	Nickel	mg/l	BDL	0.020
34	Total Coliform	Number/100ml	0	0/100 ml
35	E.Coli	Number/100ml	0	0/100 ml

Note:

- BDL (Below Detection Limit)
- 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 left over samples (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

Sample Analyzed By: Awais Shafique

Signature of analyst: *Awais Shafique*

Chief Environmentalist with Seal

ALEEM BUTT
Chief Environmentalist

Signature of Chief Environmentalist: *Aleem Butt*

Date: 07-12-2015

Page 2 of 2



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THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

DRINKING WATER ANALYSIS REPORT

Client Name: CGGC-GRC JV Address: E-35 Project Package I, Camp RD
14000
Sampling Point: Tap Water Nature of Sample: Drinking Water
Sampling Date: 03-12-2015 Date of Completion: 07-12-2015
Sampling By: SEAL-Lahore Reference No.: SEAL/CGGCGR/15/001 DW

Results:

Sr. No.	Parameter	Unit	Result	WHO Guideline
1	Temperature	$^{\circ}\text{C}$	20.0	---
2	Ph	--	8.08	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	188	1000
4	Total Suspended Solids (TSS)	mg/l	12	---
5	Chloride	mg/l	24	250
6	Fluoride	mg/l	0.2	1.5
7	Taste	Object./unobj.	Unobject.	Unobject.
8	Odour	Object./unobj.	Unobject.	Unobject.
9	Colour	TCU	0	15
10	Iron	mg/l	0.01	0.3
11	Sodium	mg/l	34	200
12	Nitrate (as NO_3^-)	mg/l	1.2	50
13	Nitrite (as NO_2^-)	mg/l	BDL	3
14	Ammonia	mg/l	0	1.5
15	Hydrogen Sulphide (H_2S)	mg/l	BDL	0.05
16	Sulphate	mg/l	44	250
17	Lead	mg/l	BDL	0.10
18	Total Hardness as CaCO_3	mg/l	40	500
19	Turbidity	NTU	0	5
20	Zinc	mg/l	0.3	3
21	Manganese	mg/l	BDL	0.1
22	Benzene	mg/l	BDL	10-120
23	Aluminum	mg/l	BDL	0.2
24	Molybdenum	mg/l	BDL	0.070
25	Chromium	mg/l	0.01	0.050
26	Cadmium	mg/l	BDL	0.003
27	Boron	mg/l	BDL	0.300



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-GRC JV Address: F-35 Project Package I, Camp RD
14000
Sampling Point: Tub Water Nature of Sample: Drinking Water
Sampling Date: 03-12-2015 Date of Completion: 07-12-2015
Sampling By: SEAL-Lahore Reference No.: SEAL/CGGCGR/15/001 DW

Sr. No.	Parameter	Unit	Result	WHO Guideline
28	Barium	mg/l	BDL	0.700
29	Antimony	mg/l	BDL	0.005
30	Arsenic	mg/l	BDL	0.010
31	Cyanide	mg/l	BDL	0.070
32	Mercury	mg/l	BDL	0.001
33	Nickel	mg/l	BDL	0.020
34	Total Coliform	Number/100ml	02	0/100 ml
35	E.Coli	Number/100ml	0	0/100 ml

Note:

- BDL (Below Detection Limit)
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- The report is not valid for any negotiation.

Sample Analyzed By: Awaiz Shafique

Signature of analyst: ALEEM BUTT
Chief Environmentalist with Seal

Signature of Chief Environmentalist: [Signature]

Date: 07-12-2015

Page 2 of 2



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

NOISE LEVEL MONITORING REPORT

Project Title: CGGC-GRC JV **Site Location:** E-35 Project Package I
Monitoring Date: 03-12-2015 **Instrument Used:** Digital Sound Level Meter TM-102
Reporting Date: 07-12-2015 **Time of Monitoring:** 11:00am – 01:00 pm
Monitoring By: SEAL **Reference No:** SEAL/CGGCGR/15/0001 NM
Results:-

