

# Initial Environmental Examination

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## Pakistan: National Disaster Risk Management Fund

Rehabilitation/Strengthening of the Water Conservation Structures, Flood Protection Schemes in Naseerabad and Killa Abdullah districts

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- (i) The fiscal year (FY) of the Government of the Islamic Republic of Pakistan and its agencies ends on 30 June. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2011 ends on 30 June 2011.
- (ii) In this report, "\$" refers to United States dollars.

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**IRRIGATION DEPARTMENT  
GOVERNMENT OF BALOCHISTAN**

**REHABILITATION/STRENGTHENING OF THE WATER CONSERVATION STRUCTURES,  
FLOOD PROTECTION SCHEMES IN DISTRICT NASEERABAD AND KILLA ABDULLAH**



**INITIAL ENVIRONMENTAL EXAMINATION REPORT**

**September 2023**



**Rehman Habib Consultants (Pvt.) Limited**

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## ABBREVIATIONS

ADB	Asian Development Bank
AJK	Azad Jammu Kashmir
BEPA	Balochistan Environmental Protection Agency
BHUs	Basic Health Units
BID	Balochistan Irrigation Department
BOQ	Bill of Quantities
CAD	Command Area Development
CCR	Community Complaint Register
CC	Construction Contractor
CSC	Construction Supervision Consultant
DO	Dissolved Oxygen
EA	Executing Agency
EHS	Environment Health & Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPC	Environmental Protection Council
FOs	Farmer Organizations
GIS	Geographic Information System
GoB	Government of Balochistan
GRC	Grievance Redress Committee
GRM	Grievance Redressal Mechanism
IEE	Initial Environmental Examination
EHS	Environment, Health and Safety
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
MCM	Million Cubic Meter
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NOx	Oxides of Nitrogen
NTU	Nephelometric Turbidity Unit
PEPA	Pakistan Environmental Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PIS	Perennial Irrigation Schemes
PMD	Pakistan Meteorological Department
PPC	Pakistan Penal Code
PPEs	Personal Protection Equipment
PPTA	Project Preparatory Technical Assistance
PIU	Project Implementation Unit
BID	Balochistan Irrigation Department

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REA	Rapid Environmental Assessment
RHCs	Rural Health Centers
SOx	Oxides of Sulfur
SPS	Safeguard Policies
SC	Supervision Consultants
TA	Technical Assistance
TDS	Total dissolved solids
TSS	Total Suspended Solids
UNEP	United Nation Environment Program
VLD	Voluntary Land Donation
VOCs	Volatile Organic Compounds
WHO	World Health Organization

# REHABILITATION/STRENGTHENING OF THE WATER CONSERVATION STRUCTURES, FLOOD PROTECTION SCHEMES IN DISTRICT NASEERABAD AND KILLA ABDULLAH

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## EXECUTIVE SUMMARY

### A. INTRODUCTION

1. This report presents the findings of an Initial Environmental Examination (IEE) study for the proposed project, which is the Rehabilitation/Strengthening of the water conservation structures, flood protection schemes in district Naseerabad and Killa Abdullah. The project is being funded by the Asian Development Bank (ADB) through the National Disaster Risk Management Fund (NDRMF), with the Balochistan Irrigation Department (BID) acting as the Executing Agency (EA).

2. The flood problems in both the project districts are peculiar and common similar to other areas in Balochistan province. Flashy hill torrents emanating from steep denuded hills cause devastation in almost entire project area because of high velocity and unpredictable magnitude. The population and cultivated land/orchard are mainly located at the edge of rivers and the toes of hills, which are in constant threat of flood and during each flood season, a considerable chunk of land is eroded, sustaining great financial loss to farmers. In order to address these issues, the BID had already constructed water conservation structures and flood mitigation works in the valley. However, these existing structures suffered severe damage during the unprecedented rainfall in July and August, 2022.

3. Under the proposed activity, the BID intends to ensure the sustainable restoration/rehabilitation of water conservation structures and flood mitigation works with the main components being as follows:

- a) Restoration and rehabilitation of water conservation structures (small Delay Action Dams and Flood Protection Bunds);
- b) Restoration and strengthening of flood embankments of canals and drains.

### B. Project Categorization

4. According to ADB Safeguard Policy Statement (SPS) 2009, the proposed projects are expected to have only short term, site specific and largely reversible impacts which will be primarily during the construction phase of the project and thus the project has been classified as Category 'B'.

5. In regard to the national environmental legislation, the proposed project falls under the category of "Water management, dams, irrigation & flood protection" of Schedule I and thus this IEE report has been prepared to obtain the No Objection Certificate (NoC) from Balochistan Environment Protection Agency (BEPA).

### C. Policy Legal and Administrative Framework

6. This report represents in accordance with Pakistan Environmental Protection Act 1997, Balochistan Environmental Protection Act, 2014 and the ADB SPS which requires that environmental considerations be incorporated into ADB's funded project to ensure that the project will have minimal environmental impacts and be environmentally sustainable.

### D. DESCRIPTION OF PROJECT

7. This project will be implemented for restoration and rehabilitation of, and two floods Embankments that have been severely damaged during the recent high intensity rainfall in July and August 2022. Details of the flood protection bunds and irrigation schemes are presented in the Table 1 below.

**Table 1: Dams and damage nomenclature**

Sr. No.	Structure Description/Sub Type	District	Location/ Coordinates	Name (Damage Nomenclature)
1	Pir Alizai & Majak Flood protection Bund	Killa Abdullah	30°43'55.16"N 66°44'19.81"E	Protection Bund damaged
2	Killa Abdullah Bazar Flood protection Bund	Killa Abdullah	30°44'03.00"N 66°39'39.00"E	Protection Bund washed out and damaged at different RDs
3	Dobandai Flood protection Bund	Killa Abdullah	31°13'58.74"N 66°51'18.20"E	Protection Bund washed out and damaged at different RDs
4	Essargai Delay Action Dam Dobandai	Killa Abdullah	31°02'52.29"N 66°47'02.80"E	Spillway damaged, raising of dam body
5	Gulistan Karez Area Flood protection Bund	Killa Abdullah	30°36'30.53"N 66°34'00.58"E	Protection Bund washed out and damaged at different RDs
6	Segai Area Flood protection Bund	Killa Abdullah	30°34'59.40"N 66°34'57.13"E	Protection Bund washed out and damaged at different RDs
7	Flood Embankment of Pat Feeder Canal from Rd.238+000 To Rd.395+000	Naseerabad	28°27'13.51"N 68°02'01.35"E	Embankments breached
8	Embankment of Outfall drain Usta Muhammad	Naseerabad	28°06'43.37"N 67°46'10.03"E 27°55'14.31"N 67°37'13.76"E	Drainage irrigation and crossing structures damaged

## E. PROJECT ALTERNATIVES

8. The 'No project' option and the proposed activity i.e. restoration and rehabilitation of water conservation structures/ flood protection schemes were compared, and it was assessed that the "No project" option maintains the status quo, leaving the district Killa Abdullah and Naseerabad vulnerable to water scarcity, excessive aquifer depletion, increased flood risks, and damages. On the other hand, executing the project offers the potential to address these challenges by restoring and rehabilitating the damaged structures, improving water management and reducing flood risks. Although the project requires initial investment, it can provide long-term benefits and contribute to the overall sustainability and resilience of the area.

## F. BASELINE CONDITIONS

- **Topography:** The general characteristics of the district Killa Abdullah is mountainous. The mountains are intersected by long narrow valleys consisting of flat alluvial plains



with heavy pebbly slopes rising on either side and the general elevation of the district is about 1,205 to 2,675 meters above mean sea level. The district Naseerabad is in the Kachhi plain/ basin area, which consists of flat valleys amid various mountain and hill ranges.

- **Soil:** Killa Abdullah valley floor is covered with unconsolidated alluvial sediment that is mostly composed of clay, silt, silt-clay and clayey-silt.

On the other hand, the soil of Naseerabad district comprises silt, clay, silt loam, clay loam and sandy loam. It is more loamy soil in dense agricultural fields. In the Chhattar sub- division, the area is sandy and clay loam.

- **Rivers and Streams:** There are no perennial streams or rivers in the district Killa Abdullah. However, some seasonal rivers and streams are found in the area. The Kurram river originates in the Toba Kakar range and Pishin river, which flows eastward and makes the boundary of the district with Afghanistan. Some of the important streams of the district are Shora Rud, Hanna, Khojak, Arambi Manda and Surkhhab Lora. Some of the intermittent streams/springs of the district include Wuch, Toghai Manda, Mandrak Sheela, Girdai and Mastai.

There is no perennial river flowing through district Naseerabad and the district depends on the canals for its surface water requirements. Pat Feeder Canal is the only perennial surface water channel in the project area.

