



Government of Pakistan
Ministry of Communications
National Highway Authority

DERA MURAD JAMALI BYPASS ON NATIONAL HIGHWAY N-65



ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(February, 2018)



ASIF ALI & ASSOCIATES (PVT) LTD

In joint venture with



**TURKPAK
INTERNATIONAL (PVT) LTD**

&



**A.A
ASSOCIATES**

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**ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR
DERA MURAD JAMALI BYPASS ON NATIONAL HIGHWAY N-65**

EXECUTIVE SUMMARY

1 INTRODUCTION

National Highway Authority is planning to construct Bypass in Dera Murad Jamali on National Highway N-65. The overall objective of the proposed Bypass is to provide a facility for the safe, congestion free and smooth flow of traffic both for the commuters of the project area as well as intercity travelers using the N-65. To comply with Pakistan's Environmental Regulations as per Pakistan Environmental Protection Act (PEPA) 1997, NHA entrusted "M/s Asif Ali & Associates (Pvt) Ltd" with the assignment of carrying out an Environmental Impact Assessment (EIA) Study of the subject project.

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

The submission of EIA and its approval from Environmental Protection Agency (EPA) is mandatory according to Pakistan Environmental Protection Act (PEPA), 1997. Section 12 (1) of the PEPA-1997 which states that:

"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."

PEPA-1997 is the apex law for mandatory EIA before project construction. The Act was promulgated on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance of 1983.

3 DESCRIPTION OF THE PROJECT

Three alternatives were considered for the proposed project namely 1) Option I, RD 112+800 to RD 125+450 (Western Side); 2) Option II, RD 112+800 to RD 129+450 (Western Side) 3) Option III, RD 112+800 to RD 125+550 (Eastern Side). Based on the suitability of meeting of the project objectives and environmental and social benefits, Alternative-3 was selected for the smooth traffic flow at Dera Murad Jamali. Accordingly, the proposed Bypass along with the construction of bridge on Put Feeder Canal was planned. The total cost of the proposed Project is 1,606,251,177 as per Engineer's Estimate

In order to access the vehicle-wise traffic volumes, the Design Consultant undertook classified 24 hours continuous traffic count surveys for three days in February 2017. Traffic counts were done at the start of Dera Murad Jamali for various types of vehicles plying in different directions.

4 ENVIRONMENTAL BASELINE PROFILE

The existing environmental conditions around the proposed project (falls in district Nasirabad) were considered with respect to physical, biological and socio-economic aspects. With the exception of the eastern side of the Dera Murad Jamali, the district Nasirabad is a flat plain. There is nothing of geological significance in the district which is entirely situated on alluvium.

The main types of soil in the district are Gora, Rohi, Doshai, Maira, Tibba, Kallar and Bela or the raverine soil. The major land use in the project area is residential & commercial. The climate of the Nasirabad district is hot and dry during summer and moderately cold in winter. June is the hottest month with mean maximum and minimum temperature of 50°C and 27°C respectively. The mean maximum and minimum temperatures during January are 23°C and 5°C respectively. The average annual rainfall in the district during 1961-98 is about 628.7 millimetres. The ambient air quality monitoring of carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂) and particulate matter (PM₁₀) was carried out at Dera Murad Jamali. All values are well within the permissible limits of their respective standards. Ground water sample was collected from a hand pump at Dera Murad Jamali near management office and was analyzed for microbiological and chemical parameters. All the physical, chemical and biological parameters are well within prescribed limits. Chemical analysis of sample of surface water from Put Feeder Canal indicated the presence of total suspended solids as 200 mg/l, the Grease & oil content as 10 mg/l, chloride content as 1 mg/l and pH value as 6.9. The values of BOD, COD and TSS are higher than the permissible limits of respective standards. The measured noise level values are in compliance with national Environmental Quality Standards for commercial area i.e. 60 db (A). According to building code of Pakistan prepared by NESPAK, it is located in Seismic Zone-2A of Pakistan (Lower limit of moderate damage).

Amaltas, Shisham, Kikar, Pipal, Banyan, Mulberry, Aam, Sirris and Lasura are the common floral species of the project area. Wild bore is fairly common in Nasirabad District and in the riverine area. Black buck, riverine deer, and hog deer are sometimes, though rarely found in the Belas around project area. Hare and jackal are fairly common all over the Nasirabad District. No wild life sanctuary or game reserve (Critical Habitats), exists near the project area.

The total population of Nasirabad District is 490,538 as enumerated in March 1998. The total area of the district is 3,387 square kilometers. The population of the district is predominantly Muslims i.e. 95.41 percent. Blouchi is the predominant language being

spoken by majority (97.3 percent) of the population of the district. The leading tribes living in the project area are Abro, Jamali, Sasoli, Umrani & Blouchi. The economically active population as enumerated in the last census is 4.18 percent of the total population. There was no family identified during the survey that belongs to indigenous people category.

5 PUBLIC CONSULTATION

Due to security alert of the area, public consultation was carried out on individual basis under police squad in this project area with the instructions that limited conversations should be done. The consultation process was carried out in accordance with the requirements of Pakistan Environmental Procedures. Main objective of the consultation was to share information with stakeholders on the construction of the proposed Bypass and expected impacts on the physical, biological and socio-economic environment of the project area. During the field survey different stakeholders identified were the shopkeepers, local residents, office workers, drivers, schools, transport users and pedestrians etc. The most commonly raised concerns during the meetings include avoiding dumping construction material openly, control of dust and noise pollution, scheduled sprinkling of water, minimize the cutting of trees, and proper compensation for the loss of properties etc.

6 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The project corridor is delineated according to two criteria: Right of Way (RoW); which the NHA is legally entitled to, and Corridor of Impact (CoI), i.e., the width of the corridor that will be impacted, directly or indirectly, by the project during the construction and operation phases. Implementation of the project will require total 671,453.6 sq. m (26547.12) of land. It will also result in relocation of 19 houses, 182 trees of varying species and sizes, on both sides of the project. It is proposed that 728 trees of suitable species shall be planted along the Bypass at available spaces.

Mitigation include proper land management by providing judicious compensation to the affectees through allocation of sufficient budget in the project cost. Due to the construction of the proposed Project, air pollution, noise and associated health risks may increase. Soil erosion may occur on roadside, at contractors' camps; 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. Due to the proposed camp sites, loss of vegetation and assets on the selected land and dissatisfaction of rehabilitation measures during and after completion of construction phase may occur. Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling and transport of hazardous construction material.

As the project deals with the construction of the Bypass, so no hazardous waste will be generated during the construction. Due to construction activities waste will be generated at construction and contractors camp sites. The waste generated from the camp sites will be disposed off through Municipal Committee. There are chances of arising of issues related to cultural differences/conflicts 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. Mitigation measures include timely and full public consultation and announcement of mobilizing equipment. Borrow areas/ open pits and their excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments. Mitigation will involve careful selection of the borrow areas, no excavation will be allowed within 300 meters from both sides of the road and regular checking of soil erosion along the borrow areas etc.

During the operation stage, raising of new trees at available spaces will have a positive impact of permanent nature. With the improved flora of the project area, due to raising of large number of trees, the fauna and especially the avi-fauna shall be attracted to the area. No major adverse impact on groundwater is anticipated during the operational phase. With the construction of Bypass, the traffic congestion will be reduced and the traffic passing through Dera Murad Jamali will move in a smooth flow from the Bypass; thereby reducing the emission levels in the city. After the construction of proposed Bypass, the landscape of the project area will be changed in terms of road infrastructure and planned plantation of trees.

7 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

For effective management of the environmental impacts, a comprehensive Environmental Management Plan (EMP) has been prepared. The objective of the EMP is to provide framework for the implementation of the proposed mitigation measures during all the three phases of the proposed Project. NHA will form an Environmental Committee (EC), which will be responsible for the environmental management and supervisory affairs during the construction phase of the proposed Project. The Project Director will be assisted by an Environmental Expert and a Social Expert in implementing the mitigation measures proposed in EMP. Environmental Monitoring is undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. To minimize the negative impacts arising due to increased vehicular activity at this Bypass and to enhance the landscape of the project area, tree plantation plan has been proposed. The total environmental mitigation cost including environmental monitoring, tree plantation and environmental training is estimated at Rs. 11.170 Million.

SECTION 1

INTRODUCTION

1.1 GENERAL

National Highway Authority (NHA) has taken a proactive step to conduct the Feasibility study for construction of Bypass over N-65 at Dera Murad Jamali. Accordingly, NHA has assigned this project to M/s Asif Ali Associates (Pvt.) Ltd. in association with M/s AA Associates & M/s Turkpak International (Pvt.) Ltd. to carry out this Feasibility Study.

1.2 PROPONENT OF THE PROJECT

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

National Highway Authority
27 Mauve Area, G-9/1, Islamabad
Ph: 051-9260565

1.3 PROJECT BACKGROUND

Advisor to Chief Minister of Baluchistan Mr. Mir Abdul Majid Abro vide letter No. Adv/CM/IPC & Zakat/15/183 dated 21st January 2015 requested to Chairman National Highway Authority for construction of a bypass at Dera Murad Jamali on N-65 District Nasirabad in province of Baluchistan.

On direction of Chairman NHA, Maintenance unit NHA Sibi conducted survey of the project site and three alignment options were proposed. Detail is given as under:

- i. The first alignment extends from N-65 at RD 112+800 to RD 125+450 having a length of 12.65 km. This alignment will bypass the city of Dera Murad Jamali from western side. The proposed alignment of bypass will terminate exactly in front of Uch Power Plant at RD 125+450.
- ii. The second alignment of proposed bypass starts from the same starting point as indicated above but it will be terminated at RD 129+450 having length of 16.65 km. The proposed alignment will pass behind the Uch power Plant without causing any trouble to the entrance of this Power Plant.
- iii. The alignment of this bypass starts 2 Km before Dera Murad Jamali, at RD 112+800 heading towards Eastern side of Dera Murad Jamali. The alignment crosses railway crossing immediately after start point and traverses through open fields. The alignment crosses Put Feeder Canal approximately 2.2 Km away from existing N-65. The alignment crosses Foliiji road and again railway crossing and finally terminates in front of Uch Power Plant at RD 125+550.

1.4 THE PROJECT

Subsequently, M/s Asif Ali & Associates (Pvt.) Ltd in association with M/s A.A Associates (Pvt.) Ltd & M/s Turpkak International (Pvt.) Ltd have been appointed as the Consultants by NHA to provide consultancy services for “Feasibility Study, Environmental Impact Assessment & Detailed Design of Dera Murad Jamali Bypass”.

Contract Agreement between National Highway Authority (NHA) and the Consultants was signed on August 08, 2016 for providing the aforesaid consultancy services.

1.5 NECESSITY

Dera Murad Jamali is located on N-65. Dera Murad Jamali is the main city of District Nasirabad and traffic on N-65 passes through the entire city of Dera Murad Jamali. Although a Railway track also runs parallel to the road, yet due to heavy flow of traffic, the road always gets blocked and VIP / emergency vehicular movement gets trapped in the heavy flow of traffic in the middle of the city. Threats of insecurity for VIPs also prevail. Traffic accidents due to congested traffic flow, which result in loss of precious lives, are commonly faced. Construction of this bypass will facilitate in two ways:-

- Firstly, it would lessen the traffic congestion for the intercity / through traffic.
- Secondly, the proposed bypass will give relief to the inhabitants of Dera Murad Jamali from heavy traffic congestions, blockage and road accidents.

1.6 OBJECTIVES OF THE PROJECT

Following are the main objectives of the undertaken project:

- To facilitate un-interrupted free flow of through traffic
- To reduce traffic accident ratio
- To reduce travel time & vehicle operating cost
- To protect the inhabitants of Dera Murad Jamali from dust pollution which reflects in better health improvements

1.7 PROJECT WORKS

The scheme envisages the construction of a bypass at Dera Murad Jamali on N-65 in District Nasirabad of Baluchistan province including a canal bridge over Put Fedder Canal as per NHA standards and specifications. Road furniture comprising of lane markings, traffic signs, guardrails and reflectors as per site requirement shall also be provided.

The scope of work and Terms of Reference which broadly covers but limited to the following:

- Feasibility Study.
- Detailed Design (keeping in view the present & future generated traffic).
- Tender Drawings and Documents.
- Environmental Impact Assessment (EIA) Study.
- Land Acquisition (if required) & Utilities folders.

1.8 PROJECT CATEGORISATION

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

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

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

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

As per EPA Guidelines, the present Project is classified as “Schedule II” that requires an EIA study and approval from the concerned authority, prior to the construction.

1.9 STANDARDS AND GUIDELINES

Environmental issues and control in Pakistan are governed by Pakistan Environmental Protection Act, 1997. Guidelines and procedures for preparing EIA reports have been published by EPA in the form of “Pakistan Environmental Assessment Package”.

Requirements of Government of Pakistan that are to be met before commencement of the Project are as follows:

- The legal requirements in Pakistan for Environmental Assessment for new projects under the Environmental Protection Act 1997;
- Pakistan National Environmental Quality Standards (NEQS) for gaseous, liquid (water), vehicular emissions and noise; and
- The need for an EIA as part of the Government of Pakistan PC-1 planning approval process for this Project.

1.10 THIS REPORT

This Environmental Impact Assessment Report is part of output of consultancy services in compliance of the Scope of Work / Terms of Reference of the Project.

SECTION 2

POLICY, LEGISLATION & GUIDELINES

2.1 INTRODUCTION

This chapter provides a synopsis of environmental policies, legislation, and guidelines that may have relevance to the proposed project. These include National Environmental Policy, legislation and guidelines; and international conventions and guidelines. NHA will be required to adhere to the relevant requirements of the policies and legislation and recommendations of the guidelines during the construction and operation phases; which have also been incorporated in the mitigation measures and the EMP provided in the EIA.

2.2 NATIONAL ENVIRONMENTAL POLICY, LEGISLATION AND GUIDELINES

The enactment of comprehensive legislation on the environment, covering multiple areas of concern, is a relatively new and ongoing phenomenon in Pakistan. Whereas, a basic policy and legislative framework for the protection of the environment and overall biodiversity in the country is now in place, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are still in various stages of formulation and discussion. The following section presents a brief overview of the existing national policies, legislation and guidelines.

2.2.1 National Environmental Policy, 2005

The National Environmental Policy (NEP) was approved by the PEPA in its 10th meeting on 27th December 2004 under the chairmanship of the Prime Minister of Pakistan and thereafter approved by the Cabinet on 29th June 2005. NEP is the primary policy of Government of Pakistan that addresses the environmental issues of the country. The broad Goal of NEP is, “To protect, conserve and restore Pakistan’s environment in order to improve the quality of life of the citizens through sustainable development”. The NEP identifies the following set of sectoral and cross-sectoral guidelines to achieve its Goal of sustainable development.

a) Sectoral Guidelines:

Water and sanitation, Air quality and noise, Waste management, Forestry, Biodiversity and Protected areas, Climate change and Ozone depletion, Energy efficiency and renewable, Agriculture and livestock, and Multilateral environmental agreements.

b) Cross-sectoral Guidelines:

Poverty, Population, Gender, Health, Trade and environment, Environment and local governance, and Natural disaster management, The NEP suggests the following policy instruments to overcome the environmental problems throughout the country:

- Integration of environment into development planning;
- Legislation and regulatory framework;
- Capacity development;
- Economic and market based instrument;
- Public awareness and education; and
- Public private civil society partnership.

NEP is a policy document and does not apply to projects. However, the proponent should ensure that the project should not add to the aggravation of the environmental issues identified in NEP and mitigation measures should be adopted to minimize or avoid any contribution of the project in these areas.

2.2.2 National Sanitation Policy, 2006

The National Sanitation Policy of Pakistan provides a broad framework and policy guidance to the Federal Government, Provincial Governments, federally Administrated Territories and the local governments, to enhance and support sanitation coverage in the country through formulation of their sanitation strategies plans and programs at all respective levels for improving the quality of life of the people of Pakistan and the physical environment necessary for healthy life.

2.2.3 National Climate Change Policy, 2012

The National Climate Change Policy was approved by the Federal Cabinet on 26 September 2012. With an overall goal, to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development, the Policy puts forward comprehensive policy objectives of sustained economic growth, integration of climate change into inter-related national policies, pro-poor gender sensitive adaptation and cost-effective mitigation, water, food and energy security, DRR, effective decision making and coordination, creating awareness, building capacities, and conservation of natural resources and long term sustainability. It also seeks effective use of financial opportunities, and public and private sector investment in adaptation measures.

2.2.4 National Resettlement Policy, 2002

In March, 2002 Pakistan Environmental Protection Agency (Pak-EPA), GOP has issued its National Resettlement Policy, which explains the basis for compensation, rehabilitation and relocation of the affectees. It also explains the requirements and implementation of Resettlement Action Plan (RAP).

2.2.5 National Conservation Strategy

Before the approval of NEP, the National Conservation Strategy (NCS) was considered as the Government's primary policy document on national environmental issues. At the moment this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity; pollution prevention and abatement; soil and water conservation; and preservation of cultural heritage, and recommends immediate attention to these core areas in order to preserve the country's environment.

The proponent should ensure that the project should not add to the aggravation of the 14 core environmental issues identified in the NCS and mitigation measures should be adopted to minimize or avoid any contribution of the project in these areas.

2.2.6 Biodiversity Action Plan (BAP)

The Biodiversity Action Plan (BAP), which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country.

The BAP recognises that an EIA is used as a tool at a project level to identify environmental effects of a proposed project and to plan for reducing adverse effects. The BAP further stipulates that an EIA needs to be initiated at an early stage of project development and that public participation in the review of potential effects is important.

2.2.7 Pakistan Environmental Protection Act, 1997

PEPA is the basic legislative tool empowering the government to frame regulations for the protection of the environment. PEPA is broadly applicable to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste. Penalties have been prescribed for those contravening the provisions of the Act. The powers of the federal and provincial Environmental Protection Agencies (EPAs) were also considerably enhanced under this legislation and they have been empowered to conduct inquiries into possible breaches of environmental law either of their own accord, or upon the registration of a complaint.

Under section 12 of PEPA, no project involving construction activities or any change in the physical environment can be taken unless an IEE or EIA as required is conducted and a report submitted to the federal or provincial EPA.

2.2.8 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

The Pak-EPA Review of IEE and EIA Regulations, 2000 (the 'Regulations'), prepared by the Pak-EPA under the powers conferred upon it by the PEPA, provide the necessary details on the preparation, submission, and review of IEE and EIA.

The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA.