Sr. No.	Monitoring point	Min. Noise Level (dB A)	Max. Noise Level (dB A)	Avg. Noise Levels (dBA)	Remarks
1	Near Generator (Camp RD 1+00)	71.5	72.6	72.05	All noise levels are found in compliance with permissible Limit (85 d BA) Although recommended measures as described in EIA may be taken if levels exceed permissible Limits.
2	Near Batching Plant (Camp RD 1+00)	68.3	69.8	69.05	
3	Near Pile Area (Camp RD 1+00)	66.1	68.3	67.2	
4	Near Cranes (Camp RD 1+00)	68.3	71.1	69.7	
5	Near Generator (RD 5+260)	81.6	84.3	82.9	
6	Near Batching Plant (RD 5+260)	74.6	75.3	74.9	
7	Near Steel Cutting (RD 5+260)	53.4	56.9	55.1	
8	Near Offices (RD 5+260)	57.9	61.1	59.5	
9	Dump Truck (Camp Road 14+00)	62.4	63.9	63.2	
10	Near Batching Machine (Camp Road 14+00)	63.7	65.8	64.7	

NEQS: National Environmental Quality Standards
NGVS: No Guideline Value Set



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Project Title:	CGGC-GRC JV	Site Location:	E-35 Project Package I
Monitoring Date:	03-12-2015	Instrument Used:	Digital Sound Level Meter TM-102
Reporting Date:	07-12-2015	Time of Monitoring:	11:00am – 01:00 pm
Monitoring By:	SEAL	Reference No:	SEAL/CGGC/GRC/15/0001 NM
Results:-			

Notes:

- 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 is not valid for any negotiations.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor: *[Signature]*

Chief Environmentalist with Seal: Chief Environmentalist

Signature of Chief Environmentalist: *[Signature]*

Date: 07-12-2015



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

DRINKING WATER ANALYSIS REPORT

Client Name: CGGC- GRC JV Address: E-35 Project Package 1, Section 2
Camp Road 14+000
Sampling Point: Tap Water Nature of Sample: Drinking Water
Sampling Date: 03-12-2015 Date of Completion: 07-12-2015
Sampling By: SEAL-Lahore Reference No.: SEAL/CGGC/GRC/15/003 DW

Results:

Sr. No.	Parameter	Unit	Result	WHO Guideline
1	Temperature	°C	20.0	----
2	pH	---	8.10	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	209	1000
4	Total Suspended Solids (TSS)	mg/l	16	---
5	Chloride	mg/l	21	250
6	Fluoride	mg/l	0.3	1.5
7	Taste	Object./unobj.	Unobject.	Unobject.
8	Odour	Object./unobj.	Unobject.	Unobject.
9	Colour	TCU	0	15
10	Iron	mg/l	0.01	0.3
11	Sodium	mg/l	44	200
12	Nitrate (as NO ₃ ⁻)	mg/l	1.2	50
13	Nitrite (as NO ₂ ⁻)	mg/l	BDL	3
14	Ammonia	mg/l	0	1.5
15	Hydrogen Sulphide (H ₂ S)	mg/l	BDL	0.05
16	Sulphate	mg/l	55	250
17	Lead	mg/l	BDL	0.10
18	Total Hardness as CaCO ₃	mg/l	60	500
19	Turbidity	NTU	0	5
20	Zinc	mg/l	0.3	3
21	Manganese	mg/l	BDL	0.1
22	Benzene	mg/l	BDL	10-120
23	Aluminum	mg/l	BDL	0.2
24	Molybdenum	mg/l	BDL	0.070
25	Chromium	mg/l	0.01	0.050
26	Cadmium	mg/l	BDL	0.003
27	Boron	mg/l	BDL	0.300

Page 1 of 2



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-GRC JV

Address: E-35 Project Package I, Section 2
Camp Road 14+000

Sampling Point: Tub Water

Nature of Sample: Drinking Water

Sampling Date: 03-12-2015

Date of Completion: 07-12-2015

Sampling By: SEAL-Lahore

Reference No.: SEAL/CGGCGR/15/003 DW

Sr. No.	Parameter	Unit	Result	WHO Guideline
28	Barium	mg/l	BDL	0.700
29	Antimony	mg/l	BDL	0.005
30	Arsenic	mg/l	BDL	0.010
31	Cyanide	mg/l	BDL	0.070
32	Mercury	mg/l	BDL	0.001
33	Nickel	mg/l	BDL	0.020
34	Total Coliform	Number/100ml	0	0/100 ml
35	E. Coli	Number/100ml	0	0/100 ml

Note:

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Sample Analyzed By: Awaris Shafique

Signature of analyst:

Chief Environmentalist with Seal

ALEEM BUTT
Chief Environmentalist
SEAL

Signature of Chief Environmentalist:

Date: 07-12-2015

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INSTRUMENTAL **M**ONITORING OF **E**NVIRONMENTAL **P**ARAMETERS ON **P**ACKAGE 2



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

DRINKING WATER ANALYSIS REPORT

Client Name: CGGC-AM Associates Address: E-35 Project Package II Khanpur
JV Road Chachian Soka Rajpur Haripur
Sampling Point: Consultants Residence Nature of Sample: Drinking Water
Sampling Date: 03-12-2015 Date of: 07-12-2015
Sampling By: SEAL-Lahore Completion: Reference No.: SEAL/CGGCAM/15/004 DW

Results:

Sr. No.	Parameter	Unit	Result	WHO Guideline
1	Temperature	$^{\circ}\text{C}$	22.4	---
2	Ph	--	7.5	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	364	1000
4	Total Suspended Solids (TSS)	mg/l	22	---
5	Chloride	mg/l	56	250
6	Fluoride	mg/l	0.3	1.5
7	Taste	Object/unobj	Unobject	Unobject
8	Odour	Object/unobj	Unobject	Unobject
9	Colour	TCU	0	15
10	Iron	mg/l	0.05	0.3
11	Sodium	mg/l	68	200
12	Nitrate (as NO_3^-)	mg/l	1.5	50
13	Nitrite (as NO_2^-)	mg/l	BDL	3
14	Ammonia	mg/l	0	1.5
15	Hydrogen Sulphide (H_2S)	mg/l	BDL	0.05
16	Sulphate	mg/l	82	250
17	Lead	mg/l	BDL	0.10
18	Total Hardness as CaCO_3	mg/l	124	500
19	Turbidity	NTU	0	5
20	Zinc	mg/l	0.2	3
21	Manganese	mg/l	BDL	0.1
22	Benzene	mg/l	BDL	10-120
23	Aluminum	mg/l	BDL	0.2
24	Molybdenum	mg/l	BDL	0.070
25	Chromium	mg/l	0.01	0.050
26	Cadmium	mg/l	BDL	0.003
27	Boron	mg/l	BDL	0.300



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-AM Associates JV Address: F-35 Project Package II Khanpur Road Chachian Soka Rajpur Haripur
Sampling Point: Consultants Residence Nature of Sample: Drinking Water
Sampling Date: 03-12-2015 Date of Completion: 07-12-2015
Sampling By: SEAL-Lahore Reference No.: SEAL/CGGCAM/15/004 DW

Sr. No.	Parameter	Unit	Result	WHO Guideline
28	Barium	mg/l	BDL	0.700
29	Antimony	mg/l	BDL	0.005
30	Arsenic	mg/l	BDL	0.010
31	Cyanide	mg/l	BDL	0.070
32	Mercury	mg/l	BDL	0.001
33	Nickel	mg/l	BDL	0.020
34	Total Coliform	Number/100ml	0	0/100 ml
35	E.Coli	Number/100ml	0	0/100 ml

Note:

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Sample Analyzed By: Awas Shafique

Signature of analyst: Far
ALEEM BUTT
Chief Environmentalist with Seal Chief Environmentalist

Signature of Chief Environmentalist: [Signature]

Date: 07-12-2015

Page 2 of 2



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

DRINKING WATER ANALYSIS REPORT

Client Name: CGGC-AM Associates JV
Address: E-35 Project Package II Khanpur Road Chachian Soka Rajpur Hattipur.
Sampling Point: Main Campus
Nature of Sample: Drinking Water
Sampling Date: 03-12-2015
Date of Completion: 07-12-2015
Sampling By: SEAL-Lahore
Reference No.: SEAL/CGGCAM/15/003 DW

Results:

Sr. No.	Parameter	Unit	Result	WHO Guideline
1	Temperature	°C	21.5	—
2	pH	—	7.96	6.5-8.5
3	Total Dissolved Solids (TDS)	mg/l	343	1000
4	Total Suspended Solids (TSS)	mg/l	28	—
5	Chloride	mg/l	38	250
6	Fluoride	mg/l	0.3	1.5
7	Taste	Object./unobj.	Unobject.	Unobject
8	Odour	Object./unobj.	Unobject	Unobject
9	Colour	TCU	0	15
10	Iron	mg/l	0.03	0.3
11	Sodium	mg/l	44	200
12	Nitrate (as NO ₃ ⁻)	mg/l	1.2	50
13	Nitrite (as NO ₂ ⁻)	mg/l	BDL	3
14	Ammonia	mg/l	0	1.5
15	Hydrogen Sulphide (H ₂ S)	mg/l	BDL	0.05
16	Sulphate	mg/l	38	250
17	Lead	mg/l	BDL	0.10
18	Total Hardness as CaCO ₃	mg/l	60	500
19	Turbidity	NTU	0	5
20	Zinc	mg/l	0.3	3
21	Manganese	mg/l	BDL	0.1
22	Benzene	mg/l	BDL	10-120
23	Aluminium	mg/l	BDL	0.2
24	Molybdenum	mg/l	BDL	0.070
25	Chromium	mg/l	0.01	0.050
26	Cadmium	mg/l	BDL	0.003
27	Boron	mg/l	BDL	0.300

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-AM Associates JV Address: E-35 Project Package II Khanpur
Sampling Point: Main Campus Nature of Sample: Road Chachian soka Rajpur Haripur
Sampling Date: 03-12-2015 Date of: Drinking Water
Sampling By: SEAL-Lahore Completion: 07-12-2015
Reference No.: SEAL/CGGCAM/15/003 DW

Sr. No.	Parameter	Unit	Result	WHO Guideline
28	Barium	mg/l	BDL	0.700
29	Antimony	mg/l	BDL	0.005
30	Arsenic	mg/l	BDL	0.010
31	Cyanide	mg/l	BDL	0.070
32	Mercury	mg/l	BDL	0.001
33	Nickel	mg/l	BDL	0.020
34	Total Coliform	Number/100ml	0	0/100 ml
35	E.Coli	Number/100ml	0	0/100 ml

Note:

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Sample Analyzed By: Ayaz Shafique

Signature of analyst: [Signature]

Chief Environmentalist with Seal:

ALEEM BUTT
Chief Environmentalist

Signature of Chief Environmentalist: [Signature]

Date: 07-12-2015

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

NOISE LEVEL MONITORING REPORT

Project Title: CGGC-AM Associates JV
Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Monitoring By: SEAL
Results:-

Site Location: E-35 Project Package II Khanpur Road Chachian soka Rajpur Haripur
Instrument Used: Digital Sound Level Meter TM-102
Time of Monitoring: 11:00am – 01:00 pm
Reference No: SEAL/CGGCAM/15/0002 NM

Sr. No.	Monitoring point	Min. Noise Level (dB A)	Max. Noise Level (dB A)	Avg. Noise Levels (dBA)	Remarks
1	Near Batching Plant RD 28+000	62.5	64.6	63.5	All noise levels are found in compliance with permissible Limit (85 dBA) Although recommended measures as described in EIA may be taken if levels exceed permissible Limits.
2	Near Site Office	58.4	61.4	59.9	
3	Near Receptors RD 28+400	60.3	65.1	62.7	
4	Foot Sheep Roller RD 29+000	59.4	60.5	59.9	
5	Dump Truck RD 32+800	62.6	64.6	63.6	

NEQS: National Environmental Quality Standards
NGVS: No Guideline Value Set



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Project Title:	CGGC-AM Associates JV	Site Location:	E-35 Project Package II Khanpur Road Chachian soka Rajpur Haripur
Monitoring Date:	03-12-2015	Instrument Used:	Digital Sound Level Meter TM-102
Reporting Date:	07-12-2015	Time of Monitoring:	11:00am – 01:00 pm
Monitoring By:	SEAL	Reference No:	SEAL/CGGCAM/15/0002 NM
Results:-			

Note:


- 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 is not valid for any negotiations.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor: 

Chief Environmentalist with Seal

ALEEM BUTT
Chief Environmentalist

Signature of Chief Environmentalist: 

Date: 07-12-2015



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

SURFACE WATER ANALYSIS REPORT

Client Name: CGGC-AM Associates JV
Address: F-35 Project Package II Khanpur Road Chachian Soka Rajpur Haripur
Sampling Point: RD 26+823.61
Nature of Sample: Surface Water
Sampling Date: 03-12-2015
Date of Completion: 08-12-2015
Sampling By: SEAL, Lahore
Reference No.: SEAL/CGGCAM/15/002 SW