- **Ground Water:** A rapid shift occurred in the changing of karez to tube-well irrigation in this district Killa Abdullah. There are about 400 tube-wells in the surrounding area of Inyatullah Karez. Currently, 98% of irrigation in district Killa Abdullah is done through tube-wells and there is no hope of Karez revival in future. It has led to lowering of the water table, which now fluctuates between 130 and 470 feet in Killa Abdullah<sup>1</sup>. In district Naseerabad, 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, motorized 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 meters to 15 meters in the project area.
- **Ambient Air Quality:** Air quality in the project area is fairly clean. There are no significant sources of air pollution in the area. The major source of air pollution is minute vehicular emissions on the road, dust arising from winds and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or katcha access roads. Average value of PM2.5 and PM10 were exceeding WHO limits, with a possible reason being that the project area is plain sandy area and the Uch Power plant at Dera Murad Jamali is located approximately 20 km away which may be affecting the airshed quality for these environmental parameters.
- **Ambient Noise:** The noise levels in the project area are within permissible limits of NEQS and WHO as shown by the monitoring results. Most of the sites are in rural areas with no potential sources of noise.
- **Flora:** In district Killa Abdullah, considerable areas are covered with bushes of Tarkha sperah (*Artemisia maritima*) and Shora (*Haloxylon griffithii*). Other vegetation varieties in

<sup>1</sup> World Bank Funded Project - Balochistan Livelihoods and Entrepreneurship Project (2018): Environmental and Social Management Framework.

<https://documents1.worldbank.org/curated/en/734761567593644139/pdf/Environmental-and-Social-Management-Framework.pdf>

the district are: Huma (*Ephedra intermedia*), Ghurezah (*Sophora alopecuroides*), Shinshob (*Menthe sylvestris*), Shezgi (*Eremurus Aucherianus*), Zawal (*Achillea sanlolina*), Zira siyah (*Carum bulbo castanum*), Zoz (*Alhagi camelorum*), Khakshir (*Sisymbium 4lisha*), Kharorak (*Arnebia Cornuta*), Makhi (*Caragana ambigua*), Lokhae (*Scirpus wardianus*), Sarghasae (*Saecharum ciliare*), Murgha (*Andro pogon annuatus*), Spina Maurai (*Thymus sp*), Barang (*Shkrae plantago major*).

The common tree species found in the district Naseerabad (either local or exotic) are babul (*Acacia nilotica*), shisham (*Dalbergia sissoo*), ber (*Zizyphus mauritiana* and *Zizyphus nummularia*), farash (*Tamarix aphylla*), karir (*Capparis aphylla*), peelu (*Salvadora oleoides*), black siris (*Albizia lebbek*), white siris (*Albizia procera*), neem (*Azadirachta indica*), jhand (*Prosopis cineraria*) and sufaida or eucalyptus (*Eucalyptus sp.*).

- **Fauna:** It includes the following **Mammals:** In the project area, commonly found mammals include the Fox (*Vulpes vulpes*), Jackals (*Canis aureus*), Rabbits (*Oryctolagus cuniculus*), Wolf (*Canis lupus*), and Mountain Sheep (*Ovis ammon*), specifically the Argali Sheep. **Birds:** Among the avian population, one can frequently encounter lack Crowned Finch Lark (*Eremopterix nigriceps*), Black Kite (*Milvus migrans*), Blue Rock Pigeon (*Columba livia*), Cattle Egret (*Bubulcus ibis*), Pied Kingfisher (*Ceryle rudis*), Sparrows (*Passeridae*, various species), Chukar Partridges (*Alectoris chukar*), and the See See Partridges (*Dicrurus paradiseus*). **Reptiles:** The reptile community in the project area consists of Lizards, including Agamas (*Agama spp.*) and Monitors (*Varanus spp.*) as well as Snakes (*Serpentes*), representing a diverse range of species within this group.
- **Aquatic Ecology:** Aquatic ecology is non-existent in district Abdullah, as there are seasonal hill torrents in the project area and no perennial stream or river. In district Naseerabad, fish species like Rohu (*Labeo rohita*), Hilsa (*Tenualosa lisha*) and Catla (*Catla catla*) are found in the Pat Feeder Canal upstream to the project area near Dera Murad Jamali. However, due to canal being in flood damaged in 2022, there are currently no fisheries in project area that are located downstream to Dera Murad Jamali. Restoring the damaged canal may help revive fish populations and potentially reinstate fisheries in the affected area.
- **Population Size and Growth:** The populations of Killa Abdullah and Naseerabad district according to census 2017 are 758,354 and 487,847 respectively, which was 360,724 and 245,894 respectively in 1998, recording an increase of 99.16 percent over the last 19 years.
- **Castes & Tribes:** Major casts and tribes of the project area fall in district Killa Abdullah are Kakar, Tareen, Syed and Achakzai while Naseerabad district has an ethnically heterogeneous population. Major Baloch tribes of the district are Umrani, Khosa, Bijarani, Kanrani, Gajani, Nindwani, Bajkani and Jamali.
- **Mother Tongue:** In district Killa Abdullah, Pushto is the prevailing language while Urdu is also understood and spoken in urban areas while in district Naseerabad, Balochi and Sindhi are the major languages spoken in the district followed by Brahvi and Saraiki.
- **Agriculture:** There are two cropping seasons in Killa Abdullah and Naseerabad district i.e. kharif and rabbi. In district Killa Abdullah, the major Rabi crops include Wheat, Barley, Cumin, Vegetables and Fodder while Kharif crops are Fruits, Melons, Vegetables, Tobacco, Potato, Fodder and Onion.
- Major crops of district Naseerabad are Wheat, barley, rapeseed/mustard, gram, masoor,

canola, sunflower, rice, jowar, bajra, sesame, moong, guarseed, cotton and sugarcane and vegetables grown in the district. Onions, potatoes, tomatoes, okra, tinda, spinach, bitter gourd, bottle gourd, cauliflower, brinjal, luffa, cucumber, coriander and peas while major fruit production include mangoes, citrus, guavas, dates, watermelon, musk melon, chikoo and ber.

- **Source of Drinking Water:** The main source of drinking water in district Killa Abdullah is groundwater, with the majority of households served by electric or diesel generated tube wells/piped schemes in urban areas. Spring, canal and river water is also used in some areas while in district Naseerabad, Hand pump, Well and PFC water are used for drinking purposes.
- **Irrigation:** The main sources of irrigation in the Killa Abdullah district include tube wells and Karezes / springs, which are commonly used in the district while the Pat Feeder Canal is the main source of irrigation in the project area falling in Naseerabad district.
- **Health:** The health facility infrastructure in district Killa Abdullah include 1 Hospital, 1 Trauma Center, 7 Rural Health Centers (RHCs) and 16 Basic Health Units (BHUs). While district Naseerabad includes 1 DHQ Hospital, 3 Rural Health Centers (RHCs), 18 Basic Health Units (BHUs), 9 Civil Dispensaries (CDs), 3 Maternal and Child Health Centers (MCHCs) 1 TB Clinic, 1 School Health Unit and 1 Health Auxiliary unit.
- **Education:** In district Killa Abdullah, a total of 364 educational institutions, operated by the Government sector are present. These schools consist of 4 colleges, 26 high schools, 27 middle schools, and 307 primary schools. Meanwhile, in district Naseerabad, a total of 340 schools/colleagues operated by the Government sector, comprising 292 primary, 25 middle, 21 high, and 2 high secondary schools. Of these schools, 92% are located in rural areas, while 8% are in urban areas.
- **Important/ Historical places of Killa Abdullah District:** Chaman Town (25 km from Killa Abdullah Bazar flood protection bund), Spin Ghundi Mound (8 km from Killa Abdullah Bazar flood protection bund and Pir Aliai and Majak flood protection bund) and Khawaja Amran Shrine (1 km from Gulistan Karez area) are important historical and recreational places of the Killa Abdullah district.

## G. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

9. The risk assessment matrix is provided as Table 2 below.

**Table 2: Impact Assessment Matrix**

Activity / Impact	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
<b>Design Phase</b>				
Flooding	Likely	Major	High	Low
Seismic damage	Likely	Moderate	Medium	Low
Land Acquisition	Unlikely	Minor	Low	Low
<b>Construction Phase</b>				
Air Quality	Likely	Moderate	Medium	Low
Noise Pollution	Likely	Moderate	Medium	Low
Vibration impacts	Likely	Minor	Medium	Low
Solid waste generation incl. Spoil material	Likely	Moderate	Medium	Low
Resource Conservation	Likely	Minor	Medium	Low
Soil Contamination	Likely	Moderate	Medium	Low

Soil erosion/ silt run-off	Likely	Moderate	Medium	Low
Community Health and Safety	Likely	Minor	Medium	Low
Occupational Health and Safety	Likely	Moderate	Medium	Low
Traffic management	Likely	Minor	Medium	Low
Flora	Likely	Minor	Medium	Low
Fauna	Likely	Moderate	Medium	Low
Use of local water resources	Likely	Moderate	Medium	Low
Contamination of water resources	Likely	Moderate	Medium	Low
Social and Cultural Conflicts	Likely	Minor	Medium	Low
Religious and Cultural Heritage	Unlikely	Minor	Low	Low
<b>Operation Phase</b>				
Damage to infrastructure	Likely	Major	High	Medium
Biodiversity impacts	Unlikely	Minor	Low	Low

## H. ENVIRONMENTAL MANAGEMENT PLAN

10. The EMP sets out mitigation actions, monitoring actions, responsibilities, and schedules for impact mitigation and monitoring. Environmental monitoring will be undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures.