2.2.9 National and International Environmental Quality Standards

The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and were last revised in 2000. The NEQS specify standards for industrial and municipal effluents, gaseous emissions, ambient air requirements and emission levels for Sulphur dioxide and Nitrogen oxide, vehicular emissions and noise levels. The PEPA specifies the imposition of a pollution charge in case of noncompliance with the NEQS. Standards for disposal of solid waste have not been promulgated as yet.

2.2.10 Conduct of an EIA

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 (The 2000 Regulations) promulgated under PEPA 1997 were enforced on 15 June, 2000. The 2000 Regulations define the applicability and procedures for preparation, submission and review of IEEs and EIAs. These Regulations also give legal status to the Pakistan Environmental Assessment Procedures prepared by the Federal EPA in 1997.

As per Schedule-A for policy and procedures for the filing, review and approval of environment assessments the proposed project falls under the list of projects which require an EIA. The projects in Schedule-A are generally major projects and have the potential to affect a large number of people. The impacts of such projects may be irreversible and could lead to significant changes in land use and the social, physical and biological environment. The preparation of this EIA satisfies the requirement of the 2000 Regulations.

2.2.11 Approval from Baluchistan Environmental Protection Agency

As per the 2000 Regulations, the proponent will be required to submit the EIA report to Baluchistan Environmental Protection Agency (BEPA) and seek approval on the same from BEPA. The EIA report will need to be submitted to BEPA. BEPA will grant its decision on the EIA as per the rules and procedures set out in the 2000 Regulations. The following rules apply.

- A fee is payable to BEPA for review of the EIA.
- The EIA submittal is to be accompanied by an application in the format prescribed in Schedule IV of the 2000 Regulations.
- BEPA is bound to conduct a preliminary scrutiny and reply within 10 days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed.
- BEPA will publish a public notice in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project. The public notice will mention the following:
 - The type of project
 - The location of the project
 - The name and address of the proponent
 - The places at which the EIA can be accessed
 - The date, time and place for public hearing of any comments on the project or its EIA
- The date set for public hearing will not be earlier than 30 days from the date of publication of the public notice.
- In the review process, BEPA may consult a Committee of Experts, which may be constituted on the request of the Director General (DG) BEPA.
- On completion of the review process and the public hearing, the decision of BEPA will be communicated to the proponent in the form prescribed in Schedule VI.
- Where an EIA is approved, BEPA can impose additional controls as part of the conditions of approval.
- BEPA is required to make every effort to complete the EIA review process within 90 days of the issue of confirmation of completeness. However, BEPA can take up to 4 months for communication of final decision.
- The approval will remain valid for the project duration mentioned in the EIA but on the condition that the project commences within a period of three years from the date of approval. If the project is initiated after three years from approval date, the proponent will have to apply for an extension in the validity period. The BEPA on receiving such request may grant extension (not exceeding 3 years at a time) or require the proponent to submit a fresh EIA if in the opinion of BEPA changes in baseline conditions or the project so warrant.

- After receiving approval from BEPA, the proponent will acknowledge acceptance of the conditions of approval by executing an undertaking in the form prescribed in Schedule VII of the 2000 Regulations.
- The 2000 Regulations also require proponents to obtain from BEPA, after the end of construction phase of the project, a confirmation that the requirements of the EIA and the conditions of approval have been duly complied with.
- The BEPA in granting the confirmation of compliance may impose any additional control regarding the environmental management of the project or the operation, as it deems necessary.

2.2.12 Project Monitoring and Compliance

During project execution NHA will be required to comply with the recommendations of the EIA and any conditions of approval set forth by BEPA. Post EIA monitoring and reporting is mandatory under clause 19 of the 2000 Regulations. The Regulations require proponents of all projects to submit monitoring reports on completion of construction, yearly reports during operation, and any additional reports required by the EPA. The format and contents of such reports are not specified in the law.

2.2.13 Effluent and Emission Self-Monitoring and Reporting

a) National Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2001

These rules establish pollution limits for industries in Pakistan under an honor-based self-monitoring system obliging all industries to monitor liquid effluents and gaseous emissions and submit environmental monitoring reports (in the formats set out in Schedule VI) to the relevant EPA (in this case BEPA) timely and correctly. All industrial units in Category-B are required to submit environmental monitoring reports on quarterly basis and they shall maintain a record of the times during which start-up and upset conditions occur, and shall mention the total time elapsed in such conditions in its monthly environmental monitoring report.

b) Industrial Pollution Charge (Calculation and Collection) Rules, 2001

These rules ensure the correct calculation, reporting and payment of pollution charges by polluting/industrial units. The list of parameters on which pollution charges shall apply and the method of calculating pollution charge are given in the Schedules attached to the Regulation.

c) Environmental Sample Rules, 2001

These rules authorise the Federal EPA and its authorised persons to obtain and test samples from industries to verify self-monitoring reports and calculation of pollution charges.

d) National Environmental Quality Standards (Certification of Environmental Laboratories) Rules, 2001

These rules were established as checks on environmental laboratories and require all laboratories to be certified from the Federal EPA as per the rules and criteria set out in the regulation.

2.2.14 Baluchistan Wildlife Protection Act, 1974

This ordinance provides for the preservation, protection, and conservation of wildlife by the formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance.

The ordinance also specifies three broad classifications of the protected areas: national parks, wildlife sanctuaries and game reserves. Activities such as hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. Wildlife sanctuaries are areas that have been set aside as undisturbed breeding grounds and cultivation and grazing is prohibited in the demarcated areas. Nobody is allowed to reside in a wildlife sanctuary and entrance for the general public is by special dispensation. However, these restrictions may be relaxed for scientific purpose or betterment of the respective area on the discretion of the governing authority in exceptional circumstances. Game reserves are designated as areas where hunting or shooting is not allowed except under special permits.

The project is located outside of any wildlife protected area therefore the project will not contravene with any provisions of this Act.

2.2.15 Canal and Drainage Act, 1873

Canals are defined as channels, pipes and reservoirs constructed and maintained by the Government for the supply for storage of water. Under section 27 of the Act a person desiring to have a supply of water from a canal for purposes other than irrigation shall submit a written application to a Canal Officer who may, with the sanction of the Provincial Government give permission under special conditions. The Act under section 61 also prohibits the damaging, altering, enlarging or obstructing the canals without proper authority.

The Canal and Drainage Act (1873) prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.

Although the Surrounding area has the presence of irrigation network, however the project activities will be limited and will not cause any physical damage to the canals. Similarly as the project is designed as a no discharge facility, there will be no alteration in water quality.

2.2.16 The Forest Act, 1927

The act empowers the provincial forest departments to declare any forest area as reserved or protected. The act also empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce; quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. The project area is located outside any reserved or protected forest area therefore the project will not contravene with any provisions of the Act

2.2.17 Antiquities Act, 1975

The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area which may contain articles of archaeological significance.

The project site was screened by the EIA study team; nothing of any archaeological interest was identified at the project site.

2.2.18 Pakistan Penal Code, 1860

The Pakistan Penal Code (1860) authorises fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.

2.2.19 National Environmental Guidelines

a. The Pakistan Environmental Assessment Procedures 1997

The Pakistan Environmental Protection Agency prepared the Pakistan Environmental Assessment Procedures in 1997. The guidelines pertaining to the review process of EIA's have been given regulatory status in the Review of IEE and EIA Regulations 2000. They are based on much of the existing work done by international donor agencies and NGO's.

The package of regulations prepared by PEPA includes:

- Policy and Procedures for Filing, Review and Approval of Environmental Assessments;
- Guidelines for the Preparation and Review of Environmental Reports;
- Guidelines for Public Consultation;
- Guidelines for Sensitive and Critical Areas; and
- Sectoral Guidelines-for environmental reports

The guidelines on policy and procedures define the policy context and the administrative procedures that will govern the environmental assessment process, from the project pre-feasibility stage, to the approval of the environmental report. According to the procedures laid out in the policy guidelines, IEE's or EIA's are to be filed with the EPA of the province where the project is to be implemented. The federal EPA has, however, been given the right to review any environmental report at any time and the power to revoke the decision of the provincial EPA, if it deems this to be necessary.

Projects have been classified in the policy guidelines by expected degree of adverse environmental impacts. All projects proposed in environmentally sensitive areas (including Game Reserves and Wildlife sanctuaries) require an EIA.

The Procedures require proponents to prepare terms of reference for the environmental assessment reports. They require that all EIA studies should contain baseline data on the area and must contain a detailed assessment of the potential environmental impacts and the recommended mitigation measures. Consultations with the communities that are most likely to be affected as well as relevant NGO's are to be an integral part of the EIA process.

The guidelines on public consultation deals with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their concerns in any impact assessment study.

2.2.20 Other Relevant Laws/Policies/Guidelines

a. Guidelines for Solid Waste Management (2005)

Guidelines for Solid Waste Management have been issued as a draft by the Pakistan Environmental Protection Agency in coordination with JICA and UNDP. These guidelines explain the waste generation, discharge and composition.

b. Sectoral Guidelines (1997)

Pakistan Environmental Assessment procedure deals with general guidelines as well as the sectoral guideline for the Environmental Assessment Studies. The sectoral guidelines have been given for different categories of the projects and deals with the procedure requirements of Environmental Assessment.

c. Pakistan Penal Code, 1860

This states the penalties for violations concerning pollution of air, water bodies and land.

d. Disaster Management Act, 2010

The Disaster Management Act, 2010 to offer an effective National Disaster Management System and for matters associated therewith or incidental thereto and to overawed unforeseen situations. The act is administered by federal government which provides guidelines for the provision of disaster management plans, offer necessary technical assistance to the Provincial Governments and Provincial Authorities as well for preparing their disaster management plans in case of any mishap. This Act is valid to the subject project in case of any unseen situation.

e. The Motor Vehicles Rules, 2000

Subject to the provisions of this Act, and the rules and regulations, 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 customary under clause (g) of sub-section (I) of section 6.

f. National Clean Air Act, 2000

The Clean Air Act legislation aims to control vehicular emissions, pollution from industry and indoor air pollution in rural areas.

g. Land Acquisition Act, 1894

This act deals with the procurement of private properties for public purposes. There are 55 sections in this act mainly dealing with area notifications, surveys, acquisition, compensation, appointment awards, dispute resolution, penalties and exemptions.

h. Seismic Building Code of Pakistan 2007

This code stipulates the minimum requirements for seismic safety of building and structures and the provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering design of buildings, like structures and related components.

Construction of buildings in defilement of the Building Code shall be considered as violation of professional engineering work specified under clause (XXV) of section 2 of the Act. This Code is applicable to the subject project as it includes the formation of structures.

i. Occupational Health & Safety

Construction and operational activities can distress the occupational health of the workers. Quantitative national standards with respect to the above aspect are yet to be developed in Pakistan. However, guidance in qualitative terms can be obtained from the Labor Laws (Amended) Ordinance, 1972 and Pakistan Factories Act (1934).

j. Labor and Health and Safety Legislation

The Constitution of Pakistan contains a range of provisions with regards to labor rights, in particular:

- Article 11 of the Constitution prohibits all forms of slavery, forced labor and child labor;
- Article 17 provides for a fundamental right to exercise the freedom of association and the right to form unions;
- Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone; and
- Article 37(e) makes provision for securing just and humane conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment.

Labor law is controlled at both provincial and national levels with compulsory employment agreements containing the terms set out by the labor laws. There are various laws containing health and safety requirements including: Mines Act 1923; Factories Act 1934; Factories Rules; Hazardous Occupations Rules 1963; Provincial Employees Social Security Ordinance 1965; and Workmen's Compensation Act 1923. No single comprehensive piece of legislation deals with occupational or community safety and health.

2.3 INTERNATIONAL TREATIES AND GUIDELINES

2.3.1 International Treaties

Pakistan is a signatory to various international treaties and conventions on the conservation of the environment and wildlife protection. The country is thus obliged to adhere to the commitments specified in these treaties.

a. The Convention on Biological Diversity

The Convention on Biological Diversity was adopted during the Earth Summit of 1992 at Rio de Janeiro. The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programmes and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promoting their sustainable use.

b. The Convention on Conservation of Migratory Species of Wild Animals, (1979)

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), (1979), requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or co-operate with other countries in matters of research on migratory species.

The Convention contains two appendices. Appendix I contain the list of migratory species that are endangered according to the best scientific evidence available. For these species, the member states to the Convention are required endeavor to:

- Conserve and restore their habitats.
- Prohibit their hunting, fishing, capturing, harassing and deliberate killing.

- Remove obstacles and minimize activities that seriously hinder their migration.
- Control other factors that might endanger them, including control of introduced exotic species.

Appendix II lists the migratory species, or groups of species, that have an unfavourable conservation status as well as those that would benefit significantly from the international co-operation that could be achieved through intergovernmental agreements.

c. The Convention on Wetlands of International Importance, Ramsar 1971

Pakistan is a signatory to the said Convention. The principal obligations of contracting parties to the Convention are:

- To designate wetlands for the List of Wetlands of International Importance.
- To formulate and implement planning so as to promote wise use of wetlands, to make EIA before transformations of wetlands, and to make national wetland inventories.
- To establish nature reserves on wetlands and provide adequately for their wardening and through management to increase waterfowl populations on appropriate wetlands.
- To train personnel competent in wetland research, management and wardening.
- To promote conservation of wetlands by combining far-sighted national policies with coordinated international action, to consult with other contracting parties about implementing obligations arising from the Convention, especially about shared wetlands and water system.
- To promote wetland conservation concerns with development aid agencies.
- To encourage research and exchange of data.

So far 19 sites in Pakistan have been declared as wetlands of International Importance or Ramsar Sites. However no Ramsar site is located within the project area.

d. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

This convention came into effect on 03 March 1973 in Washington. In all 130 countries are signatory to this convention with Pakistan signing the convention in 1976.

The convention requires the signatories to impose strict regulation (including penalization, confiscation of the specimen etc.) regarding trade of all species threatened with extinction or that may become so, in order not to endanger further their survival.

The Convention contains three appendices. Appendix I include all species threatened with extinction which are or may be affected by trade. The Convention requires that trade in these species should be subject to strict regulation. Appendix II includes species that are not necessarily threatened presently but may become so unless trade in specimens of these species is subject to strict regulation. Appendix III includes species which any contracting party identifies as subject to regulations in trade and requires other parties to co-operate in this matter.

e. International Union for Conservation of Nature and Natural Resources (IUCN) Red List

The red list is published by IUCN and includes those species that are under potential threat of extinction. These species have been categorized as

- **Endangered:** species that are sent to be facing a very high risk of extinction in the wild in the near future, reduction of 50% or more either in the last 10 years or over the last three generations, survive only in small numbers, or have very small populations.
- **Vulnerable in Decline:** species that are seen to be facing a risk of extinction in the wild, having apparent reductions of 20% or more in the last 10 years or three generations.
- **Vulnerable:** species that are seen to be facing a high risk of extinction in the wild, but not necessarily experiencing recent reductions in population size.
- **Lower Risk:** species that are seen to be facing a risk of extinction that is lesser in extent that for any of the above categories.
- **Data Deficient:** species that may be at risk of extinction in the wild but at the present time there is insufficient information available to make a firm decision about its status.

Two species Greater spotted eagle and White eyed Pochard observed in the project area are listed in IUCN Red List 2006. White eyed Pochard, which is a migratory species listed on Appendix-II of CMS and categorized as Near Threatened (NT) species in IUCN Red List 2006 was observed at the evaporation pond.

f. 1992 Climate Change Convention and Koyoto Protocol

The convention aims at stabilizing greenhouse gases (GHGs) concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. To achieve the objective of the convention, all parties are generally required to develop national inventories of emission; formulate and implement national and regional programs of mitigation measures; all developed country parties were specifically obliged to take measures to limit GHG emissions by the year 2000 at 1990 levels and the developing countries to take all measures in support of the protection

of atmosphere without any formal commitment on the quantified reduction of these gases in a time frame.

The Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change (UNFCCC) an international treaty on global warming. Ratifying developed countries commit to reduce their combined greenhouse gas levels by 5%, including six GHGs, i.e. Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydro fluorocarbons (HFCs), Per fluorocarbons (PFCs), and Sulfur hexafluoride (SF₆). As of November 2007, total of 174 countries have signed and ratified the agreement, with the notable exceptions of the United States of America.

If successful, the Kyoto Protocol is expected to reduce the average global temperature between 0.02°C and 0.28°C by the year 2050. The Kyoto Protocol proposes to set up framework for (a) Joint Implementation of projects aimed at reduction of GHGs, (b) establishment of Clean Development Mechanism (CDM), and (c) Emissions Trading, which could be availed by all developing country Parties, including Pakistan. Pakistan signed the United Nations Framework Convention on Climate Change (UNFCCC) in Rio in 1992. It was ratified in June 1994 and it became effective for Pakistan, as Party, with effect from 30th August 1994

One hundred and thirty-seven (137) developing countries have ratified the protocol. Developing countries including Pakistan have no obligation beyond monitoring and reporting emissions.

2.3.2 International Guidelines

a. World Bank Guidelines on Environment

The principal World Bank publications that contain environmental guidelines are listed below.

- Environmental Assessment-Operational Policy 4.01. Washington, DC, USA. World Bank 1999.
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991.
- Environmental Assessment Sourcebook, Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper No. 154, Environment Department, the World Bank, 1991.
- Environmental Health and Safety (EHS) guidelines, International Finance Corporation (IFC) World Bank Group, 2008.

The first two publications listed here provide general guidelines for the conduct of an EIA, and address the EIA practitioners themselves as well as project designers. While the Sourcebook in particular has been designed with Bank projects in mind, and is especially relevant for the impact assessment of large-scale infrastructure projects, it contains a wealth of information which is useful to environmentalists and project proponents.

The Sourcebook identifies a number of areas of concern, which should be addressed during impact assessment. It sets out guidelines for the determination of impacts, provides a checklist of tools to identify possible biodiversity issues and suggests possible mitigation measures. Possible development project impacts on wild lands, wetlands, forests etc. are also identified and mitigation measures suggested. The Sourcebook also highlights concerns in social impact assessment, and emphasizes the need to incorporate socio-economic issues in EIA exercises.

The EHS guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).

These guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, based on environmental assessments and/or environmental audits as appropriate, with an appropriate timetable for achieving them.

The EHS guidelines for thermal power plants were published in December 2008 and include information relevant to combustion processes fueled by gaseous, liquid and solid fossil fuels and biomass and designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of the fuel type (except for solid waste which is covered under a separate Guideline for Waste Management Facilities), with a total rated heat input capacity above 50 Megawatt thermal input (MWth) on Higher Heating Value (HHV) basis. It applies to boilers, reciprocating engines, and combustion turbines in new and existing facilities. A detailed description of industry activities for this sector and guidance for Environmental Assessment (EA) of thermal power projects is also provided in these guidelines.