Results:

Sr. No.	Parameters	Unit	Result	Remarks
1	Temperature	°C	26	There is no specific guideline or laws for Surface water analysis.
2	pH	---	7.6	
3	Chemical Oxygen Demand (COD)	mg/l	99	
4	Biochemical Oxygen Demand (BOD ₅)	mg/l	56	
5	Total Dissolved Solids (TDS)	mg/l	3789	
6	Total Suspended Solids (TSS)	mg/l	136	
7	Oil & Grease	mg/l	BDL	
8	Chromium (Hexa & Trivalent)	mg/l	0.42	
9	Sulphate (SO ₄ ²⁻)	mg/l	631	
10	Iron (Fe ²⁺)	mg/l	1.3	
11	Chlorine (Cl ₂) Free	mg/l	BDL	
12	Flouride (F ⁻)	mg/l	1.09	
13	Chloride	mg/l	550	
14	Ammonia (NH ₃)	mg/l	10	
15	Cadmium	mg/l	BDL	
16	Lead	mg/l	0.03	
17	Arsenic	mg/l	0.04	
18	Copper	mg/l	0.63	
19	Barium	mg/l	BDL	
20	Selenium	mg/l	BDL	
21	Silver	mg/l	BDL	
22	Pesticides	mg/l	BDL	
23	Manganese	mg/l	BDL	

Page 1 of 2



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

Client Name: CGGC-AM Associates JV
Address: E-35 Project Package II Khanpur Road Chuchian Soka Rajpur Haripur
Sampling Point: RD 26+823.61
Nature of Sample: Surface Water
Sampling Date: 03-12-2015
Date of Completion: 08-12-2015
Sampling By: SEAL-Lahore
Reference No.: SEAL/CGGCAM/15/002 SW

Sr. No.	Parameters	Unit	Result	
24	Zinc	mg/l	0.81	There is no specific guideline or laws for Surface water analysis
25	Nickel	mg/l	0.07	
26	Boron	mg/l	0.8	
27	Mercury	mg/l	BDL	
28	Total Toxic Metals	mg/l	0.06	
29	Sulphide (S^{2-})	mg/l	BDL	
30	An Ionic Detergent as MBAS	mg/l	BDL	
31	Phenolic Compounds	mg/l	BDL	
32	Cynaide	mg/l	BDL	

Note:

- BDL (Below Detection Limit)
- 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 left over samples (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for court.

Sample Analyzed By: Awas Shafique

Signature of analyst: [Signature]

Chief Environmentalist with Seal: **ALEEM BUTT**
Chief Environmentalist

Signature of Chief Environmentalist: [Signature]

Date: 08-12-2015

Page 2 of 2



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name: CGGC-AM Associates JV
Monitoring Point: Near Batching Plant 28+000
Time Duration of Monitoring: 1 Hour
Site Location: E-35 Project Package II Khampur Road Chachian soka Rajpur Haripur
Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Monitoring By: SEAL
Reference No.: SEAL/CGGCAM/15/04 AA

Results:


Sr. No.	Parameter	Unit	Results	NEQS	Remarks
1	PM ₁₀	($\mu\text{g}/\text{m}^3$)	135	150	All values found in compliance with NEQS
2	CO	(mg/m^3)	1.6	10	
3	NO _x	($\mu\text{g}/\text{m}^3$)	5.6	80	
4	SO _x	($\mu\text{g}/\text{m}^3$)	5.2	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.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor: 

Chief Environmentalist with Seal: ALEEM BUTT

Signature of Chief Environmentalist: 

Date: 07-12-2015



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



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name: CGGC-AM Associates JV
Monitoring Point: Near Site Office
Time Duration of Monitoring: 1 Hour

Site Location: E-35 Project Package II Khanpur Road Chachian soka Rappur Haripur
Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Monitoring By: SEAL
Reference No.: SEAL/CGGCAM/15/05-AA

Results:


Sr. No.	Parameter	Unit	Results	NEQS	Remarks
1	PM ₁₀	($\mu\text{g}/\text{m}^3$)	134	150	All values found in compliance with NEQS
2	CO	(mg/m^3)	1.3	10	
3	NO _x	($\mu\text{g}/\text{m}^3$)	3.6	80	
4	SO _x	($\mu\text{g}/\text{m}^3$)	2.3	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.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor: 