11. The EMP provides its implementation mechanism during construction and operational phases:

- **Implementation during Construction phase:** The BID, having core implementation responsibility, will overall monitor the environment related activities of Supervision Consultant and Construction Contractor and report to BEPA regarding implementation status of EMP. Construction Contractor will be in direct coordination with Supervision Consultant through its HSE department and the Contractor's HSE department will be required to be on-board prior to mobilization.
- **Implementation during O&M:** The key players involved during operation of the proposed project are EA (BID) and district Environmental Officers of Killa Abdullah/Naseerabad BID, who will randomly check the project operation in context of EMP and report to district Environmental Officers annually.

12. The EMP has been prepared taking into account the environmental consequences of the proposed action and the required mitigation measures have been proposed at different stages of the activities along with performance indicators to mitigate any potential impacts along with a comprehensive Environmental Monitoring Plan as part of the EMP. A suitable training program is also proposed to train the Contractor(s) staff, who will be involved in the construction phase and the BID staff at the project operational phase. All required permits shall be obtained from the concerned departments before starting the related activity and any grievances will be addressed promptly, as suggested in the EMP.

### EMP Budget

13. The EMP budget for the construction and operation phases of the project is 14.31 million PKR.

## I. Public Consultation and Information Disclosure

14. In order to ascertain the perceptions of different stakeholders about the project (during construction/operation), consultation meetings were held with them. Consultation meetings

were carried out in the month of August 2023 during the site visits with local communities of Killi Aiwas Markhel, Killi Muhammad Shah, Killi Arambi Pir Ali Zia and Killi Majhic etc. The comments and feedback received from the different stakeholders were incorporated into the IEE study and it was ensured that their comments and/or concerns are considered during the different stages of the proposed project activity.

#### **J. Grievance Redressal Mechanism**

15. The Grievance Redressal Mechanism (GRM) has been developed under ADB Policy (SPS 2009), to deal with complaints at any stage of the proposed project. The GRM will help to receive and resolve the concerns/complaints of any project affected persons regarding the project's social and environment performance. The measures have been identified to mitigate any potential environmental and social impacts due to implementation of proposed project and the mechanism for information disclosures has been provided in the GRM.

#### **K. CONCLUSION**

16. The report provides conclusions based on the impacts assessed and the mitigation measures suggested. It is recommended that the EMP and IEE will be made a part of all bidding/tender documents. Also, the Contractor will be bound to completely implement relevant mitigation measures set out in the EMP and the cost related to these mitigation measures will be borne by the Contractor, who shall prepare all required documentation such as the site specific EMP (SSEMP).

17. No Land acquisition and involuntary settlement is involved. No indigenous persons reside or will be affected by the proposed interventions in the areas of influence.

18. Environmental impacts identified during the design phase, including seismic activity and flooding are of high significance. To mitigate these impacts, the project has taken specific steps based on the findings of the hydrological study. The study has estimated the discharge of streams and nullahs in the project area against a 500-year return period. To address seismic hazard challenges, the structural designs for the dam body, spillway, and other related structures will adhere to the recommended criteria for Zone 4 as outlined in the Building Code of Pakistan, 2021.

19. Environmental impacts during the construction phase are largely temporary in nature and can be minimized with effective management. Construction of worker camps will not necessarily be required and/or may be very limited in size in view of the scale and scope of works while all efforts shall be made to engage locals for employment for the proposed project activities. It is concluded that the proposed project should proceed, with appropriate mitigation measures and monitoring programs identified in the IEE study.

## 1. INTRODUCTION

### 1.1 PROJECT BACKGROUND

20. Balochistan is the largest province of Pakistan in terms of area which spread virtually as a plateau over 347,185 square kilometres, constituting 44% of the total area of Pakistan. The population of Balochistan is currently estimated around 12.34 million (2017). Approximately 85% of the population live in rural area and mainly depend on agriculture and livestock as source of living.

21. Flood problems of the project area are peculiar and common in Balochistan due to its topographical and physiographical and demographic conditions. Flashy hill torrents emanating from steep denuded hills cause devastation in almost entire project area because of high velocity and unpredictable magnitude.

22. The Killa Abdullah and Naseerabad districts have historically remained under high threat of flooding during heavy rains, particularly during the high intensity rainfall in July and August 2022, which broke all previous records and the flash floods which proved to be a catastrophe and caused irreparable loss to life and property.

23. During the recent floods, flood protection schemes & conservation structures received heavy damage due to unprecedented rainfall and cloud bursts, which damaged/washed the protection bund's aprons along with embankments, stone pitching and dam body/spillway in Killa Abdullah and canal embankments in Naseerabad district.

24. Based on discussions between the National Disaster Risk Management Fund (NDRMF) and the Balochistan Irrigation Department (BID), it was agreed to conduct rehabilitation/strengthening of the water conservation structures and flood protection schemes in Naseerabad and Killa Abdullah districts.

25. This document presents the findings of the Initial Environmental Assessment (IEE) study for the proposed rehabilitation/strengthening of the water conservation structures and flood protection schemes in these two districts of Balochistan province.

### 1.2 NATURE SIZE AND LOCATION OF THE PROJECT

26. The project involves the restoration and rehabilitation of five flood protection Bunds, one delay action Dam and two flood Embankments in Killa Abdullah and Naseerabad districts under the BID. The project's core objectives are to safeguard lives, properties, and essential infrastructure such as canal embankments, residences and agricultural land from flood damage. It also aims to recharge the groundwater aquifer for sustainable irrigation and drinking water use. to store the water The project sites are located in Killa Abdullah and Naseerabad districts. The project location maps are provided as Figure 1.1 below.