The guidelines provide a brief description of the following:

Industry Specific Impacts and Management

This section provides a summary of the most significant EHS issues associated with thermal power plants, which occur during the operational phase, along with recommendations for their management. The section also

highlights the environmental issues related with power plant operations including the following:

- Air emissions;
- Energy efficiency and greenhouse gas emissions;
- Water consumption and aquatic habitat alteration;
- Effluents;
- Solid wastes;
- Hazardous materials and oil;
- Noise.

The section also provides occupational health and safety risks and mitigation measures during plant construction, operation and decommissioning to overcome the same with special emphasis on:

- Non-ionizing radiation;
- Heat;
- Noise;
- Confined spaces;
- Electrical hazards;
- Fire and explosion hazards;;
- Chemical hazards;
- Dust.

Lastly the section highlights the issues related to community safety and health with particular attention on:

- Water consumption;
- Traffic safety.

The issues not discussed in this guideline have been provided in the General EHS guidelines published by the IFC.

Performance Indicators and Monitoring

This section provides the performance indicators of various parameters both from an environmental as well as occupational health and safety perspective. The monitoring requirements of various parameters during plant operation phase are also provided in this section.

Environmental Performance Indicators and Monitoring:

The environmental performance indicators provide the effluent and air emissions guideline values of various parameters during operations. Effluent guidelines are applicable for direct discharges of treated effluents to surface waters for general use and hence are not applicable on the proposed project as the power plant will be designed as a zero discharge facility with the waste water being discharged to the on-site evaporation pond. As this is a road Project and will not have any sort of dangerous effluent.

Separate guideline values of various pollutants have been prepared based on the type of equipment used in construction phase. The maximum emissions levels given can be consistently achieved by well designed, well-operated, and well-maintained pollution control systems. In contrast, poor operating or maintenance procedures affect actual pollutant removal efficiency and may reduce it to well below the design specification. Dilution of air emissions to achieve these guidelines is unacceptable.

Furthermore emissions should not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards (i.e. NEQS), or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources. The values of the pollutants including oxides of Sulfur and Nitrogen, Ozone and Particulate matter less than 2.5 and 10 micron in size were revised in the document namely Air Quality Guidelines global update 2005 published values.

Also, emissions from a single project should not contribute more than 25% of the applicable ambient air quality standards to allow additional, future sustainable development in the same air shed.

Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken.

Occupational Health and Safety Guidelines:

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV) occupational exposure guidelines and Biological Exposure Indices (BEIs) published by American Conference of Governmental Industrial Hygienists (ACGIH), the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH), Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of

the United States (OSHA), Indicative Occupational Exposure Limit Values published by European Union member states, or other similar sources.

The working environment should be monitored for occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents.

b. ISO 18001 Occupation Health and Safety Assessment Series (OHSAS)

OHSAS 18001 is an Occupation Health and Safety Assessment Series for health and safety management systems to help organizations to control occupational health and safety risks. The OHSAS specifications are applicable to any institute that desires to establish an OH&S management system to eradicate or reduce risk to employees and other interested parties who may be exposed to the risks allied with the project activities. As the subject project is a construction of bus terminal cum commercial complex and involves various health and safety issues to construction labor, therefore these ISO 18001 guidelines will be applicable and pertinent.

2.4 ADMINISTRATIVE FRAMEWORK

2.4.1 National Highway Authority (NHA)

The client of the proposed project is National Highway Authority (NHA). The management of NHA will ensure that all the proposed measures are effectively implemented at the design, construction and operational stages of the project.

2.4.2 Environmental Protection Agency, Baluchistan

Pakistan Environmental Protection Council is the apex inter-ministerial and multi-stakeholders decision-making body, which is headed by Prime Minister. While Pakistan Environmental Protection Agency is meant for the putting into practice of environmental laws in Pakistan. They have vicarious powers to provincial environmental protection agencies for review, approval and monitoring of environmental examination/assessment projects. BEPA will be liable for reviewing the report, issuing Environmental Approval and overall/broad based monitoring of the proposed project actions.

SECTION 3

DESCRIPTION OF THE PROJECT

3.1 GENERAL

Dera Murad Jamali is located between Sukkur and Sibi on N-65 in Nasirabad District, Baluchistan. The prime Objectives of the proposed project are as follows:

- Facilitate the general public, particularly the people of Dera Murad Jamali and the surrounding areas
- Enhance the efficiency of the road network
- Reduce the number of accidents

To meet the requirements of increasing traffic volume, NHA has planned to construct a Bypass around the Dera Murad Jamali city. The Length of this Bypass is 11+190 KM.

3.2 LOCATION OF PROJECT

The proposed bypass starts in South of Dera Murad Jamali, traverses through western outskirts of Dera Murad Jamali and ends in north of city after crossing the Put Feeder Canal. Fig. 3.1 shows the location map of Dera Murad Jamali and Fig 3.2 Shows the approved alignment of bypass.



Figure 3.1 Location Map of Dera Murad Jamali

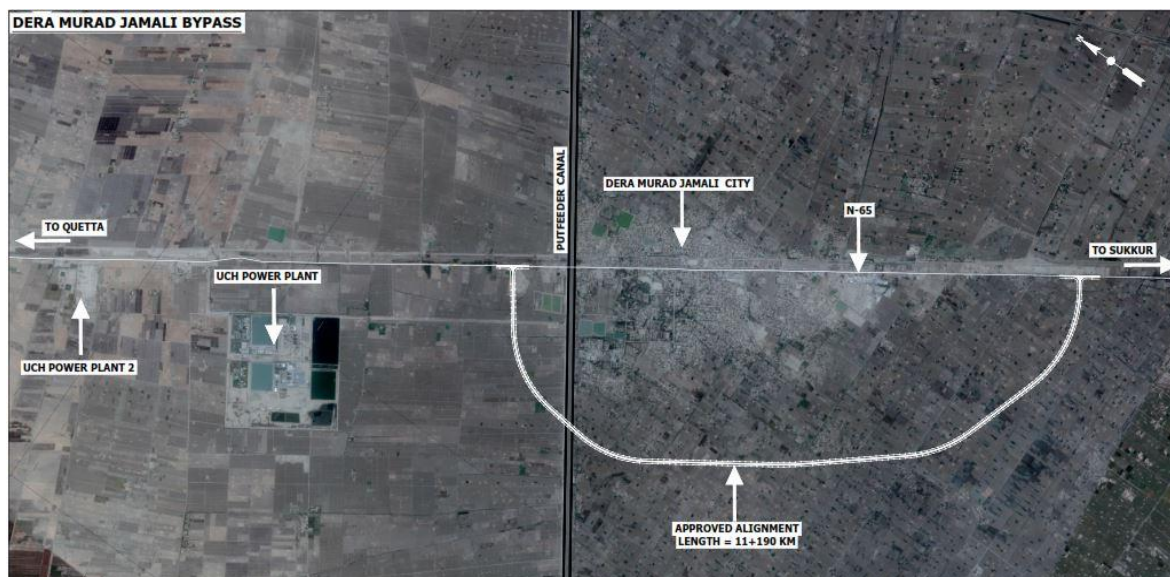


Figure 3.2 Approved Alignment of Bypass

3.3 PROJECT COMPONENTS

The various Project components include construction of a new Bypass around Dera Murad Jamali City. The Geometric Design features of the proposed bypass are presented in Table 3.1.

Table 3.1 Geometric Design Features of Bypass

S. No.	Parameters	Units	Plain Terrain
1	Design speed	KPH	100
2	Min. Radius	Meter	437
3	Rate of Super elevation (Max.)	%	6
4	Pavement cross slope	%	2
5	Shoulder cross slope	%	4
6	Formation width	Meter	13.3
7	Pavement width	Meter	7.3
8	Shoulder width (on each side)	Meter	3.0
9	K-Value for crest curves		52
10	K-Value for sag curves		45
11	Fill slopes	Horizontal: Vertical	2:1
12	Max. grade	%	3
13	Min. grade	%	0.3
14	Right of Way (ROW)	Meter	60
15	Design life of road	Years	10

Design of Road Section will be carried out on the basis of traffic counts, soil investigations. Pavement design will be done according to AASHTO Guide for the Design of Pavement (AASHTO 1993) with appropriate load factors. The final pavement design will be cross-checked through mechanistic design method. The pavement design will be based on Project traffic keeping overload factors in view. Pavement will be designed for a life of 10 years.

3.4 PROJECT RIGHT OF WAY

The Right of Way (ROW) of the bypass is 60 meters. Major construction work will generally remain confined within the ROW.

3.5 CONSTRUCTION MATERIALS

The materials used in construction of this bypass include coarse aggregates (crush), fine aggregates (sand), soil, water, asphalt, reinforcement, cement etc. Almost all these raw materials are locally available in the country.

i) Crushed Aggregate

A well-developed source of crushed aggregate is available at Arore near Rohri. Several crushers of medium sizes are exploiting these resources. Well known crusher companies are Atta Muhammad Crusher (Arore) and Fauji Crusher (Ubhan Shah). The quantities available are extensively large; however mining leases have already been obtained by various parties.

ii) Fine Aggregate (sand)

Few sources of limited quantity are available in Ubhan Shah; however extensive screening will be required. Good quality sand is available from Bolari, near Hyderabad and it is the main source of sand supplied throughout Sindh province.

iii) Sub-grade Material

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

iv) Embankment Material

The embankment material can be borrowed in huge quantities from Ubhan Shah, near Kot Diji and Arore near Rohri. In most cases, the contractors will lease private land in the vicinity on short term basis for the purpose of acquiring earth material, after the approval of NHA designated Engineer.

v) Water

Groundwater is available throughout the alignment in large quantities. Intensive pumping has been done near project area and has been found that the depth of water-table is generally from 5 metres to 20 metres. The water available near the surface water bodies is of good quality and potable in nature, which is suitable for all construction and drinking requirements. In addition to the groundwater resource, surface water is also available from Sindh Wah and Begari Wah.

vi) Asphalt, Reinforcement and Cement

Asphalt, reinforcement and cement will be transported from National Refinery Karachi, Steel Mill Karachi and cement factories from Karachi respectively.

3.6 TOTAL PROJECT COST

Cost of total project will be **Rs. 1,860,963,113** as per Engineer's Estimate.

3.7 CONSTRUCTION SCHEDULE

The implementation of the Project is expected to commence in September, 2018 and the estimated completion date will be at the end of April 2020. At present, the Project is at the engineering design stage.

3.8 CONSTRUCTION CAMPS

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

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

3.9 WORKFORCE AND MACHINERY REQUIREMENTS

Table 3.2 gives the typical workforce requirement for Dera Murad Jamali Bypass for managerial staff, engineers and labourers.

85 labourers will be required during construction of the Road, out of which 30 will be skilled, 15 will be semi-skilled and 40 will be unskilled labourers.

Table 3.2 Workforce Requirement for Construction Dera Murad Jamali Bypass

No.	Contractors Staff	Workforce Required
A. Managerial Staff		
1	Project Manager	1
2	Office Manager	1
3	Accountant	1
4	Purchaser	1
5	Quantity Surveyor	1
6	Computer Operator	1
B. Site Staff		
1	Material Engineer	1
2	Site Engineer	2
3	Surveyor	2
4	Foreman	2
5	Skilled Labourer	30
6	Semi-skilled Labourer	15
7	Labourer	40
Total		98

SECTION 4

DESCRIPTION OF THE ENVIRONMENT

4.1 GENERAL

The existing environment around the proposed Project Area has been studied with respect to physical, ecological, cultural and socio-economic aspects.

The direct “Corridor of Impact” (COI) due to construction of this bypass is 60 meters, which is within Right of Way (ROW) of the proposed bypass. However effect of the loads generating from the moving traffic can be felt beyond the design ROW. Therefore indirect COI is beyond the proposed ROW.

Human impacts such as road safety, traffic noise, vehicular emissions and other types of associated pollution are already present along the proposed corridor for bypass. These factors are therefore discussed as part of the existing environmental conditions in the Project Area. This will allow the determination of baseline conditions against which the incremental impact of the proposed Project can be assessed.

4.2 METHODOLOGY

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

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

In order to assess the impacts of the proposed Project on the people living in the vicinity of the Project Area, detailed survey was conducted and existing environmental/socio-economic conditions and salient features of the area were duly observed. In addition, the relevant secondary data were also obtained from the District Census Reports for Nasirabad. During the detailed site visit, relevant government agencies/ departments were also consulted for the relevant data. To establish baseline ambient air, noise and surface and groundwater conditions of the area; air and water samples for laboratory analysis were collected from locations in the district, whereas noise levels were measured at various locations.

Locations for conducting air and water sampling, and conducting noise measurements were selected according to their likeliness to be affected from the proposed Project.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Climate

Various meteorologists have developed classification schemes to describe local climatic features of Pakistan. The climate of the project area is described as hot and arid.

No meteorological station exists in the close proximity of project site. The nearest meteorological stations are located in Jacobabad and Sibi. Jacobabad station is located about 32 km towards south eastern direction and Sibbi about 163 km towards north-western direction from the project site.

Interpretations of available meteorological data for the last five years from these stations show that the project area experiences extreme temperatures. July and August are the wettest months. Precipitation during these two months accounts for more than half of the total annual rainfall. October and November are among the driest months. May, June, July and August are among the hottest months of the year with temperatures rising close to 50°C. December and January are the coldest months.

The weather parameters of Jacobabad and Sibbi are provided in Table 4.1 and Table 4.2.

The western hot winds blow particularly in the months of June and July. Infrequent dust storms also blow during the hot season. The northern winds blow during winter season. The humidity increases in the summer particularly in the areas adjacent to the Put Feeder Canal.

Meteorological data from Jacobabad has been used for air dispersion modelling. This data will be representative of climatic conditions prevailing within the project area and its surroundings.

The temperature remains high during the months of May, June, July and August and sometimes reaches up-to 50°C.

Table 4.1 Summary of Mean Temperature, Precipitation & Relative Humidity for Jacobabad

Month/Year	Mean Temperature (⁰ C)										Precipitation (mm)					Relative Humidity (%)				
	Maximum					Minimum														
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2004	2006
January	23.9	24.2	22.5	21.3	22.5	7.7	8.5	9.6	8.3	6.6	1.0	Trace	13.4	0.0	Trace	75.0	80.0	76.0	74.0	64.0
February	25.7	25.6	27.8	21.2	29.1	9.9	12.2	12.6	11.2	14.2	5.0	19.2	0.0	22.0	Trace	71.0	74.0	73.0	73.0	74.0
March	33.3	31.4	36.3	30.4	31.1	17.0	17.1	18.2	18.3	16.8	5.6	2.0	0.0	5.1	8.0	64.0	61.0	58.0	76.0	72.0
April	40.5	39.3	41.3	37.6	39.4	22.9	23.3	24.3	21.3	23.1	Trace	0.0	0.0	0.0	2.0	53.0	49.0	48.0	57.0	49.0
May	46.6	43.6	44.5	42.0	46.0	28.8	27.2	28.1	26.9	29.5	0.0	Trace	0.0	6.3	0.0	51.0	42.0	48.0	52.0	56.0
June	45.7	46.0	44.2	44.7	43.8	31.0	30.4	30.2	30.5	29.9	0.0	0.0	1.4	Trace	Trace	66.0	69.0	59.0	60.0	56.0
July	41.3	38.0	39.9	39.8	41.5	29.0	29.3	29.5	30.0	30.8	0.0	134.8	5.0	15.0	2.0	77.0	83.0	73.0	72.0	71.0
August	38.0	37.5	38.3	37.7	37.5	28.1	29.0	29.2	28.2	29.1	0.0	54.0	5.0	3.4	18.5	76.0	82.0	74.0	77.0	79.0
September	36.3	36.0	36.4	36.7	36.7	26.6	26.8	26.1	27.4	27.6	0.0	0.0	0.0	10.0	24.0	79.0	87.0	79.0	77.0	81.0
October	35.8	35.2	33.0	34.8	34.7	20.7	20.5	20.2	21.6	24.3	0.0	0.0	0.8	0.0	0.0	81.0	86.0	74.0	79.0	80.0
November	30.4	29.7	30.9	30.3	29.5	15.1	13.1	14.4	15.4	16.9	2.0	Trace	0.0	0.0	0.7	77.0	76.0	76.0	68.0	80.0
December	25.3	24.8	25.4	25.1	22.5	9.9	9.3	9.7	7.1	10.9	3.5	0.0	24.0	0.0	39.0	74.0	75.0	72.0	77.0	82.0
Annual Avg.	35.2	34.3	35.0	33.5	34.5	20.6	20.6	21.0	20.5	21.6	17.1	210.0	49.6	61.8	94.2	70.3	72.0	67.5	70.2	70.3

Note:

N.R: Not Recorded

Trace: Rain fall amount less than 0.1 mm

Table 4.2 Summary of Mean Temperature, Precipitation & Relative Humidity for Sibi

Month/Year	Mean Temperature (⁰ C)										Precipitation (mm)					Relative Humidity (%)				
	Maximum					Minimum														
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2004	2006
January	24.5	24.7	22.4	20.8	23.0	7.7	7.5	7.9	8.1	5.6	0.0	5.6	23.8	8.4	0.0	66.0	68.0	69.0	72.0	61.0
February	25.5	25.5	28.2	20.3	30.4	10.1	10.8	11.1	10.4	13.7	0.7	17.3	0.0	64.9	11.2	56.0	64.0	58.0	79.0	68.0
March	33.5	31.4	36.7	28.8	31.3	17.1	16.4	18.1	17.6	15.6	1.0	4.0	0.0	110.0	22.9	54.0	46.0	41.0	80.0	64.0
April	40.6	40.0	41.1	36.1	39.4	25.1	22.8	26.1	21.3	22.8	0.0	0.0	0.0	0.0	3.1	37.0	33.0	28.0	55.0	46.0
May	47.6	43.0	44.5	40.9	45.8	30.3	27.4	29.8	26.4	30.2	0.0	10.5	0.0	4.2	0.0	36.0	32.0	33.0	44.0	44.0
June	47.1	46.7	45.8	45.0	44.5	32.8	N.R	31.1	31.1	30.7	0.0	2.0	12.0	0.0	0.0	47.0	34.0	49.0	49.0	46.0
July	44.0	40.7	42.9	42.0	44.0	31.2	N.R	30.4	31.0	32.0	0.0	60.5	0.0	10.5	10.3	57.0	67.0	57.0	71.0	60.0
August	41.4	39.7	42.1	40.4	39.3	29.1	N.R	30.3	29.5	27.8	3.4	51.0	Trace	50.4	80.7	63.0	71.0	65.0	75.0	72.0
September	40.1	39.0	40.4	40.2	40.0	26.9	N.R	26.4	27.7	27.1	0.0	14.0	0.0	26.0	0.0	64.0	65.0	63.0	72.0	64.0
October	37.4	37.2	34.4	37.1	37.0	19.7	19.2	18.3	20.8	22.9	0.0	0.0	0.0	0.0	0.0	55.0	54.0	60.0	65.0	70.0
November	31.4	30.5	31.6	31.3	29.7	14.3	12.3	8.7	13.7	14.7	0.0	0.7	Trace	0.0	2.0	58.0	48.0	65.0	56.0	70.0
December	26.2	26.2	26.3	26.4	23.1	8.2	7.2	N.R	5.4	8.3	4.6	0.0	21.0	0.0	39.5	57.0	58.0	61.0	64.0	80.0
Annual Avg.	36.6	35.4	36.4	34.1	35.6	21.0	-	-	20.2	20.9	9.7	165.6	56.8	274.4	169.7	54.2	53.3	54.1	65.2	62.1

Note:

N.R: Not Recorded

b: Rain fall amount less than 0.1 mm

4.3.2 Air Quality

The region in which the bypass is situated is predominantly flat and semi-arid, although irrigation has been introduced to provide water to enable crops to be grown. The immediate vicinity of the bypass is sparsely populated. Emission from the existing power plant operations and the vehicular exhaust emissions from the national highway (N-65) may be considered as the significant sources of ambient air pollution in the project area.