Chief Environmentalist with Seal: 
ALEEM BUTT
Chief Environmentalist
SEAL

Signature of Chief Environmentalist: 

Date: 07-12-2015



HEAD OFFICE:

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THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT

Client Name: CGGC-AM Associates JV
Monitoring Point: Near Receptors RD 28+000
Time Duration of Monitoring: 1 Hour
Site Location: E-35 Project Package II Khanpur Road Chachian soka Rajpur Haripur
Monitoring Date: 03-12-2015
Reporting Date: 07-12-2015
Monitoring By: SEAL
Reference No.: SEAL/CGGCAM/15/06 AA

Results:

Sr. No.	Parameter	Unit	Results	NEQS	Remarks
1	PM ₁₀	($\mu\text{g}/\text{m}^3$)	121	150	All values found in compliance with NEQS
2	CO	(mg/m^3)	1.4	10	
3	NO _x	($\mu\text{g}/\text{m}^3$)	4.0	80	
4	SO _x	($\mu\text{g}/\text{m}^3$)	2.4	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 for the use of reported data in future.
- The report is not valid for any negotiations.

Monitoring Supervisor: M. Asif Rana

Signature of Supervisor:

Chief Environmentalist with Seal: ALEEM BUTT

Signature of Chief Environmentalist:

Date: 07-12-2015



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ANNEXURE-XII

Public Consultation Pictures

Photo 1

Public Consultation with Mr. Asif and Mr. Malik Muhammad Afsar at Rajpur regarding project scope of work and conversion to 6 lanes. Mr. Asif is land owner of borrow site. Mr. Malik has provided land for project at Chichian Village.



Photo 2

Consultation with Mr. Amjid Nawaz, Mr. Muhammad Nawaz, Mr. Omer Khan and Mr. Ali Asghar at Chichian regarding conversion of project from 4 lanes to 6 lanes in coordination with Environmental Specialist of CGGC-AM (JVs).



Photo 3

Consultation with Mr. Chaudhary Aslam and Mr. Chaudhary Saleem at Rajpur Village regarding environmental aspects of project, change in scope of work and economical growth due to project.



Photo 4

Meeting with Mr. Javiad Railway Department Haripur regarding project scope of work and other concerned matters regarding railway track protection and safety measures



Photo 5

Consultation with Displaced and affected Persons at Village Dehdar



Photo 6

Consultation with Displaced and affected Persons at Mouza Ballar Jogi & Mohri



Photo 4

Consultation with Mr. Latif at Sarai Saleh in presence of DD Construction, DD Land, Sr. Surveyor and ARE Structure and Social Consultant of the Consultant



Photo 5

Consultation with Displaced Persons at Village Jaber and Sheengali regarding project scope of work, social and environmental aspects of project.



Photo 6

Consultation with Displaced Persons at Mouza Der Chattii regarding project scope of work, social and environmental aspects of project.



Attendance Sheets of Public Consultations





NATIONAL HIGHWAY AUTHORITY

CONVERSION OF PROJECT 4 LANES TO 6 LANES. CONSULTATIVE MEETING WITH DISPLACED PERSONS (DPs)

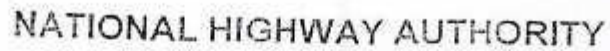
Dated: 17 / 02 / 2016

Attendance Sheet for Participants

Village: Chichuan Tehsil: Hasipur District: Hasipur

Sr. No.	Name of DPs & Contact No (if any)	Signature/ Thumb Impression
1	Mr. Malik Muhammad Afn	Malik Arif
2	Mr. Arif	
3	Mr. Amjid Nawaz 03345327073	Amjid Nawaz
4	Mr. Muhammad Nawaz	Muhammad Nawaz
5	Mr. Omer Khan	Omer Khan
6	Mr. Ali Asghar	
7	Tahir Ali	Tahir Ali
8	Mr. Abdul Wakeel	Abdul Wakeel
9	Mr. Ilyaz Khan	0345-9686520 Ilyaz Khan 0345-9686520.

NATIONAL HIGHWAY AUTHORITY



Dated: 17 / 02 / 2016

Attendance Sheet for Participants

Village: Der Chatti Tehsil: _____ District: Haripur

[illegible]

NATIONAL HIGHWAY AUTHORITY