Figure 1-1: Location Map of the project sites in district Killa Abdullah

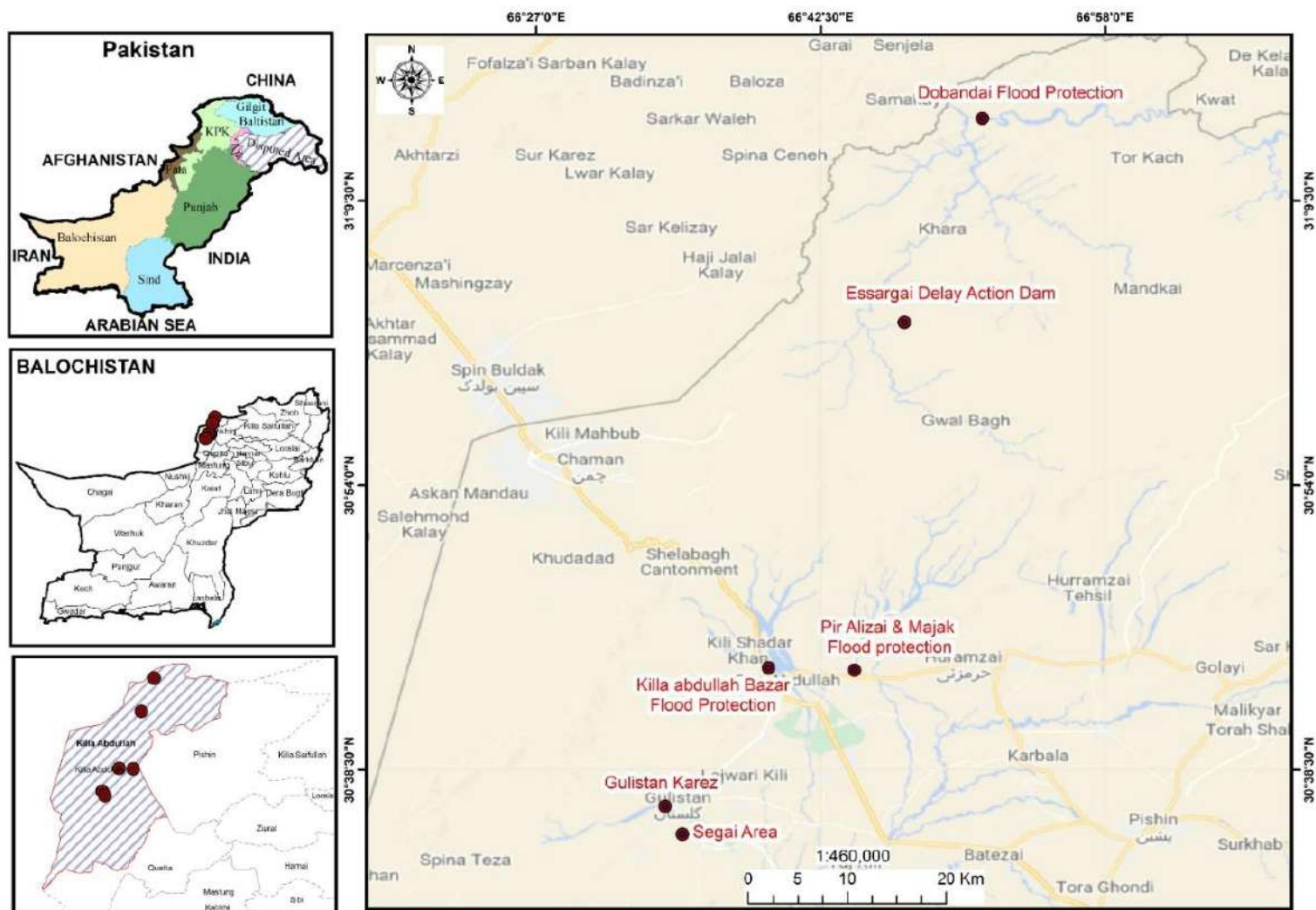
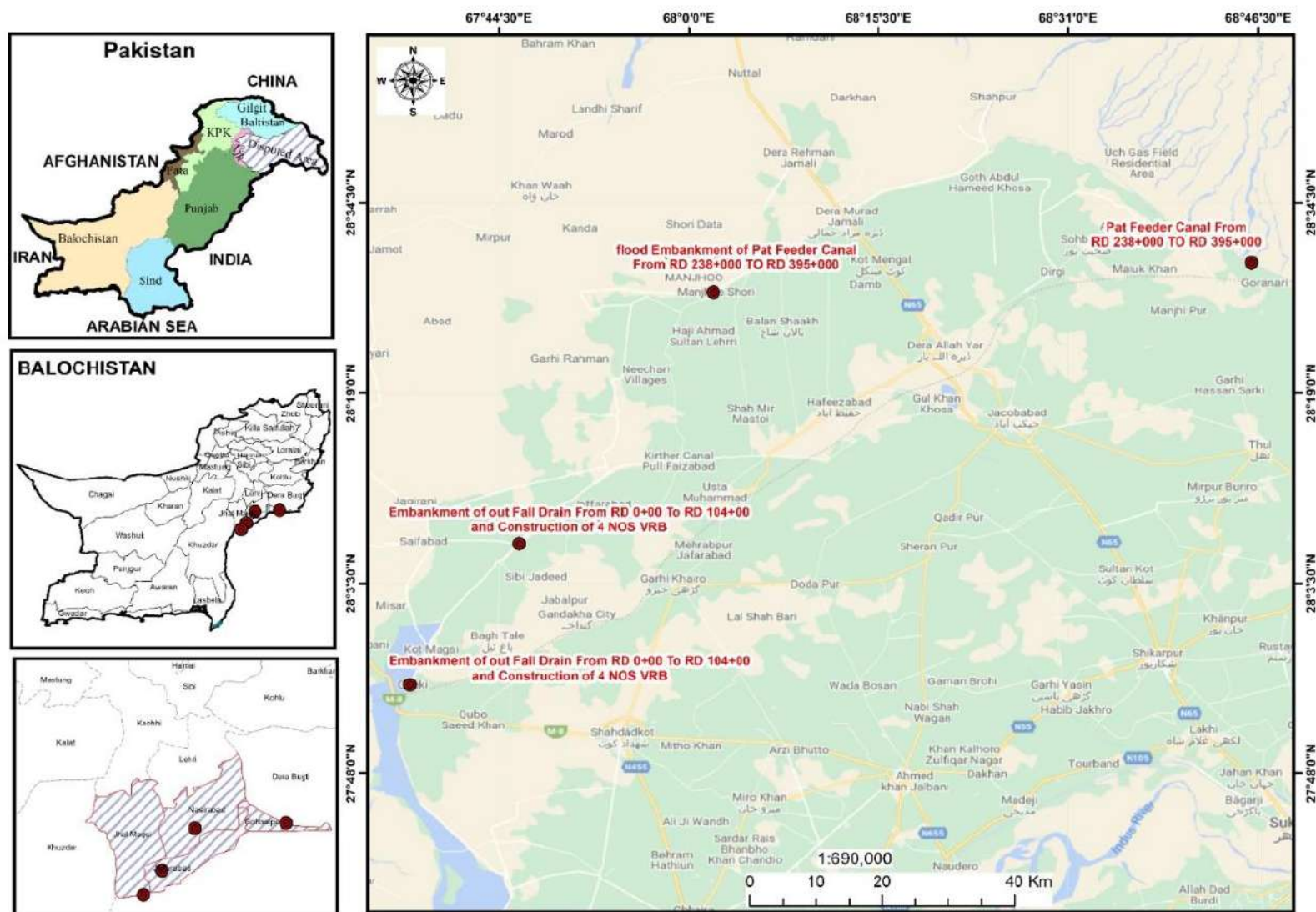


Figure 1-2: Location Map of the project sites in district Naseerabad





### 1.3 ENVIRONMENTAL CATEGORY OF PROJECT

27. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the proposed project activity is the “Balochistan Environmental Protection Act, 2012”.

28. The Balochistan EIA / IEE regulations of 2020 provide categories of projects for which IEE or EIA needs to be conducted. The proposed project falls under the category of “Water management, dams, irrigation & flood protection” and hence the environmental study has been conducted and an IEE report has been prepared.

29. For ADB’s SPS, all loans and investments are subject to categorization to determine environmental assessment requirements. Categorization has been undertaken using Rapid Environmental Assessment (REA) and the completed the environmental categorization form is attached as Annexure-1 and the proposed project has been categorized as ‘B’ for Environment.

30. The IEE report complies with both the BEPA requirements as well as the ADB Safeguard Policies SPS – 2009 for environmental management of projects.

### 1.4 OBJECTIVES OF IEE REPORT

31. The objectives of this IEE report are as follows:

- (i) Meet the statutory requirements set forth by the Pakistan Environmental Protection Act (PEPA) 1997 and the Balochistan Environmental Protection Act, 2012.
- (ii) Comply with ADB policies and safeguards for environmental and social management of Projects.
- (iii) Facilitate proponents and financiers of the project in ensuring environmental and social acceptability of the project.
- (iv) Establish a baseline of existing environmental status at the project site prior to project initiation by collecting secondary and primary data/information on physical, biological and social environment of the project area.
- (v) Help the BID to incorporate necessary measures for legally compliant and socially acceptable environmental performance of their project.
- (vi) Identify significant environmental impacts (both positive and negative) during all stages of the project implementation and propose mitigation measures for negative impacts.

### 1.5 SCOPE OF IEE STUDY

32. The scope of this IEE study is collection and analysis of data related to physical, biological and socio-economic environment of the project area and to prepare the baseline environmental profile. It also aims at the identification, prediction and evaluation of the possible environmental impacts of the proposed project on its immediate surroundings on both short and long-term basis. Based on the nature and scale of those impacts, appropriate mitigation measures are proposed in this IEE report.

## 1.6 PURPOSE OF IEE REPORT

33. The purpose of this IEE report is to assess significant adverse environmental and social impacts and to suggest mitigation and remedial measures to make the project environmental friendly and sustainable during the construction and operational stages of the project and to initiate the process of NOC from the BEPA as well as clearance from ADB prior to mobilization of the Contractor.

## 1.7 STUDY TEAM

34. A multidisciplinary team was formulated to conduct the study. The team comprised the following experts:

Dr. Akhtar Iqbal	:	Environment Specialist
M. Hussnain Azam	:	Jr. Environmentalist
Ahmed Hassan	:	Environmentalist /Sociologist
Umer Raza	:	GIS Expert

## 1.8 METHODOLOGY

35. The following methodology was adopted for carrying out the IEE study of the proposed project:

### a) Orientation

36. Meetings and discussions were held among the members of the IEE consulting team. This activity was aimed at achieving a common ground of understanding of various issues of the study.

### b) Planning for Data Collection

37. Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the IEE consulting team. The plan identified specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and facilitation needs for the execution of the data acquisition plan.

### c) Data Collection

38. In this step, primary and secondary data were gathered through field observations, concerned departments and published materials to establish baseline of physical, biological and socio-economic environmental conditions.

- Site reconnaissance
- Analysis of maps and plans
- Literature review
- Meetings with concerned department
- Public consultation

### d) Physical Environment

39. Information was gathered on the existing physical environment, particularly as related to geology, topography, soils, hydrology and drainage, water quality, air quality, climate,

seismology and noise through available secondary and primary data about water, air and noise and field surveys.

#### **e) Biological Environment**

40. The status of the flora and fauna of the study area were determined by a review of literature of the area and an assessment of both terrestrial and aquatic environments.

##### **Flora**

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

##### **Fauna**

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

#### **f) Socio-Cultural Environment**

43. The consultants utilized a combination of literature, field investigations, census report, meetings through public consultation and interviews to describe the existing social environment and assessment of the potential impact of the construction of the proposed sub-projects. Data was gathered on the following aspects of the social environment:

- Land use and municipal status
- Demographics
- Livelihoods
- Community facilities
- Solid waste management
- Proposed developments
- Archaeological and cultural heritage
- Identification and evaluation of environmental impacts

44. The impacts of the proposed project on the physical, biological and socio-economic environments prevalent in the project area are identified at the design, construction and operational phases.