As part of study, air quality monitoring was carried out during the EIA field visit. For establishing baseline ambient air quality conditions, two monitoring sites were selected and ambient air samples were collected from:

- 1 At the start of Project Area
- 2 Near Uch Power Plant

Sampling locations were selected in areas with extensive settlements and at sensitive locations. Samples were taken at downwind side and from 5 – 10 metres from the edge of the road. Monitoring results of ambient air quality parameters are Summarize in Table 4.3 and details are given in **Annexure - A**.

Table 4.3 Summary of Monitoring results of Ambient Air

Location	SO ₂	NO	NO ₂	PM ₁₀	CO
	8 hourly	8 hourly	8 hourly	8 hourly	8 hourly
At start of Project Area	76	39.5	38.9	110	4
Near Uch Power Plant	118	39	76	148	9.12

Note: Units are ($\mu\text{g}/\text{m}^3$)

4.3.3 Noise

There is no continuous major source in the project area. Intermittent sources include farm tractors, farm equipment, road and rail traffic. Considering the nature of these noise sources, it can be concluded that noise pollution in the area is low. Table 4.4 presents the average noise levels recorded at different locations. Average values for the section are all well within the NEQS i.e. 85 dB(A). However, these values may reach excessive levels in areas where new construction will be initiated and also during operation when traffic levels reach operating design volumes. Details are given in **Annexure – A**.

Table 4.4 Average Noise Levels at Various Locations

S. No.	Source/Location	Avg. Noise Level dB(A)
1	At start of bypass	58.67
2	At RD 06+000 Km	57.95
3	At end of bypass	57.95

4.3.4 Surface Water and Ground Water

The Indus River and its associated canals and water courses form the largest irrigation system in the world. One of its associated canals is Put Feeder Canal which originates from the right bank of River Indus at Guddu Barrage and crosses N-65 at Dera Murad Jamali. Put Feeder Canal is the only perennial surface water channel in the project area. Some seasonal streams also originate from the Dera Bughti hills. These streams flow during rains, but with limited flows.

Nasirabad District is irrigated by the Put Feeder Canal. The total length of the canal is 171 km and has a present design discharge of nearly 190 m³/s (6700 cusecs). The canal serves cultivated command area (CCA) of about 458,425 hectares. The canal is perennial except for a closure/ maintenance period of about one month. The land is also irrigated by tubewells.

The quality of Put Feeder Canal is generally good as the water is used for irrigation and domestic purposes. In order to evaluate the water quality, surface water samples were collected from Put Feeder Canal near Dera Murad Jamali. Summary of water test results are given in Table 4.5 And details are presented in **Annexure – A**.

Table 4.5 Summary Of Water Test Results

Sr. No.	Parameters	Method	Unit	Test Results		Guideline Values
				Put Feeder Canal	Drinking Water	NEQs
1	Temperature	-	⁰ C	20	20	-
2	pH @25 ⁰ C	APHA-4500H ⁺ B	-	8.3	8.4	6-9
3	Total Suspended Solids (TSS)	APHA-2540 D	mg/L	65	-	200
4	Total Dissolved Solids	APHA-2540 C	mg/L	235	310	3500
5	Chlorine, Residual	APHA-3500C G	mg/L	0.12	0.03	1
6	Chromium (Cr)	ASTM-D1687	mg/L	0.04	-	1
7	Copper (Cu)	ASTM-D1688	mg/L	0.22	0.04	1
8	Zinc (Zn)	ASTM-D1691	mg/L	0.06	0.01	5

Large aquifer sources of groundwater underline the Indus basin. They form an important source of water supply throughout the Project Area with the use of tube wells, motorised pumps and hand pumps. Groundwater in the Indus Basin is, however, of variable quality and tends to be non-saline only near the surface water bodies. Water is generally saline. Aquifers are recharged by means of seepage during flood season. The depth of groundwater table varies from 8 metres to 15 metres in the project area.

4.3.5 Topography and Geology

Geographically, district Nasirabad comprises of flat plain area with no hilly or mountainous features. The area is formed of alluvial soil and has slopes from north to south with a ground elevation of 50 - 170 meters above sea level. It has been a part of Kachhi basin (plain).

The soil of Nasirabad district comprises silt, clay, silt loam, clay loam, and sandy loam. On the basis of the soil reconnaissance, soil in the command area (irrigated by canals), constituting the largest area of Dera Murad Jamali sub-division, can be classified as sandy and loamy soil. It is more loamy soil in dense agricultural field. In the Chattar sub-division, the area is sandy and clay loam.

4.3.6 Seismicity

According to the seismic zone map of Pakistan, the Project Area (District Nasirabad) lies in Zone 2B and Zone 3.

4.4 BIOLOGICAL ENVIRONMENT

During the site visit of the project area, the sampling locations were randomly selected, ensuring that sufficient locations are sampled for each habitat and the maximum number of species belonging to each habitat is identified.

The project area is located outside any conventional protected area (national park, wildlife sanctuary or game reserve) declared under the Baluchistan Wildlife Protection Act, 1974.

4.4.1 Flora

The project area is characterised by low rainfall, high summer temperatures, poor soil and low diversity of plant species. This type of climate hardly supports any appreciable vegetation. However, irrigation system introduced in the project area has altered the ecological conditions of this area.

In general the native vegetation is xerophytic, sparse and of low economic value. The primary natural influence on the vegetation is the low rainfall. The common vegetation species recorded in the project area and adjoining areas are listed below in Table 4.6.

Table 4.6 Floral Species Observed During the Site Visit in Project Area

Family Name Plant Specie	Local Name	Life-Form	Life-Span
Cyperaceae			
Cyperus rotundus	Kabuh	Sedge	Perennial
Cyperus specie		Sedge	Perennial
Poaceae			
Cynodon dactylon	Chhabar	Grass	Perennial
Dactyloctenium aegyptium	Gandheer Gaah	Grass	Annual
Desmostachya bippinata	Drabh	Grass	Perennial
Eragrostis minor	Makhni Gaah	Grass	Annual
Ochthochloa compressa	Gandheer Gaah	Grass	Perennial
Oryza sativa	Saari	Grass	Annual
Panicum antidotale	Jhim	Grass	Perennial
Phragmites karka	naaro	Grass	Perennial
Saccharum bengalense	Booro	Grass	Perennial
Setaria ipalica	Bajari	Grass	Annual
Sorghum bicolor	Jowar	Grass	Annual
Triticum aestivum	Gandum	Grass	Annual
Veazea nays	Makae	Grass	Annual
Aizoaceae			
Limeum indicum	Dhoor Chhapri	Herb	Annual
Zelya petandra	Wasanh/Waho	Herb	Annual
Asclepiadaceae			
Calotropis procera	Ak	Shrub	Perennial
Asteraceae			
Conyza canadensis	Gidar Buti	Herb	Annual
Eclipta alba	Daryi Booti	Herb	Annual
Heliantbus annuus	Sooraj Mukhi	Shrub	Perennial
Launaea procumbens	Bhattar	Herb	Perennial
Xanthium indicum	Bhurt	Shrub	Annual
Boraginaceae			
Cordia myxa	Lesuro	Small tree	Perennial
Heliotropium europeum	Uth Charo	Herb	Annual
Capparidaceae			
Cleome scaposa	Khathoori	Herb	Annual
Chenopodiaceae			
Saueda nudiflora	Lano	Sub-shrub	Semi-perennial
Saueda fruticosa	Lani	Sub-shrub	Semi-perennial
Convolvulaceae			
Cressa cretica	Oin	Herb	Annual

Family Name Plant Specie	Local Name	Life-Form	Life-Span
Convolvulus arvensis	Naro	Climbing herb	Annual
Cucumis melo	Mitero	Prostrate herb	Annual
Euphorbiaceae			
Euphorbia birta	Kheer Wal	Herb	Annual
Fabaceae			
Albaji maurorum	Kandero	Sub-shrub	Perennial
Dalbergia sisso	Taari	Tree	Perennial
Liliaceae			
Allium cepa	Peyaz	Herb	Annual
Malvaceae			
Abutilon indicum	Pat Teer	Shrub	Perennial
Mimosaceae			
Acacia nilotica	Sindhi Babur	Tree	Perennial
Albizia lebbeck	Sarianh	Tree	Perennial
Prosopis cineraria	Kandi	Tree	Perennial
Prosopis juliflora	Devi	Shrub	Perennial
Molluginaceae			
Glinus		Herb	Perennial
Rhamnaceae			
Zizyphus mauritiana	Jhangoori Ber	Shrub	Perennial
Solanaceae			
Lycopersicom sesculeupum	Tamator	Shrub	Annual
Solamun melonjina	Wagan	Shrub	Annual
Solanum surattense	Kanderi Wal	Sub-shrub	Annual
Tamaricaceae			
Tamarix aphylla	Lawo	Tree	Perennial
Tamarix indica	Laie	Large shrub	Perennial
Verbenaceae			
Phyla domingenensis	Pan	Rush	Perennial
Typha elephantina	Pan	Rush	Perennial
Zygophyllaceae			
Fagonia indica	Dramaho	Herb	Annual
Fagonia bruuieri	Dramaho	Herb	Annual



Calotropis procera



Tamarix indica



Albaji maurorum



Prosopis juliflora





Some of the photographs of existing flora in project area

4.4.2 Fauna

The fauna of Dera Murad Jamali predominately belongs to Palaearctic zoogeographical region. However, some avian species of Oriental region are also noticed here. Table 4.7 shows list of birds, mammals and reptiles observed during the site visit in the project area.

Table 4.7 List of Birds, Mammals and Reptiles Observed during the Site Visit in the Project Area

Sr. No.	Common Name	Scientific name
Birds		
1	Black Crowned Finch Lark	Eremopterix nigriceps
2	Black Kite	Milvus migrans
3	Blue Rock Pigeon	Columba livia
4	Cattle Egret	Bubulcus ibis
5	Common Myna/ Indian Myna	Acridotheres tristis
6	Desert Wheatear	Oenanthe deserti

Sr. No.	Common Name	Scientific name
7	Hoopoe	Upupa epops
8	House Crow	Corvus splendens
9	House Sparrow	Passer domesticus
10	Hume's Wheatear	Oenanthe alboniger
11	Pied Bushchat	Saxicola caprata
12	Pied Kingfisher	Ceryle rudis
13	Purple Sunbird	Nectarinia asiatica
14	Red-vented Bulbul	Pycnonotus cafer
15	Red-wattled Lapwing	Hoplopterus indicus
16	White-breasted Kingfisher	Halcyon smyrnensis
17	White-cheeked Bulbul	Pycnonotus leucogenys
18	White / Pied Wagtail	Motacilla alba
Mammals		
19	Asiatic Jackal	Canis auris
20	Five Stripped Palm Squirrel	Funambulus pennant
21	Indian Desert Jird	Meriones hurrionae
22	Indian Gerbil	Tatera indica
23	Long-eared Hedgehog	Hemiechinus auritus
24	House Mouse	Mus musculus
25	Little Indian Field Mouse	Mus booduga
Reptiles		
26	Brilliant Agama	Trapelus (Agama) agilis isolepis
27	Indian Monitor	Varanus bengalensis
28	Saw Scaled Viper	Echis carinatus
29	Glossy Bellied Racer	Coluber ventromaculatus
30	Garden Lizard	Calotes versicolor



Flock of little egret at Put Feeder Canal



Indian Pond Heron



Bay Backed Shrike



Black Drongo

4.5 SOCIAL ENVIRONMENT

This section deals with the social conditions of the project area. During the desk/ office study, available reports/ documents were comprehensively studied. During the field survey consultation with the residents, shopkeepers, pedestrians and drivers were carried out and observations were taken after giving due consideration to the desk study results.

4.5.1 Social Organisation

Social organisation in the area is tribal. Tribe is the major entity which provides identity, security and rights to individuals and families and who in return sow their allegiance to their leader. A tribe is a segmentary organisation of kinship groups consisting of many lineages and each lineage consisting of many agnatic groups. Each agnatic group has its own leader, who is also the village headman and is consulted for conflict or dispute resolution. Every lineage has one leader, who is recognised by all of the constituent agnatic groups. The jurisdiction of the tribal leader is extended to all areas inhabited or controlled by his tribe, and also to other smaller tribal groups or lineages in the area.

The District Nasirabad is subdivided into 4 Tehsils and 24 Union Councils.

4.5.2 Demographics Characteristics of the Project Area

According to the Census of 1998, the reported population of district Nasirabad was 245 thousand and the designated annual growth rate was calculated to be 3.86%. The population growth is moderately high as compared to other districts of Baluchistan. Between the Censuses of 1961 and 1972, the population annual growth increased by 6.3%, between 1972 and 1981 it increased to the highest level of 13.6% and between 1981 and 1998 a massive decrease was observed in the population growth rate, where it went down to 3.86% in 1998. By applying the annual growth rate (3.86%) of Census 1998, the projected population in 2016 is estimated to be 485 thousand.

The total area of the district is 3,387 square kilometers, which gives population density of 73 persons per square kilometer in 1998 and population density of 144 persons per square kilometer in 2016 indicating a fast growth rate of the district.

Dera Murad Jamali covers an area of 1,986 km². The total population of Dera Murad Jamali is 157,429, out of which 82,627 are males and 74,802 are females according to the housing census of 1998. According to the 1998 census, the male-female ratio is 1.10:1 i.e. there are 110 men to every 100 women.

Table 4.8 gives population and annual growth rate since 1951 of district.

Table 4.8 Population and Growth Rate of District Nasirabad

Description	1951	1961	1972	1981	1998
Population (in 000's)	n/a	n/a	n/a	128	246
Average Annual Growth Rate (%)	-	-	6.3	13.6	3.86

Source: Nasirabad District Development Profile 2011

A. Rural and Urban Distributions

Over the period of time, the urban population has a low proportion in the total population close to 16% in Census of 1998, whereas it was reported high (27%) in Census of 1981. Majority of the population in Nasirabad district lives in rural areas (about 84%). According to the 1998 Population Census, female population has equal portion in both rural and urban population i.e., about 47%. A narrow difference between gender ratio among the genders was noticed both in the rural and urban areas.

The local government institutions in urban areas of district Nasirabad include the Municipal Committees, headed by chairman and ward members and their size depend on the number of people living in the area. The Government is represented by one Chief Officer, who assists the chairman and members in routine working. There is a special representation of women, peasant/workers and minorities in the district.

B. Religion

There is 99% Muslim population and 1% Non-Muslim Population. The majority of people living in Nasirabad district belong to the Sunni sect of Islam. The Shia population is very small in number. They are less than one-tenth of the overall population.

C. Mother Tongue

Balochi and Sindhi are the major languages spoken in the district followed by Brahvi and Sairaki. Urdu is used as a medium of education and as means of communication between people with different ethnic backgrounds. There is also a small number of Pushto and Punjabi speaking population in the district.

D. Races and Tribes

Nasirabad District has an ethnically heterogeneous population. Major Baloch tribes of the district are Umrani, Khosa, Bijarani, Kanrani, Gajani, Nindwani, Bajkani and Jamali. Major ethnic group is the Baloch followed by Jamoot (Jat), Brahvi, Sindhi and Saraiki. Umrani is the economically and politically influenced Baloch tribe: speaks Sindhi and Balochi.

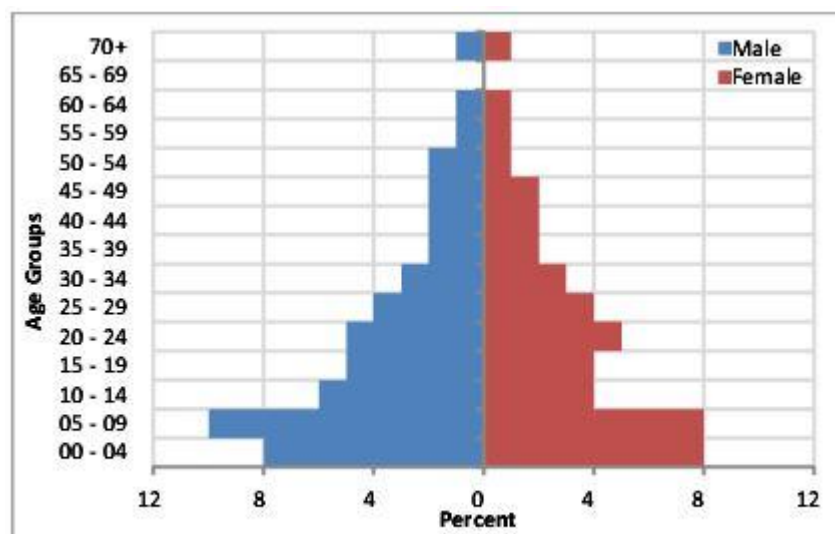
E. Sex Ratio

Number of males for every 100 females was 111 as recorded in 1981, 1998 Census in the district. The ratio is projected to 111 per 100 females for 2010.