#### **g) Mitigation Measures and Implementation Arrangements**

45. The adequate mitigation measures and implementation framework were proposed so that the BID can incorporate them beforehand in the design phase.

## **1.9 STRUCTURE OF THE REPORT**

Section 1 “**Introduction**” briefly presents the project background, objectives, methodology and need of the IEE study.

Section 2 “**Policy, Legal and Administrative Framework**” comprises policy guidelines, statutory obligations and roles of institutions concerning the IEE study of the proposed project.

Section 3 “**The Project**” furnishes information about the studied alternatives, location of the proposed project, cost and size of the project, its major components and alternatives considered

for the proposed project to select at the preferred alternative for detailed environmental assessment.

Section 4 “**Environmental and Social Baseline**” describes physical, biological and socioeconomic conditions prevalent in the project area.

Section 5 “**Analysis of Alternatives**” describes the proposed alternatives of the project and identified the environmentally, socially and economically viable project design.

Section 6 “**Public Consultation**” identifies the main stakeholders and their concerns raised through scoping sessions and deals with the measures to mitigate the social impacts.

Section 7 “**Environmental Impacts Assessment and Mitigation Measures**” identifies and evaluates impacts of the project activities during the construction and operation stages and recommends with the measures proposed to mitigate potential environmental impacts of the proposed sub-project activities.

Section 8 “**Environmental Management Plan**” outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, monitoring cost etc.

Section 9 “**Conclusion and Recommendation**” describes the conclusion of this IEE report and recommendations for the proposed sub-project activities.

## **2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK**

### **2.1 GENERAL**

46. This chapter provides the current legal framework which is applicable on the proposed project in context of environment and sustainable development. The institutional arrangement that exists in Pakistan and may influence the environmental management of the proposed project is also discussed in this chapter. This IEE report also conforms with the guidelines as provided in ADB's Safeguard Policy Statement (SPS), 2009.

### **2.2 BACKGROUND**

47. The enactment of PEPA 1997 took up the key issues of PEPO and in addition provided for a considerable strengthening of institutions at the national and provincial level for the formulation, execution and enforcement of environmental policies and conferred broad-based enforcement powers to the EPA. NEQS for municipal and liquid industrial effluent, industrial gaseous emissions and motor vehicle exhaust and noise, were issued by Pakistan EPA in 1994.

48. Balochistan EPA review of IEE and EIA Regulations, 2020 and Pakistan Environmental Assessment Procedures were published, to provide necessary guidelines for preparation, submission and review of IEE and EIA studies.

### **2.3 NATIONAL ENVIRONMENTAL POLICY**

49. The National Environment Policy aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development. The Policy provides broad guidelines for addressing environmental concerns and ensuring effective management of their environmental resources. The provincial, AJK, Northern Areas and local governments, however may devise their own strategies, plans and programs in pursuit of this Policy.

50. Enforcement of the policy is being carried out through National Environmental Quality Standard (NEQS) and Self-Monitoring & Reporting Tools (SMART) in order to optimize energy and environmental resource consumption within the industries; encourage reduction, recycling and reuse of municipal and industrial solid and liquid wastes; introduce discharge licensing system for industry; devise and implement master plans for treatment of municipal and industrial wastewater in urban and rural areas. The policy has not been revised since 2005.

### **2.4 IWRM POLICY**

51. The Integrated Water Resources Management (IWRM) Policy in Balochistan was approved in 2006 which highlighted the reforms needed for water resources monitoring and planning in the province. The policy also enforces the adoption of IWRM approach for basin sustainability.

52. As per draft Balochistan Comprehensive Development Strategy 2013 -2020, the water sector development will be as follows:

53. "For the irrigation water, the strategy is clear that evolving Water Resource Management System and Institutional Framework will be central to sustainable water use in the province. The theme is pillared on undertaking river basin wide management of water with greater focus

on the flood irrigation and creating water storages on all strategic locations in the river basins and handling the irrigation and dams command area in an integrated manner. Under the Strategy, GoB will support restoration and rehabilitation of Check dams for flood control and groundwater recharge.

## **2.5 ENVIRONMENTAL LEGISLATIONS**

54. The key environmental regulations and legislations which are applicable to the proposed project is discussed below.

### **2.5.1 National Regulations**

55. The environmental policy framework, which will govern the project, is the NCS of Pakistan. The Pakistan NCS is a broad-based policy statement aimed at achieving environmentally sustainable social and economic development in Pakistan. The three overriding objectives of the NCS are:

- Conservation of natural resources
- Sustainable development
- Improved efficiency in the use and management of resources

56. Three operating principles are identified to achieve these objectives. These are:

- Greater public participation in development and environmental management
- A merging of environmental and economic decision making
- Lasting improvements in the quality of life

The NCS specifies the basic guidelines for an integrated effort aimed at protecting the environment and the natural resources of the country. This broad framework provides a comprehensive point of reference for all agencies, departments, private sector companies, financial institutions, and donor agencies for undertaking systematic efforts to bring about an effective change for sustainable development.

### **2.5.2 Pakistan Environmental Protection Act, 1997**

57. The PEPA 1997 is the apex environmental law of the country. Under section 12 of the Act, it is mandatory for the proponents of the projects to execute the IEE and / or EIA (where warranted) and get the approval from provincial EPA.

58. The following rules and regulations have been issued under the Pakistan Environmental Protection Act, 1997.

#### **Rules:**

- National Environmental Quality Standards (Self-monitoring and Reporting by Industries) Rules, 2001.
- Provincial Sustainable Development Fund (Procedure) Rules, 2001.
- Pakistan Sustainable Development Fund (Utilization) Rules, 2001.
- Pollution Charge for Industry (Calculation and Collection) Rules, 2001.
- Environmental Tribunal Procedures and Qualifications Rules, 2000.
- Environmental Samples Rules, 2001.

- Hazardous Substance Rules, 2000

#### **Regulations:**

- Review of IEE / EIA Regulations, 2020.
- National Environmental Quality Standards (Certification of Environmental Laboratories)

### **2.5.3 Balochistan Environmental Protection Act, 2012**

59. After the 18th Constitutional amendment, the subject of environment vide Notification No.4-9/2011-Min dated 29th June, 2011 stand devolved to the provinces with effect from 1st July, 2011. Even after the deletion of the subject of environment from the concurrent list, the Pakistan Environmental Protection Act 1997 remained intact as per Article 270-AA, Sub Article (6). However, there is provision that the province, through an appropriate legislature / competent authority, may alter, repeal and amend the laws related to the subject.

60. To regulate and effectively address the peculiar environmental issues of the province of Balochistan this act namely “Balochistan Environmental Protection Act, 2012” is submitted as per provisions of the Article 270-AA, Sub-Article (6) of 18th Constitutional amendments.

61. The proposed project falls under the jurisdiction of the Balochistan Environmental Protection Agency (BEPA).

62. This IEE report will need to be submitted to EPA (B) for grant of environmental NOC. An interesting provision of the provincial Act, which is relevant for the proposed project, is given in its section 20. Sub-section 2 of Section 20 states that “When preparing water resource management plans, Departments and other relevant institutions shall at least take the following into account:

- Provisions for integrated watershed management;
- Regulation of sustainable abstraction of groundwater;
- Regulation of the use of ground or surface water for agricultural, industrial, mining, and urban purposes;
- Measures to protect human health and ecosystems;
- Measures to protect wetlands and their associated ecosystems;
- Any other provision necessary for the sustainable use and management of water resources.

### **2.5.4 Balochistan EPA Review of IEE and EIA Regulations, 2020**

63. Two types of environmental assessments can be carried out i.e. IEE and EIA. EIAs are carried out for the projects that have a potentially significant environmental impact, and IEEs are conducted for relatively smaller projects with some relatively lesser significant impacts.

64. The Review of IEE and EIA Regulations 2020, prepared by BEPA under the powers conferred upon it by PEPA-97, categorizes projects for IEE and EIA, respectively. The proposed interventions are likely to fall under the Category B as defined in Schedule – I. According to these guidelines, the proposed project would require an IEE to be conducted.

65. According to the details provided in the regulations regarding preparation, submission, and review of IEEs and EIAs, following is a brief description of the approval process.



- A project is categorized as requiring an IEE or EIA using the two schedules attached to the regulations.
- An EIA or IEE is conducted as required and following the BEPA guidelines.
- The EIA or IEE is submitted to BEPA.
- A non-refundable review fee, depending on the cost of the project and the type of the report, is submitted along with the document as per the rates shown in Schedule III.
- The submittal is also accompanied by an application in the format prescribed in Schedule IV of the regulations.
- The BEPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report, (i) confirming completeness, or (ii) asking for additional information, if needed, or (iii) returning the report requiring additional studies, if necessary.
- The BEPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, for the issue of confirmation of completeness.
- When the BEPA accord their approval subject to certain conditions:
- Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
- Before commencing operation of the project, the proponent is required to obtain from BEPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
- An environmental management plan (EMP) is to be submitted with a request for obtaining confirmation of compliance.
- The BEPA is required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
- The IEE approval is valid for three years from the date of accord. The proponents are required to complete the construction and installation within this time period and start operations. In case of any delays, the proponents are required to obtain extension from EPA.