F. Marital Status

As per projected data for 2010, 19 percent of the total population was never married, 77 percent married, 4 percent widowed/divorced. About 86% of the women of reproductive age (15-49 years) were married, and of these married women, 81% had children.

Graph below shows percentage of population by Age and Sex.



(Census, 1998)

Source: Nasirabad District Development Profile 2011

4.5.3 Economic Conditions

Economy of the project area is dependent primarily on two occupations i.e., agriculture (maximum) and livestock (limited extent).

A. Agriculture

Agricultural activity in the project area started after the construction of Put Feeder Canal in 1970, the activity emerged in the immediate vicinity of the Canal. The entire area around the bypass is now cultivated by irrigation supplies from Put Feeder Canal and Rabi Canals. This indicates the importance of the agricultural sector in the project area. The existing standards and the management levels of agriculture in the project area are very low. As a result the present subsistent agriculture does not produce enough to meet the food and financial requirements of the farm population.



Put Feeder Canal at Dera Murad Jamali

B. Livestock

Livestock is an important asset for the poor, particularly the landless and farmers. In the project area, the communities near flocks of goats, cows and sheep for commercial reasons and donkeys for water collection.

In the livestock management, the entire family participate except for those keeping large herds, which employ wage paid workers on monthly wages fixed for cow and goat/sheep.

4.5.4 Communications

Railways

The length of railway track is 39 kilometers and there are three railway stations: Notal, Mangoli and Dera Murad Jamali in Nasirabad. The regular stop for passengers express trains is at Dera Murad Jamali. Nasirabad has a place for helicopter landings but there is no regular airway service. The nearest airport is in Jacobabad (35 km).



Railway Track at Project Area

Roads

As compared to other provinces, Baluchistan has low road density. Though much of the Public Sector Development Programs' yearly allocations have gone to road sector, situation on ground till doesn't look much promising. The investment appears to have not produced the desired results due to two main reasons: (i) very large area and improper selection of roads for construction keeping in view requirement of its productive sectors, (ii) poor quality construction that lasts hardly a few years. Black topped road density per square kilometer is 0.12 and that of shingle is 0.07. The total length of roads in Nasirabad is 664 km, out of which, 413 km is black topped road (metalled road). Major portion of the total roads comprises of metalled roads. Length of shingle roads remained stagnant at 252 km. The condition of the shingle roads is also not good. Many of them are neither flat nor covered with rounded pebbles. The table given below gives the length of various roads in District Nasirabad.

Table 4.9 Road Type and Length

Length by Surface Type	(Kilometer)		
	Black Topped	Shingle	Total Length
2002	490	252	742
2010	413	251	664

4.5.5 Educational Facilities

The District Education Department is headed by a District Education Officer (DEO) supported by two District Officers (a male and a female each), Deputy District Officers and Assistant District Officers (ADOs), who maintain close contact with the (head) teachers. According to official statistics collected through Annual School Census, the overall student population in 434 public primary, middle and high schools is 28,934, whereas, 647 students were enrolled in colleges, of which, 565 were boys and 82 were girls. As per BEMIS school census 2009-10, there are 399 primary schools (270 male and 129 female), 21 middle schools (15 male and 6 female), 14 high schools (13 male and 1 female) and 1 Degree College (male only) in government sector. Table 4.10 shows enrolment in government schools by gender and level.

Table 4.10 Enrolment on Government Schools by gender and Level-Year wise

Institute Type	2004-05			2009-10		
	Male	Female	Total	Male	Female	Total
Primary Section	13,380	6,268	19,648	17,912	7,595	25,507
Middle Section	1,447	368	1,815	1,825	482	2,307
High Section	572	141	713	917	203	1120
Inter Colleges	232	0	232	0	0	0
Degree Colleges	0	0	0	565	82	647
Total	15,631	6,777	22,408	21,219	8,362	29,581

Source: Nasirabad District Development Profile 2011

4.5.6 Health Facilities

The highly subsidized public healthcare system is major provider of curative and preventive care services to the local population. The health facility infrastructure in District Nasirabad includes: 1 Hospitals, 3 Rural Health Centres (RHCs), 14 Basic Health Units (BHUs), 9 Civil Dispensaries (CDs), 3 Maternal and Child Health Centres (MCHCs) 1 TB Clinic, 1 School Health Unit and 1 Health Auxiliary unit. There are 50 beds out of which 30 are present in RHCs. The community visits the District Head Quarter (DHQ) hospital and nearest BHU and the government clinic and private clinic at Dera Murad Jamali.

Apart from the above health facilities, there is one non-functional Basic Health Unit and two under construction health facilities (1 CD and 1 MCH Centre) in the district. Moreover there is also a jail dispensary. The public-sector healthcare system suffers from governance, funding, staffing and resource limitations.

4.5.7 Social/ Impact Assessment Survey of Project Area

A social/ impact assessment survey was carried out in the project area to identify the impacts and their magnitudes on the affected population. Efforts were made to consult maximum number of stakeholders, which included shop keepers, residents, pedestrians and drivers, etc. The purpose of this survey was to get response about the perceived impacts and preferences towards the project implementation. Efforts were made to include the majority of the population in the sample and contact the maximum population during the survey.

Survey Results

The findings of the social survey are described below;

- Most of the people of the project area were found to be aware of the need of the project considering the situation of traffic congestion at Dera Murad Jamali;
- Majority of the respondents contacted favoured the construction of the Bypass but at the same time demanded the fair and transparent compensation of their lost properties;
- The average working hours of the shop keepers were reported from 8 to 10 hours daily;
- Majority of the respondents contacted were between the age groups of 25 to 30 years, to be mature enough to give some response about the project implementation;
- Most of the respondents interviewed were associated with the profession of shop keeping running their shops in Dera Murad jamali during the day hours;
- The average household size was reported between 6 to 7 persons per household depending upon the number of family members living together;
- Disturbance of business, access problem for the customers, dust and noise problems were identified as the major problems during the project implementation; and
- The main protective measures suggested by the respondents include the timely completion of the project, regular sprinkling of water at the construction site to control the dust emissions and proper compensation of the lost assets.

SECTION 5

PROJECT ALTERNATIVES

5.1 GENERAL

It is very important to evaluate different alternatives to arrive at the best possible option. Different alternatives that were evaluated are briefed as follow:

5.2 NO PROJECT

According to the Traffic Projection Survey it is estimated that in the future years more and more people will be using the N-65. Without the Project bypass the existing road from Sukkur to Quetta (N-65) will continue to be the main transportation corridor in the area. Traffic volume on the existing N-65 (National Highway) is anticipated to increase with the passage of time, as indicated from the traffic projection survey.

Traffic congestion is expected to increase in the future and road conditions are expected to deteriorate due to ever increasing traffic volume.

Therefore, the “No Project” conditions will result in further worsening of the present environmental conditions and increased disturbance to residents of the area and the road users. Socio-economic conditions will also deteriorate due to lack of proper link between Sindh and other provinces. The effect of “no build” alternative for N-65 would therefore result in longer travelling times and accidents due to the shorter width of the existing road.

5.3 ALTERNATE TRANSPORT MODES

The alternate transport modes include railways, air travel and other access roads. Air access from Sukkur to the other parts of the country is already available and the people of Dera Murad Jamali and surrounding areas use N-65 for access to the Sukkur Airport. Rail track bound for Karachi and Quetta already passes along the road but this option cannot be considered as an alternate keeping in view the traffic pattern and connectivity with surrounding areas.

5.4 IMPROVEMENT OF EXISTING CARRIAGEWAY

In terms of the movement of people and goods, road transportation facilitates majority of travellers in the Project Area. Further improvement of the road system will enhance economic development by providing reliable corridor for the movement of goods and

passengers to and from other provinces. For this and other reasons, the implementation of the Project is the only viable solution for reducing traffic congestion and providing safe and good quality route for movement of people and goods. Different options for the proposed route were examined as discussed below:

- (i) Improve the existing road with the same alignment by widening on both sides
- (ii) Upgrade the existing 2 lane road into 4 lane dual carriageway by extending on both sides from centreline of the existing road; and
- (iii) Construct a bypass around the Dera Murad Jamali city

The most feasible option was selected by considering following factors:

- Potential environmental and social impacts;
- Capital and recurrent cost;
- Environmental mitigation costs and benefits.

The third option was selected by considering the above mentioned factors and the bypass will be constructed. This alternative has the advantage of enhanced safety during construction and operational stages, and less disruption to the passing traffic during construction. It will also minimise resettlement of structures, trees and other utilities. Provision of new bypass at Dera Murad Jamali will facilitate the traffic. Its merits are discussed in section 5.5 hereafter.

First option was rejected because of the disturbance to the moving traffic during construction. Also there will be more disturbances to the people living in the vicinity of the project area if construction on both sides is initiated simultaneously.

Second option was not selected due to the increased resettlement of structures, trees and other utilities. In this case project cost will also increase, which will be an unnecessary burden on the national exchequer.

5.5 PROVISION OF BYPASS AT DERA MURAD JAMALI

Bypasses are used to either shorten the travelling time on the highway route or to specifically reroute traffic away from the existing cities/towns and commercial areas to provide safety to the citizens living in the cities/towns. NHA has decided to provide a bypass around Dera Murad Jamali so that the traffic moving between Sukkur and Quetta can move without any hindrance. Traffic projection survey shows that traffic on this important route will increase in the coming years. Provision of the bypass will also facilitate the residents of Dera Murad Jamali who are vulnerable due to the passing of high traffic volume within the city.

SECTION 6

PUBLIC CONSULTATION

6.1 GENERAL

This section describes the outcome of the public consultation sessions held with different stakeholders that may be affected by the proposed project. Public consultation is a mandatory part of the EIA process for development projects. The adequacy of the public consultation and information disclosure is one of the basic criteria used to determine the project compliance with the national / international safeguard policies.

The consultation process was carried out in accordance with the requirements of Pakistan Environmental Assessment Procedures. The objectives of this process were to:

- a) Involve all stakeholders, especially Project Affected Persons (PAPs), in the consultative and participative process;
- b) Share information with stakeholders on the design and construction of the proposed project and anticipated impacts on the physical, biological and socio-economic environment of the proposed project area;
- c) Understand stakeholders' concerns regarding various aspects of the project, including the existing available facilities and problems, construction of the proposed project and the likely impacts of construction and operation related activities of the proposed project;
- d) Understand the perceptions, assessment of social impacts and concerns of the Project Affected Persons (PAPs) / communities in the vicinity of the proposed project;
- e) Provide an opportunity to the public in the public consultation session to provide valuable suggestions for the project design in a positive manner; and
- f) Reduce the chances of conflict through the identification of controversial issues, and consult them to find up to standard solutions.

6.2 IDENTIFICATION OF MAIN STAKEHOLDERS

Stakeholders are those who have a direct or indirect interest in project development, and who will be involved in the consultative process. During the field survey, significant efforts were made to contact maximum household residing and shop owners running their business within the proposed ROW of the project to identify the possible categories of direct stakeholders and their stakes. The stakeholders identified during field survey are the Project Affected Persons (PAPS) which consist of private land and structure (shop) owners, shopkeepers (renters), local residents, pedestrian, factory owners, school and hospital management, travellers and drivers. All the stakeholders had different type of stakes and apprehension according to their professions and were listed down along with their apprehensions.

a) Consultation and Participation Process

For ascertaining the perceptions of different stakeholders about the project (during construction/operation) consultation meetings were held with them. These meetings were held in an open atmosphere, in which participants expressed their views freely. Informal group discussions and gender consultation meetings were also held, as an additional tool for the assessment of the perceptions of the stakeholders.

b) Methods of Public Consultation

Public Consultation was carried out in order to establish stakeholder's opinion regarding project implementation. The following methods were used for public consultation with project stakeholders.

- Scoping Sessions
- Formal Meetings
- Informal Group Meetings

c) Categories of Stakeholders Contacted

The contacted stakeholders belonging to different categories are shown in Table 6.1.

Table 6.1 Stakeholders Contacted in the Project Area

Sr. No.	Stakeholder Category
1	PAPs (private land & shop owners)
2	Shopkeepers (renters)
3	Local residents
4	Pedestrians
5	Drivers / Travellers
6	Hospitals
7	Factory owners
8	Schools
9	Students

d) Major Stakeholders and their Apprehensions

During socioeconomic baseline survey, among all stakeholders some major stakeholders were identified in the proposed project area. Plate 6.1 shows the Interviews, and informal group discussions with the stakeholders. The following Table 6.2 contains the list of major stakeholders and their apprehensions.

Table 6.2 Major Stakeholders and their Apprehensions in the Project Area

Sr. No.	Stakeholders	Apprehensions
1	PAPs	PAPs (legal title holders of land & structures) will lose their land and shops due to land acquisition for the proposed project, which will ultimately result in permanent physical and economical displacement of the PAPs, loss of business, family disturbance
2	Shopkeepers (renters)	Permanent economical displacement, noise, air pollution, odour issue, access problem for customers, reduction in number of customers and income during construction, disturbance of utilities, security/ safety issues, loss of business, family disturbance
3	Hospitals	Noise, air pollution, dust, access problem for patients and doctors, reducing the number of patients, discomfort for the indoor patients, issue of parking of vehicles, disturbance of utilities, security/ safety issues, business decline.
4	Schools & colleges	Noise, air pollution, dust, access problem for the students & teachers, issue of parking of vehicles in the peak hours, disruption of utilities, safety issues & disruption in the classes & studies.
5	Local Residents	Dust and noise pollution, privacy / safety issues, disturbance of utilities, traffic and lightening associated with construction activities on the residents living near the project area that can cause disturbances and stress, disturbance in movement.
6	Pedestrians	During construction period pedestrians will face difficulties while walking to nearby places existing in the vicinity of proposed project area
7	Drivers / Passengers	During construction period passengers will face difficulties while travelling, wastage of time and fuel



Plate 6.1 Interviews and Group Discussions with Stakeholders

6.3 CONSULTATION MEETINGS AND FORMAL AND INFORMAL GROUP DISCUSSIONS

Consultation meetings and informal group discussions regarding project impacts and their probable mitigation measures were held with the PAPs (private land and shop owners), local residents, shop keepers (renters), pedestrian, passengers, management of District Headquarter Hospital Dera Murad Jamali and Al-Huda Public School.

Generally, it was found during the consultation process that people were already aware of the proposed project. After the meetings with PAPs and other stakeholders, majority of the respondents (95%) during sample survey showed their support for the proposed project provided that proper compensation is paid for the loss of their land and land based assets. This project will be beneficial not only for income generating activities but also good for easement to traffic which is high traffic blockage area on N-65 highway and for the development of the area.



Figure 6.1 Group Photo with management and students of Al-Huda Public School DMJ



Figure 6.2 Discussion with Medical Superintendent of DHQ Hospital DMJ

6.4 SCOPING SESSIONS

Scoping sessions were conducted with the shop owners, shop keepers (renters) local residents, pedestrians and passengers.

PAPs demanded that they must be properly compensated for their physical and economical displacement with some additional allowances so that they could improve or at least restore their living standards up to prior level of the project.

6.5 CONCERNS / APPREHENSIONS OF THE STAKEHOLDERS

The most common suggestions proposed during the meetings are listed below:

- Commencement of the proposed project will cause permanent physical and economical displacement of the local residents residing within the proposed RoW. Local residents (affectees by land and structures) will lose their land and housing structures and will suffer from permanent physical and economical displacement that's why owners of land and structures must be compensated on the basis of current market rates.
- Local residents (affectees by land and structures) demanded that criteria of payments should be translucent and fair;
- As local residents (affectees by land and structures) are going to lose their land and housing structures so they suggested that besides compensation based on current market rates, some additional allowances should also be paid to them owing to their physical and economical displacement;
- Avoid dumping construction material openly;
- Adopt measures to minimize dust, smoke, and noise pollution, and to control spillages from construction machine;
- Waste / debris produced during the construction due to construction of the road should be disposed of properly;
- Construction site should be fenced with the corrugated iron sheets to control the noise and dust emissions and other hazards;
- Sprinkling of water should be regular in the morning, noon and evening on the daily basis;
- Utilities disturbed at the site should be restored as early as possible;
- Cutting of trees should be avoided at the maximum level;
- Efforts should be made to transplant the trees according to the available facilities;
- Proper compensation should be paid to the affectees for the loss of their properties;
- Criteria of payments to the affectees should be transparent and fair; and
- Local residents should be given priority in jobs during the construction phase;
- Increase in traffic and safety hazards will create problems to local population and surrounding communities. Accordingly, a detailed health and safety plan must be developed to mitigate the construction and operation risks of the proposed project on the local residents and surrounding communities.

6.6 MITIGATION MEASURES FOR ADDRESSING THE STAKEHOLDERS' CONCERNS

The contractors and design consultants may include the following environmental and safety provisions in the project design in order to protect the surrounding communities from the anticipated impacts of pre and post construction activities:

- Significant efforts including change in design should be adopted to minimize the physical and economical displacement of the PAPs (legal title holders of land & structures);
- Local residents should be given priority while hiring during construction and operation phase of the proposed project;
- All efforts should be espoused to save existing plantation; 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 the operation;
- Construction machinery should be placed at adequate locations away from the sensitive areas to minimize the impacts related to the dust & noise;
- Project site will be fenced with corrugated iron sheets to minimize the level of noise and dust on the surrounding areas;
- Project facilities should be located outside the existing residential areas. In order to avoid restricting the mobility of the local stakeholders, construction vehicles should remain confined within their designated areas of movement;
- The utilities to be shifted due to the implementation of the proposed project should be rehabilitated on priority basis to minimize the impacts on the stakeholders;
- NHA will make sure the payment for the acquisition of properties;
- Solid waste generated during construction at site should be disposed of safely at the waste disposal sites approved by the District Government; and
- All necessary measures should be taken to ensure the safety of traffic during construction, including barricades (including signs boards, pavement markings, flags, and lights). All such barricades will be set up to facilitate the local traffic.

6.7 OTHER STAKEHOLDERS

In addition to holding consultation meetings with communities, meetings with community and members of local and provincial government and NGOs were also deemed essential. All the stakeholders were given maximum project information verbally and were shown map of the area in detail. Their concerns and suggestions were heard which are reproduced below. A list of these stakeholders is provided in Table 5.3.

Proceedings of the meeting with DC Nasirabad and Executive District Officer (EDO) Forest & Wildlife are presented below. The rest of the meetings were mostly of the sort of information collection and dissemination.

a) Deputy Commissioner (DC), District Nasirabad

As the project area lies under the Nasirabad District, the DC was approached and the proposed project was discussed in detail.

Briefing and Discussion

The environmental specialist paid a customary visit on Dr. Muhammad Yasir Bazai at his office.

He was informed with the help of project's area map about the proposed activities. He spoke at length about the development activities in the area. He expressed some concerns regarding the projects, which are discussed below.

The contractor should employ local people during the project execution, thereby ensuring maximum project benefits for the local communities. He also emphasized on the need to provide trainings to the unskilled workers so that in future locals may also be hired for skilled jobs. He also stressed that the project alignment should pass through uncultivated land so that the land would be acquired at low cost and making project more beneficial to locals.

DC welcomed the project initiation and termed the consultation as a very meaningful and healthy activity.



Figure 6.3 View of Discussion with Deputy Commissioner Nasirabad

b) Executive District Officer, Forest and Wildlife Department Baluchistan

A consultation meeting was held with Executive District Officer of Forest and Wildlife departments, Baluchistan at his office in Dera Murad Jamali. He was informed about the proposed project. He informed that the proposed location of the plant does not fall in any wildlife protected area or protected forest and therefore the department has no objection or concern related to the project. However he suggested that the natural vegetation and wildlife in the area should be protected adopting proper mitigation measures.



Figure 6.4 Group Photo with Executive District Officer Wildlife & Forest

6.7.1 Other Meetings

Similarly consultation meetings with Sub Division Officer (SDO) QESCO (Operation), Sub Division Officer (SDO) SSGC, Secretary Market Committee, Executive Engineer Irrigation and Power Department, Sub Division Officer (SDO) C&W, Medical Superintendent DHQ Hospital and Mr. Tarra Chan (District Head of Local Minorities) were held. They were informed about the proposed activities. None of the consulted stakeholders showed any apprehension about the proposed activities. All of them raised common concerns and suggestions which were:

- The proponent should respect local cultural environment
- The proponent must give preference to the locals in employment; and
- The proponent should consider investing in social infrastructure for the locals.

6.7.2 Key Findings and Issues

- People have hopes that the proponent and its contractors would employ locals during the project. However, locals know their limitations, as they are mostly illiterate and unskilled.
- Most of the communities and to some extent the local influential people are not concerned over the environmental issues. They are mostly interested in getting maximum benefits in terms of employment, local market boom and community development programmes.
- The biggest aspiration of locals can be easily identified as ‘employment’.

Table 6.3 List of Stakeholders

Sr. No.	Stakeholder Name	Organization	Designation
1	Dr. Muhammad Yasir Bazai	District Government	Deputy Commissioner
2	Mr. Naeem Javaid	Forest & Wildlife Department Baluchistan	Executive District Officer (EDO)
3	Mr. Muhammad Waryam Manjho	QESCO (Operation),	Sub Divisional Officer (SDO)
4	Mr. Hadayat Ullah Khoso	Sui Southern Gas Company,	Sub Divisional Officer (SDO)
5	Mr. Muhammad Aslam Laghari	District Government	Secretary Market Committee
6	Engr. Ghulam Sarwar	Irrigation and Power Department	Executive Engineer
7	Engr. Muhammad Farooq Tareen	Communications & Works Department	Sub Divisional Officer (SDO)
8	Dr. Mahmood Umrani	DHQ Hospital	Medical Superintendent
9	Mr. Tarra Chan	District Government	Head of Minorities



Figure 6.5 Group photo with Sub Divisional Officer C&W Dept.



Figure 6.6 Secretry Market Committee expressing his views



Figure 6.7 Head of Local Minorities giving his remarks



Figure 6.8 A view of discussion with Sub Divisional Officer SSGC

6.8 DETAILS OF MEETINGS WITH THE STAKEHOLDERS OF THE PROJECT AREA

In addition to the previously discussed commonly raised concerns, there were certain issues at the project site which were raised by the respondents. The detailed schedule of meetings at site with the stakeholders and the issues raised by them is given in Table 6.4.

Table 6.4 Schedule of Meetings With Stakeholders, Their Concerns/Apprehensions & Suggestions

Sr. No.	Date	Time	Venue	No. of Participants	Concerns/Apprehensions Raised	Suggestions
1	7/2/2019	12:30 PM	Local Residents (Shopkeepers, shop owners, pedestrians)	15	<ul style="list-style-type: none"> • In the origination of the proposed project local residents will suffer from physical and economical displacement. • Privacy Issues were also raised by local residents during the construction of the proposed project due to the movement of labour. • Exposure of noise and dust particles will cause disturbance and health issues to the local residents throughout the construction stage due to the movement of construction machinery and transportation of construction materials. • Some respondents expressed that they do not trust on local government in terms of dealing with fair compensation. • Traffic will be congested on the access road and main road during the construction phase of the proposed project as no alternate route is available. It will be difficult for all local residents to react their designations and more time will be consumed. • Due to lack of educational attainment, majority of local 	<ul style="list-style-type: none"> • Local resident who will suffer from physical and economical displacement must be compensated on the basis of current market rate for their land and land based assets. Criteria of payments to the affectees should be translucent and fair. • As a solution labour should bound to work and stay in the designated area or camp sites. • The effects of noise and dust pollution on the local residents should be minimized by making necessary arrangements. Dust pollution should be controlled by water smattering on daily basis. • So they demanded that criteria of payments should be fair. • Proper diversion route rather than access road should be provided to minimize the traffic problems of the people during the construction stage. • Local residents should be given preference for jobs during construction and operation phase. • Solid waste produced should be properly managed and disposed in an identified designated area.

Sr. No.	Date	Time	Venue	No. of Participants	Concerns/Apprehensions Raised	Suggestions
					<p>residents are working as daily wage labour.</p> <ul style="list-style-type: none"> • Solid waste produced during construction period is a major concern of many stakeholders. • Due to the construction of the proposed project, public utilities will be disturbed. • During construction period pedestrians will face difficulties while walking to nearby places in the vicinity of proposed project area. • The project is a good step for the development of the proposed project area. • No proper educational, medical and safe drinking water facilities are available in the project area. • Increase in traffic and safety hazards will create problems to local population and surrounding communities. 	<ul style="list-style-type: none"> • Appropriate detour plan should be developed to avoid the disruption of pedestrians due to use of heavy machinery in day timings and should avoid disturbance for the local residents living in the project vicinity. • Efforts should be made to complete the construction period. • Government should provide the basic facilities like safe drinking water as well as the educational and medical facilities in the proposed project area. • Accordingly a detailed health and safety plan must be developed and implemented to mitigate the construction and operation risks of the proposed project on the local residents and surrounding communities.
2	7/2/2019	1:00 PM	Management of Al-Huda Public School	11	<ul style="list-style-type: none"> • Dust & noise problems during construction stage. • Positive impact during operation stage. • Project should be completed in-time. 	<ul style="list-style-type: none"> • Dust & noise problems during Construction stage can be minimized through water sprinkling on daily basis.

Sr. No.	Date	Time	Venue	No. of Participants	Concerns/Apprehensions Raised	Suggestions
3	7/2/2019	2:00 PM	Management of District Headquarter Hospital Dera Murad Jamali	6	<ul style="list-style-type: none"> • Traffic would be choked due to school and office hours at the Highway. • Dust & noise problem during the construction period. 	<ul style="list-style-type: none"> • Project should complete well in time. • Water should be sprinkled regularly to control the dust emission
4	8/2/2019	12:00 PM	Management of Market Committee and Terminal Manager	15	<ul style="list-style-type: none"> • Land acquisition • Dust & noise problems during construction stage. • Positive impact during operation stage. • Project should be completed in-time. 	<ul style="list-style-type: none"> • Efforts should be made to avoid land acquisition. If land acquisition is unavoidable than market based compensation should be paid; • Dust & noise problems during construction stage can be minimized through water sprinkling on daily basis.
5	8/2/2019	1:00 PM	Management of Trucking Station	6	<ul style="list-style-type: none"> • Land acquisition • Dust & noise problems during construction stage. • Positive impact during operation stage. 	<ul style="list-style-type: none"> • Efforts should be made to avoid land acquisition. If land acquisition is unavoidable than market based compensation should be paid. • Water sprinkling on daily basis. • Project should be completed in-time.

6.9 GRIEVANCES REDRESSAL MECHANISM (GRM)

Grievances Redressal Mechanism is an integral part of the proposed project planning and implementation mechanism. It aims at addressing public grievances arising from the work and work related activities. Following are the specific objectives of establishing Grievances Redress Mechanism;

- Ensure better safeguard mechanism for implementation of project;
- Resolve environmental and social grievances in the project area;
- Build up relationship of trust between the project proponent and the affected parties;
- Ensure transparency in dealing amongst stakeholders including affected parties through a proper communication mechanism.

The major objective of GRM is to establish, implement and maintain a procedure for handling environmental and social concerns of the project stakeholders and affected. The procedure will include a redressal mechanism scaled to project's identified risks and adverse impacts, focusing on stakeholders.

6.10 GRIEVANCES REDRESSAL COMMITTEE (GRC)

The project proponent will establish a Grievances Redress Committee (GRC) to facilitate resolution of complaints of the Stakeholders, Affected People (AP) and grievances relating to environmental performance of the project. The GRC will address affected people concerns and complaints promptly using an understandable and transparent process. The terms of functioning of GRC will be as follows;

- a) Provide support to the affected persons and stakeholders in solving the problems;
- b) Resolve grievances preferably on the first day of hearing or within a period of one week, in case of complicated issues may require additional time;
- c) Provide information to Project Director on serious cases at the earliest and advise on remedial measures or actions to avoid further grievances
- d) Coordinate with the Affected Person (AP) and concerned parties, getting proper and timely information on the solution worked out for his /her grievances;
- e) Study the normal occurring grievances and advise Project Director on remedial measures / actions to avoid further occurrences;
- f) Create awareness of the Grievances Redressal Mechanism (GRM) through public consultation leaflets.

GRC meetings will be held in NHA, PD Office or other locations agreed by the committee. If needed GRC members will conduct field visits to verify and review the issues at dispute.

6.11 COMPOSITION OF GRIEVANCES REDRESS COMMITTEE (GRC)

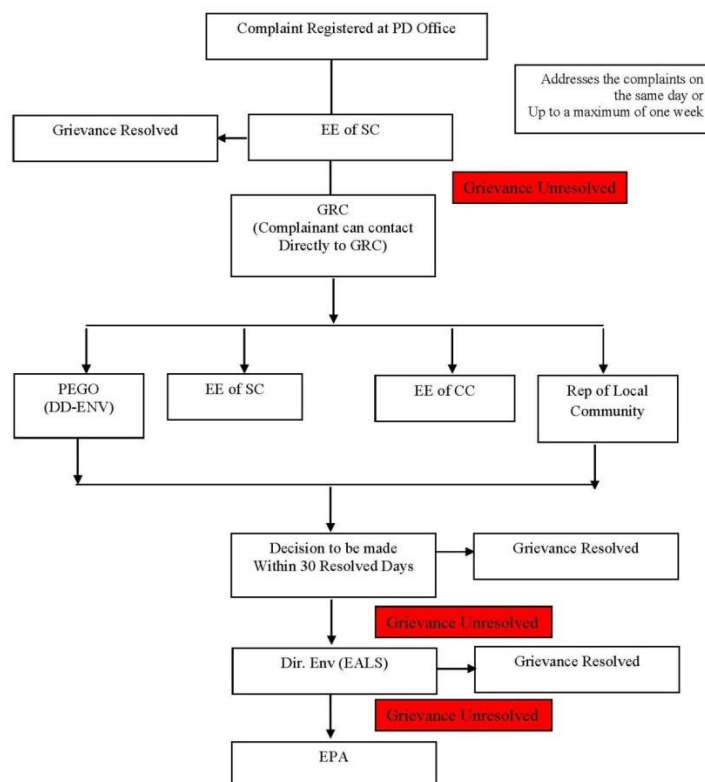
The GRC will directly work under the supervision of Director Environment (EALS). The following members are recommended to form a GRC to resolve the grievances;

- Deputy Director Environment (EALS)
- Representative of Affected persons (APs)
- Environmental Engineer of Supervision Consultant
- Environmental Engineer of Construction Contractor

Deputy Director Environment (EALS) will act as Project Environmental Grievances officer (PEGO) / Coordinator of the Grievances Redress Committee (GRC). He will review the cases on merit and address the problem in accordance with prevailing rules / procedures applicable to such grievances as per Environmental Management Plan (EMP). The PEGO will refer then refer the case to GRC for final decision, whether to update and make necessary amendment to EPM. The GRC will give its decision within 30 days of the registry of the complaint. The complainant can appeal to Director EALS who should act on the complaint / grievance within two weeks of its filing. If the Affected Person (AP) is not satisfied with the decision of redressal committee, he can request the higher authorities / relevant govt. departments for its resolution. In this regard, he may submit the complaint to Baluchistan EPA also.

The flow chart of the proposed redress mechanism is shown in Figure 6.9 on the next page:

Figure 6.9 Flow Diagram of Proposed Redress Mechanism



6.12 PROCEDURE FOR FILING THE COMPLAINT

The Affected person (AP) / stakeholder may submit an application in the PD Office for the redressal of his grievances. The PD will refer the matter to Director Environment (EALS). Director Environment (EALS) will address the grievances preferably the same day or he may take a maximum of one week to resolve the grievance. In case the grievance is not addressed within a week time, the Affected Person (AP) may take the matter to GRC.

There are several ways to approach GRC for the redressal of grievances;

- Contact the PEGO of GRC over phone apprising him of his /her grievances;
- Send an email or courier to the PEGO for taking up the matter in GRC.

GRC will investigate and review the grievance and convey the final decision to the AP. In case the grievance is not related to the project, the GRC will not process it and accordingly inform the grievant. All decision of the GRC will be conveyed to the grievant in writing.

GRC can take up any matter of project related grievances for consideration of resolution.

SECTION 7

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

7.1 GENERAL

This section identifies the overall impacts of construction/ rehabilitation works on the physical, biological and socio-economic environment of the Project Area. This assessment also includes the impact of traffic volume due to improved road conditions. In addition, it also narrates the measures that will mitigate the Project's adverse environmental effects. Following is a description of the perceived environmental impacts (positive/negative) of the Project with their proposed mitigation measures.

7.2 PROJECT CORRIDOR

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

a) Project Right of Way (ROW)

The proposed Project corridor will have a well-defined ROW that will be 60 meters. Major construction works will generally remain confined within the ROW. All the infrastructure and commercial activities within the proposed ROW need to be relocated and have direct impact of the Project.

b) Corridor of Impact (COI)

Corridor of Impact (COI) was delineated as the extent, which has direct or indirect impact of Project. Direct impacts of the Project, caused by relocation, are envisioned within the ROW and indirect impacts, caused by noise, dust emissions, camp sites and borrow sites could be beyond the ROW. After the detail site visits, Indirect Corridor of Impact (COI) was defined as area covered within 200 metres (100 metres on both sides of the Road section from its centre).

7.3 PRE-CONSTRUCTION/ DESIGN PHASE

Following is the brief description of impacts envisaged during Pre-construction/ Design phase:

7.3.1 Topography

The topography along the Project Area will change to some extent because of construction of Project related structures such as embankments, culverts etc. Visual changes to the topography will be of permanent and minor negative in nature and do not require any mitigation measures, except that the Project design should consider aesthetic concerns.

7.3.2 Land Acquisition and Clearing

The Project-impact related activities will be land acquisition and clearing of the Right of Way (ROW) that will result in disturbance to the affected residents of the Project Area. Land acquisition is mainly required for construction of Dera Murad Jamali Bypass is 671,453.6 square meter.

This impact will be permanent and moderately negative in nature and mitigation measures will involve careful alignment and route selection by the designer to minimise the impact. Also adequate budget will be provided in the Project cost for the compensation to the affected people as per Land Acquisition Act, 1894.

Dera Murad Jamali Bypass is proposed for avoiding the traffic congestion and blocking within the city due to excessive traffic movement. Its construction will not only save the travelling time but will also be beneficial to the citizens of Dera Murad Jamali City. Following are the associated merits of Dera Murad Jamali Bypass:

- Time saving due to uninterrupted traffic;
- Safety of the citizens;
- Reduction in traffic congestion;
- Reduction in noise and air pollution; and
- Motivation to the travellers for using Project.

Following are the associated demerits of Dera Murad Jamali Bypass:

- Acquisition of additional land (additional funds required for purchasing the land);
- Reduction in precious agricultural land (depletion of agricultural activities);
- Unpleasant and non-compromising attitude of the affectees unless they are properly compensated; and
- Property related issues due to division of land in two parts along the proposed Bypass.

Due to these issues, proper mitigation measures should be suggested at the Design stage so that the Bypass should be more and more beneficial.

7.3.3 Changes in Nearby Land Value

The proposed Project is expected to increase the land values, especially in areas where no road infrastructure is present i.e. villages through which Dera Murad Jamali Bypass is proposed to pass. Landowners will have an opportunity to sell their land on increased prices and start a new business.

This Impact will be a major positive in nature.

7.3.4 Flora

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

Proposed mitigation measures include the following:

- Incorporate technical design to minimise removal of roadside plantation;
- Plan for compensatory and compulsory plantation for each felled tree, 4 plants of similar floral function/type; and
- Disallow introduction of exotic species or species with known environmental setbacks (e.g. Eucalyptus, Prosopis).

7.3.5 Change in Hydrologic Regime

As the proposed Road passes through the flood prone areas, it may result in changing the hydrologic regime of the area, resulting in flood damages to local community and the proposed road. Also flood flows may damage structures or cause drainage problems in urban areas.

Possible impacts due to flood are temporary but may have significant adverse (major negative) impacts, i.e. erosion of road surface; damage to the crops, bridges etc. Mitigation measures will include:

- Provision of culverts to control flood damages and provision of safety of embankments against floods; and
- Provision of sufficient sizes of drains to take design flows.

7.3.6 Waterlogging and Salinity

Considering the problem of waterlogging and salinity proper measures in the immediate vicinity of the proposed road alignment is required because if no mitigation is provided, the road may settle at certain locations. Embankments can also weaken due to this phenomenon. This impact is permanent but moderately adverse in nature. Mitigation measures will include:

- Provide drainage culverts at suitable locations in water logged areas and
- Ensure design of pavement by considering water logged areas

7.3.7 Resettlement Issues

Resettlement of the approximate 122 affectees will cast a negative impact on their lives. They will have to shift their houses and business setups permanently. This impact is permanent and moderate negative in nature. Mitigation measures include:

- Avoiding relocation of settlements during design stage as much as possible
- Developing proper judicious compensation package for affectees

7.3.8 Public Utilities

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

- Provision in design and budget for the relocation of the existing utility infrastructures wherever required and necessary
- All public utilities (e.g. water pipes, power/ telephone lines) are likely to be affected by this bypass need to be relocated well ahead of time before the actual commencement of bypass

7.3.9 Historical/ Archaeological Places

There is no historical/ archaeological place in the vicinity of the Project ROW.