### **2.5.5 Land Acquisition Act 1894**

66. The primary law for acquisition of land for public purposes in Pakistan is the “Land Acquisition Act, 1894” (hereinafter referred as the Act). The land acquired under the Act vests in the Province and it is only thereafter that the Province may transfer it to someone else.

67. This law is no relevant to this project, because it involves restoration/rehabilitation of Water conservation structures within existing RoW owned by BID, and Land acquisition is not involved in this project.

### **2.5.6 Forest Act 1927**

68. The Forest Act, 1927 was largely based on previous Indian Forest Acts implemented under the British. The first and most famous was the Indian Forest Act of 1878. Both the 1878 act and the 1927 one sought to consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on



timber and other forest produce. It also defines the procedure to be followed for declaring an area to be a Reserved Forest, a Protected Forest or a Village Forest.

69. This Act is not relevant as the project does not lie in any of the notified forest land of Balochistan.

#### **2.5.7 The Antiquities Act, 1975**

70. This act basically defines how to repeal and re-enact the law relating to the preservation and protection of antiquities. The Federal Government may, by notification in the official Gazette, declare any antiquity to be a protected antiquity for the purposes of this Act. No person shall put any neon signs or other kinds of advertisement, including bill posting, commercial signs, poles or pylons, electricity or telephone cables and television aerials, on or near any protected immovable antiquity. No person shall, for any commercial purpose, make a cinematograph film of any protected antiquity or any part thereof except under, and in accordance with, a license granted by the Director. A contravention of any provision of this Act or the rules shall, where no punishment has been specification provided, be punishable with rigorous imprisonment for a term which may extend to six months, or with fine which may extend to five thousand rupees, or with both.

#### **2.5.8 Pakistan Penal Code, 1860**

71. The Pakistan Penal Code usually called PPC is a penal code for all offences charged in Pakistan. It was originally prepared on the behalf of the Government of British India. After the partition of India in 1947, Pakistan inherited the same code and subsequently after several amendments by different governments, it is now a mixture of Islamic and English Law. Presently, the Pakistan Penal Code is still in effect and can be amended by the Senate of Pakistan.

#### **2.5.9 The Balochistan Wildlife Protection (Amendment) Ordinance, 2001**

72. The Wildlife Protection Ordinance empowers the government to declare certain areas reserved for the protection of wildlife and control activities within these areas. It also provides protection to endangered species of wildlife. As no activities are planned in notified protected areas, no provision of this law is applicable to the proposed project.

#### **2.5.10 Balochistan Goats (Restriction) Ordinance 1959**

73. This law may come into play, if any of the proposed intervention falls in any informal grazing pasture, as livestock rearing is an important occupation in the project area. The ordinance empowers the Government to restrict movement and / or grazing etc. of livestock in certain areas.

#### **2.5.11 Balochistan Ground Water Rights Administration Ordinance, 1978**

74. This law was promulgated to ensure efficient and site-specific management of scarce water resources in Balochistan. The background to the law suggests admission that hydrological conditions in the entire Balochistan vary a great deal from place to place. Hence this Ordinance requires establishment of a Provincial Water Board and District Level Water Committees. The Provincial Water Board shall have representation from the Planning &

Development Department, Revenue Department, and Irrigation Department etc., thereby clearly identifying major stakeholders. The Ordinance also calls for registration of all water sources and establishes protocols for grant of permits by water committees for use of such sources. The statement of objectives for the Ordinance stipulates that the Provincial Water Board shall identify areas with ground water resources and declare them as Designated Ground Water Basins. It also calls for establishment of suitable laws for all designated ground water basins.

## **2.5.12 The Canal and Drainage Act, 1873**

75. This is an act to regulate Irrigation, navigation and drainage. The Provincial Government is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes, sub-soil water and other natural collections of still water.

## **2.6 INSTITUTIONAL SETUP FOR ENVIRONMENTAL MANAGEMENT**

76. The structural setup of agencies/departments in the environmental sector is such that the Provincial Ministry of Environment governs and regulates environment-related work at the government level. The BEPA works directly under the control of ministry.

### **2.6.1 Provincial Environmental Protection Council (Provincial EPC) and the Balochistan Environmental Protection Agency (BEPA)**

77. After devolution of the subject environment to provincial level under 18th amendment, these two organizations are primarily responsible for administering the provisions of the Balochistan Environmental Protection Act, 2012. The EPC oversees the functioning of the BEPA. Its members include the representatives of the government, industry, nongovernmental organizations and the private sector. The EPA is required to ensure compliance with the National Environmental Quality Standard (NEQS), establish monitoring and evaluation systems, and both identify the need to, as well as initiate legislation, whenever necessary. It is thus the primary implementing agency in the hierarchy. Another function of the provincial EPA are the review and approval of environmental assessment reports.

## **2.7 ASIAN DEVELOPMENT BANK SAFEGUARD POLICIES**

### **2.7.1 ADB Requirements for Preparation of Environmental Assessments of Projects**

78. The ADB SPS, 2009 affirms that “environmental and social sustainability is a cornerstone of economic growth and poverty reduction in Asia and the Pacific” (p 14). Furthermore, the document underlines the ADB’s Strategy 2030, promoting the “sustainability of project outcomes by protecting the environment and people from project’s potential adverse impacts”.

79. This IEE study is fully committed to the requirements determined in the “ADB Safeguard Policy Statement”. The environmental works carried out by RHC on behalf of project proponents have been essentially guided by these rules as enunciated in the “Outline of an Initial Environmental Examination Report”.

80. In the light of significance attached by ADB to various environmental impacts, Project is classified as Category B project, wherein an Initial Environmental Examination is required.

81. The main reason is that the interventions are basically the upgradation and rehabilitation of existing irrigation systems and no resettlement is envisaged. However, an environmental

assessment using ADB's Rapid Environmental Assessment (REA) checklist for urban development and water supply, was filled by PPTA consultants, and the results of the assessment show that the projects are unlikely to cause significant adverse impacts. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subprojects.

82. Thus, an Initial Environmental Examination (IEE) of the project has been conducted, through the following documents: -

- Review and data collection;
- Field visits and public consultation;
- Derive Baseline Condition for the area of influence of proposed work scheme;
- Alternative Analysis
- Impact identification and analysis, and planning and recommendation of mitigation measures;
- Preparation of an environmental management and monitoring plan.

## 2.7.2 ADB Safeguard Policy 2009

83. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. ADB's Safeguards Policy Statement 2009 (SPS) consists of three Safeguard Policies on the environment, involuntary resettlement and indigenous peoples. These are accompanied by Operations Manual sections on Environmental Considerations in ADB Operations; Involuntary Resettlement; and Indigenous Peoples. All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address the adverse effects of projects throughout the project cycle. The safeguard policies require that

- Impacts are identified and assessed early in the project cycle;
- Plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and
- Affected Persons (AP) are informed and consulted during project preparation and implementation.

The Project will need to comply with all the Safeguard Policies in the subproject or activities, irrespective of whether or not they are being funded in whole or in part by the ADB, the GoP or any other donor. A brief synopsis of these policies and their relevance for the proposed project is given in the **Table 2-1**.

**Table 2-1 ADB Safeguard Policy 2009 Relevant to Project**

S. No.	Safeguard Policies	Key Requirements	Remarks
1.	Environment	Projects and subprojects need IEE to address important issues not covered by any applicable regional or sectoral EA.	Applicable to proposed project
2.	Involuntary Resettlement	Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.	no involuntary resettlement is envisaged for the

		Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.	proposed project.
3.	Indigenous Peoples	Measures to avoid potentially adverse effects on the Indigenous Peoples' communities; and when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and intergenerationally inclusive.	There are no groups of people in the project area who could be categorized as indigenous people, therefore, this policy does not apply to the proposed project.

### 2.7.3 ADB's Accountability Mechanism Policy 2012

84. The objectives of the Accountability Mechanism are providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism is a "last resort" mechanism.

85. In case PAPs' grievances/complaints are unaddressed by multi-tiered Grievance Redressal Committee, ADB provides an independent forum to all the affected personnel to register their complaints directly. However, ADB may refer back the case to multi-tiered GRC for consideration if any complainant approaches ADB without utilizing the project based GRM first.

### 2.7.4 ADB's Access to Information Policy 2018 (AIP)

86. The objective of the AIP is to promote stakeholder trust in ADB and to increase the development impact of ADB activities. The policy reflects ADB's commitment to transparency, accountability, and participation by stakeholders in ADB-supported development activities in Asia and the Pacific. It also recognizes the right of people to seek, receive, and impart information about ADB's operations.

The policy applies to documents and information that ADB produces, requires to be produced by its borrowers or clients, or are produced and provided to ADB by other parties in the course of ADB operations. The policy will be implemented in accordance with detailed arrangements approved by ADB Management and made publicly available in accordance with ADB's normal procedures.

## **2.8 Relevant International Treaties**

### **2.8.1 Convention on Biological Diversity**

87. The Convention was opened for signature on 5th of June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). It remained open for signature until 4th of June 1993, by which time it had received 168 signatures. The Convention entered into force on 29th of December 1993, which was 90 days after the 30th ratification. The first session of the Conference of the Parties was scheduled on 28th of November – 9th of December 1994 in the Bahamas.

88. The Convention on Biological Diversity was inspired by the world community's growing commitment to sustainable development. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. Pakistan became its member in 1994. The Inspector General of Forests Office in the Ministry of Climate Change act as its Focal point.

### **2.8.2 Convention on the Conservation of Migratory Species of Wild Animals**

89. Also Known as CMS, it is an environmental treaty under the aegis of the United Nations Environment Program. CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. This was established at Bonn in 1979 and Pakistan has become its member in 1987. National Council for the Conservation of Wildlife in the Ministry of Climate Change is the focal desk for CMS.

## **2.9 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS**

90. The ADB's SPS 2009 requires application of pollution prevention and control technologies and consistency with international good practice, as reflected in internationally recognized standards. The SPS states that when host country regulations differ from these standards, the EA will achieve whichever is more stringent.

91. In order to select the most stringent standards applicable, a comparison of local (NEQS) and international i.e. International Financing Corporation (IFC)/ World Health Organization (WHO) and United States Environmental Protection Agency (USEPA) regulations have been made, as shown in Table 2-2 below. For air quality, comparison was only possible for pollutants having same averaging periods in NEQS, IFC and WHO. WHO for ambient air quality are more stringent in comparison to USEPA and NEQS standards, in the case of most pollutants. So, WHO standards will be used.

92. Similar to the standards for air quality, the comparison of noise standards provided in Table 2-3 clearly shows that NEQS for noise are more stringent in comparison to the WHO/IFC standards so these will be used to compare with baseline noise values. The only exception is the daytime noise level standard for Industrial areas where the WHO/IFC standard is more stringent (70 dB (A)) in comparison to NEQS (75 dB (A)) and so for this particular parameter, the WHO/IFC standard will be used.

93. As far as regulations regarding other environmental parameters are concerned such as acceptable effluent disposal parameters, the local regulations i.e. NEQS are more stringent and would be preferred over any other international regulations such as WHO/IFC.

94. Similar to the standards for air and noise quality, the comparison of drinking water quality standards provided in Table 2-4 clearly shows that NEQS for biological and physical parameters of drinking water quality are same as for WHO standards except for Total hardness as CaCO<sub>3</sub>. NEQS for chemical, toxic inorganic and organic parameters are mostly similar/comparable to zinc, residual chlorine, Phenolic compounds (as Phenols) mg/l, Polynuclear aromatic hydrocarbons (as PAHs) g/l. WHO for Lead and Zn are more stringent comparatively. No WHO standards will be used to compare with baseline values.

**Table 2-2 Applicable Most Stringent Air Quality Standards\***

Pollutants	WHO/IFC		Pak. NEQS	
	Avg. Time	Standard	Avg. Time	Standard
SO <sub>2</sub>	24 hr. 10 min	20 up/m <sup>3</sup> 500 up/m <sup>3</sup>	Annual Mean 24 hrs.	80 up/m <sup>3</sup> 120 up/m <sup>3</sup>
CO	-	-	8 hrs. 1 hr.	5 mg/m <sup>3</sup> 10 mg/m <sup>3</sup>
NO <sub>2</sub>	1 yr. 1 hr.	40 up/m <sup>3</sup> 200 up/m <sup>3</sup>	Annual Mean 24 hrs.	40 up/m <sup>3</sup> 80 up/m <sup>3</sup>
O <sub>3</sub>	8 hrs.	100 up/m <sup>3</sup>	1 hr.	130 up/m <sup>3</sup>
TSP	-	-	Annual Mean 24 hrs.	360 up/m <sup>3</sup> 500 up/m <sup>3</sup>
PM <sub>10</sub>	1 yr. 24 hr.	20 up/m <sup>3</sup> 50 up/m <sup>3</sup>	Annual Mean 24 hrs.	120 up/m <sup>3</sup> 150 up/m <sup>3</sup>
PM <sub>2.5</sub>	1 yr. 24 hr.	10 up/m <sup>3</sup> 25 up/m <sup>3</sup>	Annual Average 24 hrs. 1 hr.	15 up/m <sup>3</sup> 35 up/m <sup>3</sup> 15 up/m <sup>3</sup>

Table 2-3 Applicable Most Stringent Noise Standards

Category of Area/Zone	Limit in dB(A) Leq			
	NEQS		WHO	
	Day Time 06:00 – 22:00	Night Time 22:00-06:00	Day Time 07:00 – 22:00	Night Time 22:00-07:00
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70
Industrial area (C)	75	65	70	70
Silence zone (D)	50	45	55	45

95. There are no national standards for surface water quality. Instead, drinking water quality and effluent discharge (to inland waters) are listed below. The latter standard assumes a dilution factor of 10 to 1 at discharge and this dilution is taken as an indicator of acceptable surface water quality. The WHO standards will be used for comparison with baseline water quality values.

Table 2-4 Comparison of International and Local Drinking Water Quality Standards

Parameter	Unit	NEQS	WHO/IFC
<b>Bacterial</b>			
<b>E-Coli</b>	numbers/ml	Must not be detectable in any 100	Must not be detectable in any 100
<b>Total Coliform</b>	numbers/ml	Must not be detectable in any 100	Must not be detectable in any 100
<b>Physical</b>			
<b>Color</b>	TCU	≤ 15 TCU	≤ 15 TCU
<b>Taste</b>	No objectionable/Acceptable	No objectionable/Acceptable	No objectionable/Acceptable
<b>Odor</b>	No objectionable/Acceptable	No objectionable/Acceptable	No objectionable/Acceptable
<b>Turbidity</b>	NTU	< 5 NTU	< 5 NTU
<b>Total Hardness</b>	mg/l	< 500 mg/l	--
<b>TDS</b>	mg/l	< 1000	< 1000
<b>pH</b>		6.5-8.5	6.5-8.5



Chemical			
Aluminum	mg/l	≤0.02	0.2
Antimony	mg/l	≤0.005 (P)	<0.02
Arsenic	mg/l	≤0.05 (P)	0.01
Barium	mg/l	0.7	0.7
Boron	mg/l	0.3	0.3
Cadmium	mg/l	0.01	0.003
Chloride	mg/l	<250	250
Chromium	mg/l	≤0.05	0.05
Copper	mg/l	2	2
Cyanide	mg/l	≤0.05	0.07
Fluoride	mg/l	<1.5	1.5
Lead	mg/l	≤0.05	0.01
Manganese	mg/l	≤0.5	0.5
Mercury	mg/l	≤0.001	0.001
Nickel	mg/l	≤0.02	0.02
Nitrate	mg/l	≤50	50
Nitrite	mg/l	≤3	3
Selenium	mg/l	0.01 )P)	0.01
Residual Chlorine	mg/l	0.2-0.5 at consumer end	-
Zinc	mg/l	5.0	3

96. The NEQS for vehicular emissions and wastewater are given in Table 2-5 and 2-6 respectively.

**Table 2-5: NEQS for Motor Vehicle Exhaust and Noise**

Sr. No.	Parameter	Standards (maximum permissible limit)	Measuring method
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1	Smoke	40% or 2 on the Ringelmann Scale during engine acceleration mode.	To be compared with Ringelmann Chart at a distance of 6 meters or more.
2	Carbon Monoxide	Emission Standards: New Used Vehicles 4.5% 6%	Under idling conditions: Non-depressive infrared detection through gas analyzer
3	Noise	85 db (A)	Sound-meter at 7.5 meters from the source

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**Table 2-6: National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (Mg/L, Unless Otherwise Defined)**

Sr. No.	Parameter Standards	Value
1.	Temperature	40°C
2.	pH value (acidity/basicity)	6-10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20°C	80mg/L
4.	Chemical Oxygen Demand (COD)	150 mg/L
5.	Total Suspended Solids	150 mg/L
6.	Total Dissolved Solids	3500 mg/L
7.	Oil and Grease	10 mg/L
8.	Phenolic compounds (as phenol)	0.1 mg/L
9.	Chloride(as Cl <sup>-</sup> )	1000mg/L
10.	Fluoride (as F <sup>-</sup> )	20mg/L
11.	Cyanide (as CN <sup>-</sup> )	2mg/L
12.	An-ionic detergents <sup>(2)</sup> (as MBAS) <sup>(5)</sup>	20mg/L
13.	Sulphate(SO <sub>4</sub> <sup>2-</sup> )	600mg/L
14.	Sulphide (S <sup>2-</sup> )	1.0mg/L
15.	Ammonia (NH <sub>3</sub> )	40mg/L
16.	Pesticides, herbicides, fungicides and	0.15mg/L
17.	insecticides Cadmium <sup>(4)</sup>	0.1mg/L
18.	Chromium (4) (trivalent and hexavalent)	1.0 mg/L
19.	Copper <sup>(4)</sup>	1.0mg/L
20.	Lead <sup>(4)</sup>	0.5mg/L
21.	Mercury <sup>(4)</sup>	0.01mg/L
22.	Selenium <sup>(4)</sup>	0.5mg/L

23.	Nickel <sup>(4)</sup>	1.0mg/L
24.	Silver <sup>(4)</sup>	1.0mg/L
25.	Total toxic metals	2.0 mg/L
26.	Zinc	5.0mg/L
27.	Arsenic	1.0mg/L
28.	Barium	1.5mg/L
29.	Iron	2.0mg/L
30.	Manganese	1.5mg/L
31.	Boron	6.0mg/L
32.	Chlorine	1.0mg/L

Explanations:

1. Assuming minimum dilution 1: 10 on discharge. Lower ratios would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency.
2. Assuming surfactant as biodegradable.
3. MBAS means Methylene Blue Active Substances.
4. Subject to total toxic metals discharge as at S. No. 25.