7.4 CONSTRUCTION PHASE

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

7.4.1 Topography

As a result of construction, there will be no major changes in the topography of the Project Area.

This impact is temporary and minor negative in nature. Mitigation measure for this impact is the proper landscaping, wherever required.

7.4.2 Land Acquisition and Resettlement

Due to the construction of the proposed Project, land acquisition and resettlement will occur in some part of this bypass. This will result in loss of infrastructure, livelihood and commercial activities.

This impact is permanent and major negative in nature. Mitigation measure will involve judicious compensation as per Resettlement Action Plan to be paid for relocation of properties to the displaced population. Compensation should be given before actual dislocation.

7.4.3 Borrow/ Open Pits

Potential sources of soil can be borrowed in huge quantity from Ubhan Shah near Kot Diji and Arore near Rohri.

Borrow/ open pits and its excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation.

Borrow/ Open pits may also become potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife. This will also degrade hygienic condition of the Project Area.

This impact is permanent and moderately adverse in nature. 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 should be allowed within a distance of 100 meters of the ROW.
- In borrow pits, the depth of the pits should be regulated so that the sides of the excavation will have a slope not steeper than 1:4
- Soil erosion along the borrow pit should be regularly checked to prevent/ mitigate impacts on adjacent lands;
- In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites; and
- Borrow pits can be used for sanitary landfill, but during the excavation, top 20 cm soil cover should be preserved for vegetation after the filling of the pits. This is the best way to restore the flora of that area.

7.4.4 Air Quality

Air quality may be affected from the following sources:

- Construction machinery;
- Hydrogen carbons from asphalt plants and vehicular traffic;
- Dust emissions due to wind blowing; and
- Uncontrolled burning of construction waste.

Impact of air emission may be carried over long distances depending upon the wind speed, direction, the temperature of the surrounding air and atmospheric stability.

Emissions from crushers and quarry sites can cause health impacts, i.e. coughing, flu, difficulty in inhaling, irritation in eyes and reduction in visibility. This impact is temporary and minor negative in nature.

Mitigation measures will include:

- Dust control by equipping asphalt, hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions
- Surface treating or overlaying diversion tracks with shingle, and sprinkling water across diversion tracks
- Ensuring that haul trucks carrying aggregate fill materials are kept covered with canvass sheet to help contain construction material being transported between sites
- Enforcing the NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery
- Dust mask will be provided to the workers. Proper dust collection system should be ensured at crushers and continuous sprinkling of water.

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

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

Following are the types and sources of construction waste:

- Oil, grease etc. from construction machinery
- Solid waste from extra construction material and food
- Wastewater from washing and sprinkling
- Sanitary waste from staff toilets

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

- Wastewater effluent from contractor's workshop and equipment washing yards would be passed through gravel/ sand beds to remove oil/ grease contaminants before discharging it into natural streams;
- Training of working force in the storage and handling of materials and chemicals that can potentially cause soil contamination;
- Solid Waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Sanitary wastes generating from staff and labour camps must be disposed of in environment friendly manner, i.e. Provision of septic tank etc. for toilet wastes; and
- Aggregate waste material of existing road will be reused in up-gradation of road.

7.4.6 Geology and Soil

Due to construction activities soil erosion and contamination may occur. Soil erosion may occur around roadside, contractor's camps and at embankment works as a result of unmanaged run-off from equipment washing yards, excavation of earth, cutting operation, embanking and clearing of vegetation whereas contamination of soil by oil and chemicals at asphalt plant sites, workshops areas and equipment washing yards may limit future use of lands for agricultural purposes.

This impact is temporary and moderate negative in nature. Mitigation measures will include

- Low embankments will be protected by planting Vetiver grass that can flourish in relatively dry conditions;
- The plant site/ workshop areas will be restored to the original condition. The contaminated soil will be removed and disposed at appropriate site; and
- Soil contamination by asphalt will be minimized by placing all containers in caissons.

7.4.7 Noise

Noise is one of the most pervasive environmental problems in the urban areas especially on the road side. Noise pollution will be due to increase in mobility and construction activity. However, this impact will be temporary but moderate negative in nature. All mitigation measures mentioned below 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 latest equipment and plant with reduced noise level ensured by suitable in-built damping techniques and appropriate muffling devices;
- Confining excessively noisy work to normal working hours in the day;
- Providing the construction workers with suitable hearing protection like ear cap, ear muffs etc.;
- Avoiding heavy machinery like percussion hammers and pneumatic drills, especially during night time; and
- Locating the rock crushing, concrete mixing and material shipment yards away from residential areas, particularly schools, hospitals and nursing homes.

Table 7.1 Maximum Limits of Noise Levels

Noise Level dB (A)	Situation
194	Lung damage
180	Ear drum rupture
150	Absolute limit with ears protected
150	Maximum of instantaneous noise
135	Absolute maximum with ears unprotected
100	Prolonged noise causing permanent damage
90	Factory work for an 8-hour day, 5 days a week
*85	Ear protection should be worn
80	Noise on building or construction sites
70	Normal road traffic near residential areas

Source: "Environmental Degradation" by APEX Laboratory.

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

Table 7.2 General Noise Levels of Machinery and Equipment

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

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

Table 7.3 Construction Equipment Noise Levels

S. No.	Equipment	Observation Point to the Source (meters)	Noise dB(A)
1	Wheeled loading	5	90
2	Grader	5	90
3	Vibration pavement roller	5	86
4	2-wheel vibration pavement roller	5	81
5	3-wheel pavement roller	5	81
6	Tire pavement roller	5	76
7	Bulldozer	5	86
8	Wheeled pneumatic dredger	5	84
9	Sprayer	5	87
10	Power generator	5	98
11	Impact drill	5	87
12	Impact pile driver	5	112
13	Truck	5	92
14	Concrete mixer	5	91

S. No.	Equipment	Observation Point to the Source (meters)	Noise dB(A)
15	Concrete pump	5	85
16	Mobile lift	5	96
17	Pneumatic hammer and rock crusher	5	98
18	Breaker	5	84
19	Pneumatic spanner	5	95

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

7.4.8 Surface and Groundwater

Surface water might get contaminated due to the disposal of construction waste generated due to the Project activity; this contamination will not only endanger the aquatic life but will also result in jeopardizing the health of natives that use this water for meeting domestic requirement. In addition to that, construction waste, if left unattended will result in forming leachate which will percolate through the soil strata and will reach underground water table and hence, will end up contaminating it.

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

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

- Construct temporary or permanent devices to prevent water pollution due to increased saltation
- Wastes must be collected, stored and taken to approved disposal site.

7.4.9 Flora

There will be cutting of estimated 182 trees due to the proposed construction activities. This impact will be temporary and major adverse in nature. A number of trees will have to be cut, that will need mitigation during the operation phase. Mitigation measures during construction include:

- Contractor must be bound to establish the staff and labour camps, and workshop at barren (non-vegetative) land
- Camps should be confined by fencing around the area so that no waste should approach the flora.

7.4.10 Fauna

During the construction phase, there will be considerable human interventions in the project area which can potentially affect the wildlife resources of the project area.

No environmentally sensitive area is located in the vicinity of the project area. The project area has been under cultivation and human habitation for almost half a century, and the natural vegetation and habitats have been degraded in most areas. As a result, most wildlife species have either left the area or become locally extinct. Most of the animals found are common species that are highly adaptable and are able to co-exist with people. Mitigation measures during construction stage include:

- A “no hunting, no trapping, no harassment” policy will be strictly enforced
- Wildlife protection rules will be included in the Camp Rules
- Trading of wild animals or birds by project personnel will also be prohibited

7.4.11 Social and Cultural Problems

People will face minor exit/entry problems during the construction activities. The impact of construction on entry/exit problem is of minor nature as there is no major shrine or mosque located in the immediate vicinity of ROW.

This impact is temporary and minor negative in nature. Mitigation measures will include timely completion of the construction work and provision of alternate routes during the construction.

7.4.12 Traffic Management

Due to construction activity there will be traffic congestion at entry/exit of the bypass on the existing highway. Since, during construction period the existing highway will be operational for the traffic movement, therefore the traffic management will not be a major problem.

This impact is temporary and minor negative in nature and can be mitigated by providing proper alternate traffic management plan during rehabilitation of existing road. Proper traffic management with marking should be done on the existing road.

7.4.13 Waterlogged and Wetland Areas

There is no waterlogged and wetland area in the Project Area or its immediate vicinity. Main impact of the waterlogged area is that it reduces the bearing capacity of the soil. If present, this effect is moderate negative in nature and needs immediate attention. Mitigation measures will include dewatering, use of sandpits and boulders.

7.4.14 Poverty Alleviation

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

As a result of bypass construction, prices of nearby lands will increase that will be a positive thing for the local people. After the construction of Dera Murad Jamali Bypass, local people will get a chance to open shops and hotels in its vicinity. This will provide them more earning opportunities, which will enhance economic profile of the area. This is a moderate positive impact.

Regarding the resettlement issue, it is required that these settlements should be relocated and handled in such a way that those affectees might not be turned into poor or vulnerable groups. At the time of formulating compensation package, shifting charges, idle time compensation and 15% contingencies charges should be accounted for (Resettlement compensation package is discussed in Resettlement Action Plan).

7.4.15 Lifestyle and Culture

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

7.5 OPERATIONAL PHASE

7.5.1 Noise

Due to increase in traffic volume, noise is expected to increase. This impact is permanent and minor negative. Provision of adequate noise barriers such as hedges and indigenous tree species will reduce the noise. Further improvement can be made with the help of National Highway and Motorway Police (NHMP) by enforcing the laws and getting the vehicles tested, regularly after a specific time period, by some reputable vehicle testing laboratory and obtaining a clearance certificate.

7.5.2 Deterioration of Vehicles

Bypass construction will result in less wear and tear to vehicles; it will also result in less fuel consumption.

This impact is permanent and major positive in nature.

7.5.3 Community Development/ Commercial Activities

Bypass construction will promote better business opportunities such as new petrol pumps and hotels. In addition, such an activity will also increase the land value that will benefit the local residents. This impact is permanent and major positive in nature.

7.5.4 Air Quality

Bypass construction will help reduce traffic related emissions in the short term by allowing a smoother traffic flow. However, in the longer run, increased traffic levels may lead to higher values of emissions.

This impact is permanent and two-fold. It is positive, in case of improvement of road conditions; and minor negative, when traffic volume increases.

Mitigation measures will include:

- Setting up of system to monitor air quality along the Project Area in accordance with acceptable International standards;
- Monitoring emissions of vehicles as per NEQS;

- Helping the owners and occupants of the affected premises to identify and implement special measures such as hedges and vegetation to reduce air pollution.

7.5.5 **Time Saving**

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

7.5.6 **Safety Concerns**

Bypass construction will improve safety conditions and will reduce accidents and loss of lives due to better traffic movements. This impact is permanent and major positive in nature.

SECTION 8

ENVIRONMENTAL MANAGEMENT PLAN

8.1 INTRODUCTION

8.1.1 General

This section provides an approach for managing and monitoring environment related issues and describes the institutional framework for environmental management and resource allocations to be carried out by the National Highway Authority (NHA) for mitigating the negative impacts of Dera Murad Jamali Bypass.

8.1.2 Objectives of Environmental Management Plan (EMP)

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

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

8.1.3 Key Environmental and Social Components

The key environmental and social issues associated with this Project are as follows: The key environmental and social issues associated with this part of the project are as follows:

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

- 2 Appropriately locating temporary construction camps, asphalt plants, and waste disposal sites, and the environmental impact of operating these facilities;
- 3 Regulating the procurement of borrow material and topsoil erosion during construction;
- 4 Avoiding the obstruction of highway drainage system during construction and operation;
- 5 Enhancing and maintaining tree plantation along the entire length of the project corridor;
- 6 Minimizing the impact on cultural sites or structures and community-owned assets during construction and operation; and
- 7 Ensuring pedestrian and traffic safety during construction and operation.

8.1.4 Role of Functionaries for Implementation of EMP

General

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

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

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

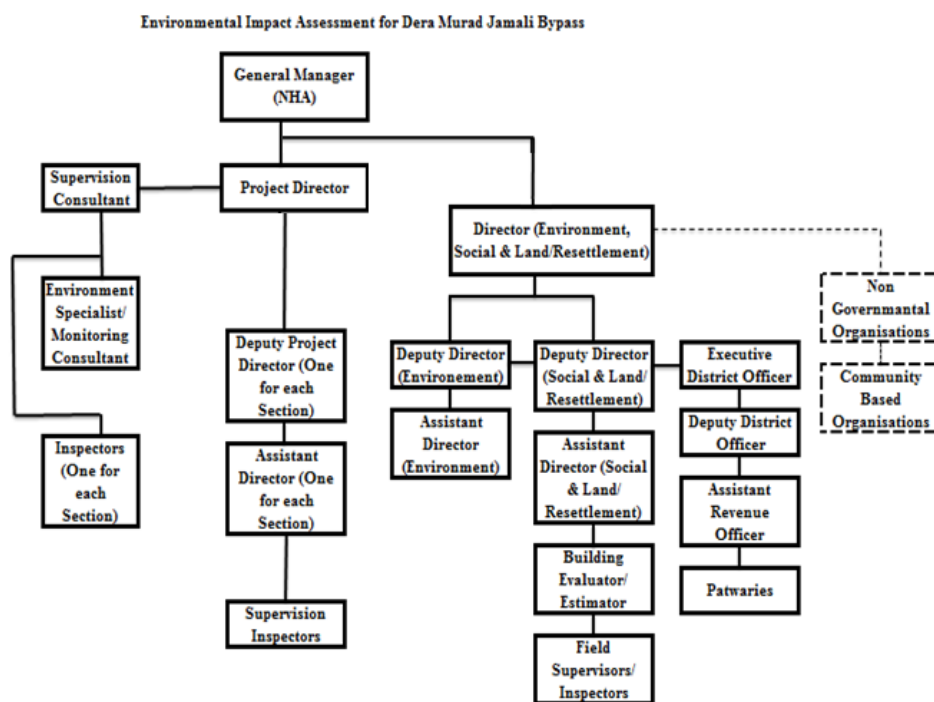


Figure 8.1 Organisation Chart for Construction, Environmental Management Plan & Resettlement Action Plan

(i) National Highway Authority (NHA)

a) Project Director

The Project Director (NHA) will be responsible for the successful implementation of the Project. He will be assisted by the Supervision Consultants.

b) Director (Environment, Social and Land/Resettlement)

The Director (Environment, Social and Land/Resettlement) will be the overall Incharge for handling the NHA's obligations with respect to the EMP. The Director (Environment, Social and Land/Resettlement) will depute one Deputy Director (Environment) for the Project, who will be responsible for ensuring that the provisions of the EMP are implemented. In addition, the Deputy Director (Environment) will also coordinate with the EPA Baluchistan, provincial Agriculture, Forest and Wildlife departments, NGOs/ CBOs and other public/ private sector organisations.

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

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

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

(ii) EIA Consultants

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

(iii) Design Consultants

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

(iv) Supervision Consultants

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

- 1 Ensure that all the environmental and social parameters/provisions comply with the applicable standards;
- 2 Ensure that day-to-day construction activities are carried out in an environmentally sound and sustainable manner;
- 3 Organise periodic environmental training programmes and workshops for the Contractors’ staff and NHA site staff in consultation with the NHA; and
- 4 Develop “good practices” construction guidelines to assist the Contractors and NHA staff in implementing the EMP.

(v) Construction Contractor

EMP will be made a part of the contract agreement and the contractor will ensure that all Project activities are in compliance with the EMP and NEQS.

8.2 SPECIFIC IMPLEMENTATION RESPONSIBILITIES

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

a) Design Phase/ Pre-Construction Phase

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

The responsibilities of Director (Environment, Social and Land/Resettlement) may be briefly described as follows:

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

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

- 1 Identifying and verifying Project affected persons (PAPs) on the basis of specified documents;
- 2 Identifying which public facilities and utilities need to be relocated.
- 3 Identifying alternative resettlement sites for PAPs outside the ROW.
- 4 Carrying out a consultation and dissemination campaign with regard to compensation procedures, entitlement packages, and proposed alternative resettlement sites.
- 5 Preparing individual entitlement files
- 6 Preparing and approving compensation budgets;
- 7 Ensuring that an adequate notice period is given to PAPs before shifting
- 8 Providing shifting assistance to displaced squatters and to assist squatter-owners to salvage their facilities

b) Construction Phase

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

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

c) Operation Phase

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

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

8.3 ENVIRONMENTAL MONITORING

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

8.3.1 Objectives

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

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

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

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

8.3.2 Monitoring Roles, Responsibilities and Schedules

a) Internal Monitoring

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

- DD (Environment)
- Supervision Consultants

Overall monitoring plan is shown in Table 8.3.

b) Deputy Director (Environment)

The Deputy Director (Environment) will have overall responsibility for Environmental Monitoring and Evaluation (M&E).

This includes the following:

- 1 Ensuring the availability of human and material resources required for environmental monitoring
- 2 Generating periodic monitoring reports and disseminating these among the management and appropriate staff members

- 3 Ensuring that the required environmental training is provided to the staff concerned
- 4 Contracting out external monitoring to independent firms and ensuring that periodic environmental audits are carried out

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

- 1 Carrying out visits to the construction sites to review the environmental performance of the contractors
- 2 The status of the Project's consultation strategy

c) **Supervision Consultant**

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

8.3.3 **Monitoring Parameters**

a) **Environmental Monitoring Parameters**

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

- Ambient Air Quality (NO_x, SO_x, CO and PM₁₀)
- Asphalt Plant Emissions (smoke, dust, etc.)
- Ambient Noise Levels
- Water Quality

b) **Social Monitoring Parameters**

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

- Number of PAPs to be resettled/ relocated/ provided livelihood assistance where required
- Availability and adequacy of alternative resettlement sites for PAPs (by number and type)
- Inventory and valuation of PAPs' affected assets
- Pre- and post-resettlement incomes of PAPs

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

8.3.4 Reporting Structure and Outcomes

Progress reporting will be the overall responsibility of the Supervision Consultants / Contractor who will prepare environmental/ social report for the Project to GM (NHA) & DD (Environment). DD (Environment) NHA will verify that monitoring reports; submission to EPA will be the responsibility of the project office.

8.4 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan based on the mitigation measures is presented in Tables 8.1 and 8.2 below.

Table 8.1 Environmental Management Plan (Construction Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
1	Topography	Cutting and dismantling of pavements and borrow area	<ol style="list-style-type: none"> 1. Landscaping and construction of stone pitching/ riprap across the embankments 2. Land management to take care of the drop in the elevation of the borrow areas. 	Construction Contractors (CC) and Supervision Consultants (SC)
2	Land Acquisition and Resettlement	Loss of agricultural land, livelihood, commercial activities and loss of fertile plough layer at camp sites and asphalt plants and drop in the elevation of the borrow areas.	Compensation for loss in agricultural products	CC, NHA's land/ social staff
3	Borrow/ open pits	Borrow and open pits are potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife	Where deep ditching is to be carried out, the top one meter layer of ditching area will be stripped and stockpiled. The ditch will initially be filled with scrap material from construction and then levelled with the stockpiled top soil	CC and SC
4	Air Quality	Dust and vehicular emissions-Air quality will be affected by fugitive dust and emissions from construction machinery, asphalt plants and vehicular traffic. Emission may be carried over long distances depending upon the wind speed, direction, the temperature of the surrounding air etc.	<p>Dust control by equipping asphalt, hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions.</p> <p>Sprinkling of water across diversion tracks. Ensuring that haul trucks carrying asphalt concrete mix and/ or aggregate fill materials are kept covered with tarpaulin to help contain construction material being transported between sites.</p> <p>Enforcing the NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery.</p>	SC and NHA's Staff
5	Construction	Unhygienic conditions	Wastewater effluent from contractors workshop and	CC and SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
	waste disposal (Wastewater, oil and solid waste)		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 in camp sites will be properly treated and safely disposed off in demarcated waste disposal sites. Debris generated by dismantling of existing pavement structures will be recycled subject to the suitability of the material.	
6	Health and Safety Hazards	Accidental risks	Training workers in construction safety procedures; equipping all construction workers with hard boots, helmets, gloves and protective masks.	Training assistant hired by NHA.
7	Geology and Soil	Soil erosion may occur around contractor's camps as a result of unmanaged run-off from equipment washing yards. Possible contamination of soil by oil and chemicals at asphalt plant sites, workshops areas and equipment washing yards may limit future use of lands for agricultural purposes.	Low embankments will be protected by planting 'Vetiver' grass that can flourish in local 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. Appropriate measures for slope protection like vegetation cover will be taken. Soil contamination by asphalt will be minimized by placing all containers in caissons.	CC, SC and NHA staff for land affairs
8	Noise	Noise pollution due to increased vehicular mobility and construction activity	Selection of up-to-date equipment and plant, with reduced noise level ensured by suitable in built damping techniques and appropriate muffling	SC and NHA staff

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
			<p>devices.</p> <p>Confining excessively noisy work to normal working hours in the day. Providing the construction workers with suitable hearing protection like ear cap, ear muffs etc.</p> <p>Avoiding heavy machinery like percussion hammers and pneumatic drills, especially during night time.</p> <p>Locating the rock crushing, concrete mixing and materials shipment yards at least 2km from residential areas, particularly schools, hospitals and nursing homes.</p>	
9	Surface and Groundwater	Surface water might get contaminated by the disposal of construction waste generated due to the Project activity; this contamination will not only endanger the aquatic life but will also result in jeopardizing the health of natives that use this water for meeting domestic requirement. In addition to that, construction waste, if left unattended will result in forming leachate which will percolate through the soil strata and will reach underground water table and hence, will end up contaminating it.	The surface and groundwater reserves will be adequately protected from any source of contamination such as the construction and oily waste that will degrade its potable quality. The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements.	SC and NHA staff
10	Flora	Cutting of trees due to Project related construction activities.	Re-plantation of indigenous species.	NHA staff for forest
11	Utilities	Construction activities will result in relocation of various utilities within the ROW, including electrical poles,	<ol style="list-style-type: none"> 1. Strengthening of utilities, wherever required; 2. Close coordination with the concerned departments to curtail inconvenience to the 	NHA staff and Local concerned

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
		transmission and telephone lines	residents of the Project area	departments.
12	Local communities	Migrant construction workers inevitably cause social unease and active disputes with the local community due to cultural differences. In addition, the involvement of migrant workers in the Project activity will reduce the employment opportunity for the locals, construction activity at site will also cause disturbance, to the already existing businesses along the Project area and Pedestrian's movements.	Migrant worker camp sites will preferably be located approximately 500 metres away from local settlements and sensitivity towards local customs and traditions will be encouraged. Good relations with the local communities will be promoted by employing skilled and un-skilled natives, providing proper compensations for the losses of businesses and alternate paths for the routine movement of the pedestrians.	NHA, CC and SC in coordination with Union Councils and local NGO's
13	Social/ cultural	Exit/entry problems for the residents; Movement of people to the mosque/ shrine will be disturbed.	Timely completion of the construction works and provision of alternate routes	CC and SC
14	Water logged & Wetland Areas	Road can settle in such areas if not designed and constructed according to the design specifications for such conditions.	Road sections in waterlogged and wetland areas should be designed according to the relevant design specifications for such conditions and design must be followed by the contractor's staff.	DC and CC
15	Traffic Management	Disturbance to routine traffic plying in the Project area	Alternate traffic management plan	NHA and NHMP

Table 8.2 Environmental Management Plan (Operation Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
1	Noise	Noise is expected to increase due to increase in traffic volume	Provision of adequate noise barriers such as hedges and indigenous tree species. In addition, the height of boundary walls of sensitive receptors such as basic health units, schools and colleges will be raised along the Project corridor.	SC
2	Air Quality	Improvement in road condition will help reduce traffic related emissions in the short term by allowing a smoother traffic flow. However, in the long run, increased traffic levels and congestion will lead to pollution levels well above the international standards such as WHO guidelines and JICA standards.	Setting up of a system to monitor air quality along Project area in accordance with acceptable international standards. Helping the owners and occupants of the affected premises to identify and implement special measures such as hedges and vegetation to reduce air pollution	SC

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

Table 8.3 Environmental Monitoring Plan

Project Stage	Parameters	Details of Location	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
Pre-Construction/ Design							
	Air Quality SO _x NO _x CO PM ₁₀	5 metres from the edge of pavement downwind at two selected locations	2	Baseline once prior to construction @ Rs.25,000/ location	NHA	Continuous 24 hours	50,000/-
	Water Quality E- Coli	Community groundwater sources near the edge of the ROW at three selected locations on existing/ proposed highway	3	Once before construction starts @ Rs. 30,000/test for 3 locations	NHA		90,000/-
	Noise Levels on dB(A) Scale	Three locations: 5 m from the edge of the pavement, at sensitive location like basic health unit, school, madrassa and residential/ commercial area.	3	Once before start of construction @ Rs.4000/- source	NHA	12 hours, readings taken at 15 sec intervals over 15 min, every hour and then averaged.	12,000/-
Construction							
	Air Quality PM ₁₀ , co, No ₂ , So ₂	35 metres from the hot mix plant in downwind direction	4	Once every 6 months during construction period @ Rs. 25000/ location	Monitoring Consultants (MC)	Continuous 12 hours or over one full working day	300,000/-

Project Stage	Parameters	Details of Location	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
	Ground Water and Waste Water Quality	Community groundwater source near the edge of the ROW three selected locations on existing/proposed highway	3	Once a every 6 months during construction and the start of the operation phase @ Rs. 30,000/test	MC	-	270,000/-
	Noise Levels on dB(A) scale	5 m from edge of the pavement at four selected locations on existing/proposed highway	4	Once every 6 months during construction phase @ Rs.4000/source	MC	24 hours, readings taken at 15 sec intervals, over 15 min, every hour, and then averaged	48,000/-
	Oil and Grease	Two selected locations in contractor's equipment yards, as identified by the supervision consultant	2	Once a year in construction phase @ 1,000/sample	MC	-	4,000/-
Operation							
	Air Quality SO _x NO _x CO PM ₁₀	5 m from the edge of the Pavement downwind background concentration near a residential area at a sensitive location e.g. hospital or school, taken at 2 selected locations on the bypass	2	Twice a year for 1 year @ Rs. 25,000/location	MC	Continuous 24 hours (Assuming three years past Project monitoring)	150,000/-

Project Stage	Parameters	Details of Location	No. of Samples	Frequency	Responsibility	Duration	Cost (Rs.)
	Water Quality E- Coli	Community ground water sources near ROW – two selected locations on proposed bypass	2	Twice a year 1 year @ Rs30,000/test	MC	-	180,000/-
	Noise Levels on dB(A) scale	Two locations: 5 metres from the edge of pavement, at sensitive location and a residential/ commercial area	2	Twice a year 1 year @ Rs.4000/ source	MC	24 hours, readings taken at 15 sec, 15 min, every hour and then averaged	24000/-
						Total Monitoring Cost	1,128,000

- SO_x, NO_x, CO values are compared with WHO guidelines
- MC – Monitoring Consultant
- DC – Design Consultant

8.5 ENVIRONMENTAL TECHNICAL ASSISTANCE AND TRAINING PLAN

An environmental and social training and Technical Assistance (TA) programme will be carried out to build the NHA's capacity to effectively implement this EMP, as well as to facilitate the improved environmental management of future highway Projects by increasing the environmental and social awareness of NHA staff in general. The NHA with the collaboration of Monitoring Consultants (MC) will arrange the environmental training sessions for their staff. The objective of these sessions will be to help establish appropriate systems, and to train senior NHA staff responsible for managing environment, operations, and planning, who can then impart training at a broader level within and outside the NHA (i.e., the training of trainers). The Consultants will organize training courses for NHA staff, in specialized areas such as air and noise pollution monitoring; develop environment operation manuals in consultation with the NHA's Environmental wing. The details of this training program are presented in Table 8.4.

Table 8.4 Personnel Training Programme/ TA Services

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

8.6 ENVIRONMENTAL MONITORING, MITIGATION & TRAINING COSTS

For an effective implementation of environmental mitigation measures, it is very important to provide sufficient funds for implementation of environmental mitigation measures, monitoring and training. The Table 8.5 shows the total environmental monitoring, mitigation and training costs.

Table 8.5 Environmental Mitigation & Monitoring Cost

Sr. No.	Activity	Basis	Cost (Rs.)
1	Health & Safety of Workers	For 85 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi Vis) And Provision of dust bins, warning tap, safety cones, safety sign boards and water sprinkling	6,720,500
2	Environmental Monitoring Cost	Air, water and noise	1,128,000
3	Cost for hiring of staff (Environment Health & Safety Specialist)	Rs. 100,000 / month for 18 months	1,800,000
4	Cost of environmental training	For the whole construction period	300,000
5	Tree Plantation and maintenance for five (05) years	Plan is attached in (Annexure-C)	1,221,584
Total			11,170,084

The estimated Environmental Mitigation and Monitoring cost will be Rs. 11,170,084 or Rs. 11.170 Million.

SECTION 9 CONCLUSIONS

9.1 GENERAL

This chapter presents conclusions of the entire EIA Report. Present Project has been conceived to provide fast and safe access to the traffic using Dera Murad Jamali Bypass. The conclusions are based on the findings of detailed environmental assessment, which has been carried out as a requirement of Federal EPA.

9.2 FEASIBILITY/ PRACTICAL UTILITY OF THE PROJECT

In order to check the feasibility of the Project, an EIA study was carried out by a team of Asif Ali & Associates experts. After carrying out detailed field surveys, it was felt that this Project will prove to be very beneficial in overcoming the problems being faced on N-65 at Dera Murad Jamali.

9.3 VARIOUS OPTIONS CONSIDERED FOR THE PROJECT

Various options were considered for this Project that included “No project”, Alternate transport modes” and “Construction of a Bypass”. These have been discussed in detail in Chapter 4 of this Report. The last option was selected because it fulfils the Project requirements in the best way.

Three alternatives were discussed for the improvement of the existing carriageway i.e. Widening of the both sides of existing road with the same alignment; up-gradation of the existing 2 lane road into 4 lane dual carriageway by extending on both sides from centreline of the existing road; and construction of a completely new Bypass.

Third option was selected after discussing the associated benefits.

After the completion of this Project, a 2 lane bypass will be available for the traffic passing around the Dera Murad Jamali city. It will increase safety and comfort of the travellers and also reduce the travelling time.

9.4 AVAILABILITY OF RESOURCES AND MATERIALS

Availability of resources and materials for the execution of present Project has been discussed in Chapter 2 of this Report. All the resources are available in the vicinity of the Project Area, except reinforcement, asphalt and cement that will be purchased from Karachi.

9.5 IDENTIFICATION OF THE MAIN ISSUES AND CONCERNS

During the field surveys, significant efforts were made to identify the main social, cultural and environmental issues related to the execution of this Project. Government departments and agencies were also contacted for obtaining salient information. Following is the list of main issues and concerns:

- Resettlement of the structures, i.e. houses, shops, electric poles etc. that fall within the design Right of Way (ROW).
- Cutting of trees falling within the proposed corridor.
- Due to the change in the hydrologic regime, flood water can cause damage to the local community and road.
- Disturbance to the public movement during construction.
- Reduction in the business activities 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.

9.6 MITIGATION MEASURES PROPOSED

In order to overcome the social, cultural and environmental issues discussed above, following mitigation measures have been proposed (detail available in Chapter 7):

- All the affectees should be compensated for their properties, falling in the ROW, through judicious compensation packages. For this purpose all such structures have been measured and evaluated for their costs estimation.
- Trees that are within the corridor and have to be cut down should be compensated by planting new trees in a ratio 4:1 to the cut trees.
- Provision of culverts can be made to control flood damages and ensuring safety of embankments against floods. Drains should be designed to take the design flows.
- Informatory signs and warning boards should be displayed. Zebra Crossings and U turns provided at appropriate places will help people safely cross the road after the construction
- Compensation should be made to the affectees for loss in business/commercial activities.
- Air and dust pollution can be controlled by equipping asphalt, hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions. Haul trucks carrying asphalt concrete mix and/ or aggregate fill materials should be kept covered with tarpauli to help contain construction material being transported between sites.

- Noise pollution due to working machinery and equipment must be taken seriously. All the workers must be provided with suitable hearing protection like ear cap, ear muffs etc. Machines and equipment noise should be controlled by providing appropriate muffing devices to the construction workers.
- Solid waste generated during construction and in camp sites should be properly treated and safely disposed of in demarcated waste disposal sites. Sanitary wastes generating from staff and labour camps must be disposed of in environment friendly manner, i.e. provision of septic tank etc. for toilet wastes.

Table 9.1 summarises the overall findings and recommendations of the present EIA Study in matrix form.

Table 9.1 Findings and Recommendations of the EIA Study

S. No.	Main Findings	Recommendations
1	Project will cause resettlement of the houses, electric poles etc. that fall within the design Right of Way (ROW)	Judicious compensation packages should be given to the affectees for their properties should be relocated/ compensated. (Detail is attached in Annexure-B)
2	At present two lanes by pass will be constructed formation width is 20m only 182 effected trees will have to be cut for construction of Bypass.	New trees must be planted in a ratio 4:1 to the cut trees.
3	Due to the change in hydrology regime, floods can damage road and local community.	Proper designing of drains and provision of culverts at appropriate locations can control flood damages.
4	During the construction phase, public movement will be disturbed.	Informatory signs and warning boards should be displayed. Zebra Crossings and U turns should be provided at appropriate places.
5	Execution of the construction works will reduce the business activities of the area.	Proper compensation should be provided to the affectees for their business losses.
6	Project activities (operating of construction machinery during construction phase of the Project) will increase noise and air pollution of the Project Area.	<ul style="list-style-type: none"> • Air and dust pollution can be controlled by equipping asphalt, hot mix and batching plants with fabric filters or wet scrubbers to reduce the level of dust emissions. Haul trucks carrying asphalt concrete mix and/ or aggregate fill materials should be kept covered with tarpaulin to help contain construction material being transported between sites. • For minimising the effects of heavy noise emissions from working machinery and equipment, all the workers must be

S. No.	Main Findings	Recommendations
		provided with suitable hearing protection like ear cap, ear muffs etc. Machines and equipment noise should be controlled by providing appropriate muffling devices.
7	Solid waste will be generated during construction phase of the Project.	Solid waste generated during construction and in camp sites will be properly treated and safely disposed of in demarcated waste disposal sites. Aggregate waste material of existing road can be reused in up-gradation of road. Sanitary wastes generating from staff and labour camps must be disposed of in environment friendly manner, i.e. provision of septic tank etc. for toilet wastes.

9.7 BENEFITS OF THE PROJECT

After the execution of the Project, people living in the Project Area and the travellers of the National Highway (N-65) will get the following benefits:

- Overall safety of passengers will be increased.
- Less time will be required for travelling and reaching the destination.
- During the construction phase, local labour will be accommodated in the construction activities.
- Economic condition of the area is expected to get uplift due to better approach to the nearby markets.
- Inter-provincial trading will get a boost due to better communication passage.

9.8 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

An Environmental Management Plan (EMP) has been provided in Chapter 6 of this Report. The EMP will facilitate the NHA in taking mitigation measures for potential environmental impacts of the Project. It will also enable NHA to enhance the Project's overall benefits and introduce standards of good environmental practices. Roles and responsibilities of functionaries have also been defined in the EMP for effective management of the Project components.

9.9 SURVEILLANCE & MAINTENANCE AFTER CONSTRUCTION

National highway Authority (NHA) and National Highway & Motorway Police (NHMP) will take care of the bypass after construction. NHA will look after its surface condition and make sure that there are no encroachments within the Right of Way (ROW).

National Highway and Motorway Police (NHMP) will be responsible for ensuring smooth traffic flow on the road. They will advise NHA to provide the required facilities for reducing the road accidents and hazards.

9.10 PROPOSED MEASURES FOR INCORPORATING THE STAKEHOLDERS' CONCERNS

During the detailed survey, Consultants' EIA team identified the main stakeholders of the proposed Project and discussed the Project with them in order to get knowledge about their concerns and worries. Chapter 7 of this Report discusses public consultation and information disclosure in detail. It also describes the measures suggested for mitigating these concerns.

ANNEXURE - A
LABORATORY TEST RESULTS

ANNEXURE - B
DETAILS OF LAND ACQUISITION

ANNEXURE - C
TREE PLANTATION PLAN