### 3. PROJECT DESCRIPTION

#### 3.1 BACKGROUND

97. The regions of Killa Abdullah and Naseerabad are under severe threat of flooding during heavy rains. The rapid floods originating from hill torrents in the area cause extensive devastation across almost the entire region due to their high velocity and magnitude. Specifically, the recent high-intensity rainfall in July and August 2022 broke all previous records. During these instances of high-magnitude flash floods, the flood protection schemes and conservation structures under discussion sustained heavy damages due to unprecedented rainfall and cloud bursts. These events led to significant damage and erosion, affecting the protection bund's aprons, embankments, stone pitching, dam body/spillway in Killa Abdullah and canal embankments in Naseerabad.

98. Therefore, this project is being proposed not only to restore the damaged structures but also to strengthen them against similar events in the future. By investing in rehabilitation and strengthening efforts, the government aims to create a more resilient and disaster-ready infrastructure capable of better withstanding extreme weather events. Ultimately, this initiative aims to reduce the vulnerability of the region to flooding and its associated consequences.

#### 3.2 COMPONENTS OF THE PROJECT AND SCOPE OF WORK

99. Main components of the sub-project include:

- Restoration and rehabilitation of water conservation structures (Small delay action dams, Flood protection bunds)
- Restoration and strengthening of flood embankment of canal and drain respectively.

100. The salient features of the project and details of the scope of work are presented below.

##### 3.2.1 DISTRICT KILLA ABDULLAH

###### 1. PIR ALIZAI & MAJAK FLOOD PROTECTION BUND

101. The Pir Alizai and Majak flood protection bund is located along the left bank of the Arambi river, 14 kilometres north east of Killa Abdullah district headquarters, at 30°43'55.16" N and 66°44'19.81"E. The flood protection bund was constructed in different phases under the provincial PSDP in 1990-91, then again in the years 2006-07, 2008-09 and under the provincial PSDP in 2010-11 respectively. The flood protection bund has helped in protecting Thooth ada Bazar, Killi Pir Alizai and Killi Majak from the floods.

102. The existing damaged protection Bund of Pir Alizai and Majak area is located along the left bank of Arambi river, which was designed for a flood discharge of 12,254 cusecs and a scouring depth of 3.50 ft. Owing to devastating flood of monsoon 2022, the Arambi river experienced a flood discharge of 16,183 cusecs, due to which the Bund got washed/damaged at different RD's. Therefore, the protection Bund is now designed in accordance with the 2022 monsoon flood discharge and scouring depth of 4.75 ft. with the Lacy's Silt factor of 2.75 for materials such as shingles and sand.

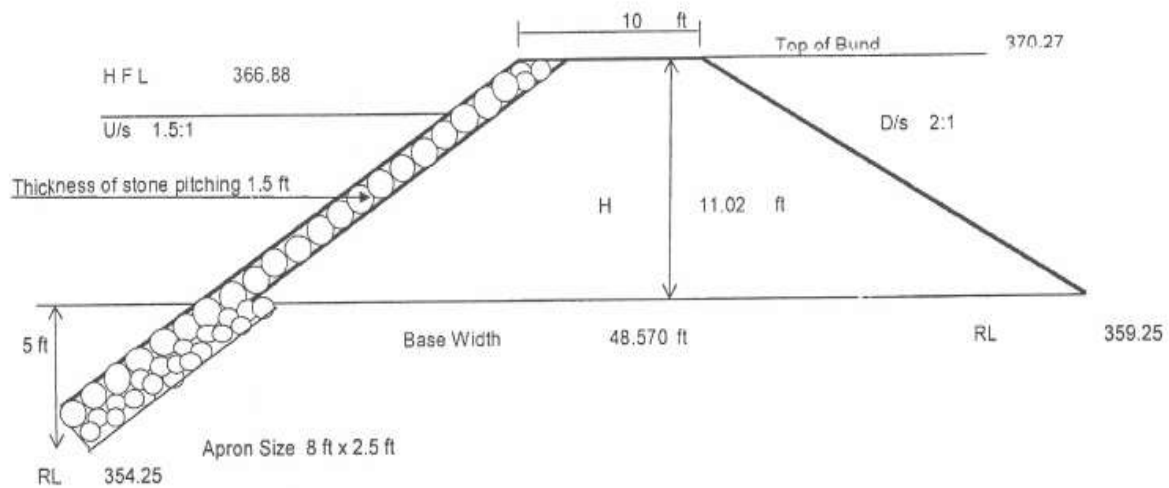


Figure 3-1: X-Section of Bund at 0+000 RD

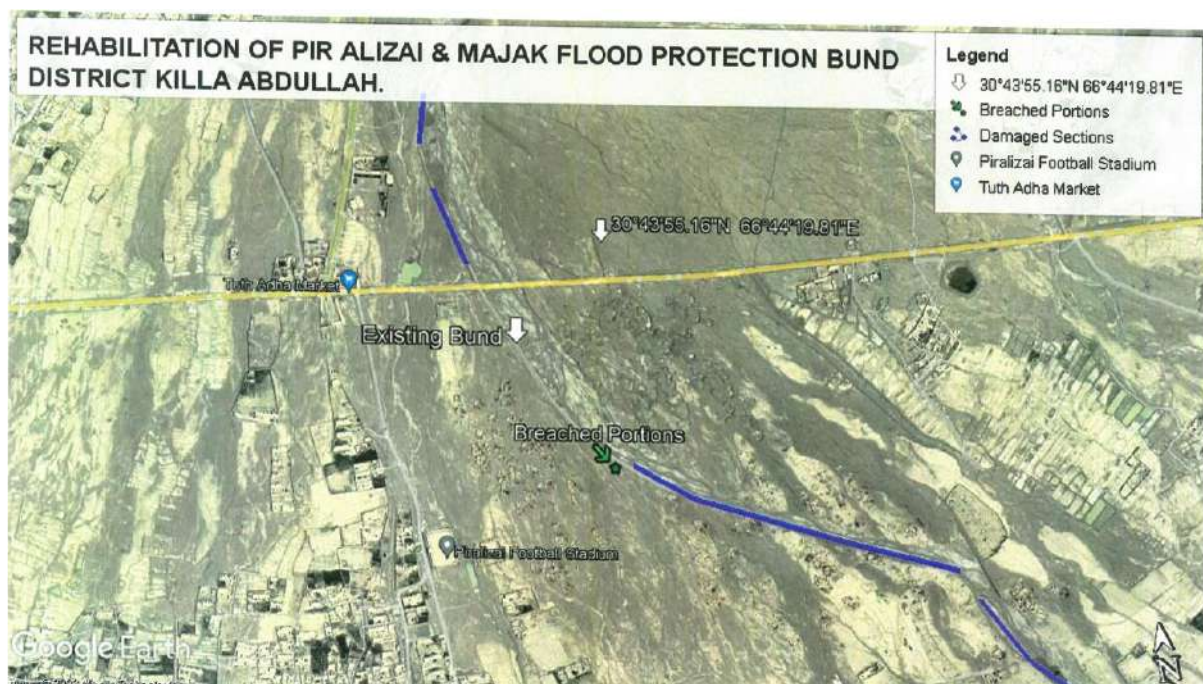


Figure 3-2: Location of Pir Alizai & Majak flood protection Bund

## 2. KILLA ABDULLAH BAZAR FLOOD PROTECTION BUND

103. The Killa Abdullah Bazar flood protection Bund is located along the right bank of the Machka river, 17 kilometres northeast of Killa Abdullah district headquarters, at 30°44'03.00" N and 66°39'39.00"E. The flood protection bund was constructed in three phases and the flood protection bund has helped in protecting the main Killa Abdullah Bazar/ town.

104. The existing damaged protection bund of Killa Abdullah area is located along Machka river, which was designed for a flood discharge of 7520 cusecs and scouring depth of 3.0 ft.



Owing to the devastating floods of the 2022 monsoon, the Machka river experienced a flood discharge of 10,983 cusecs, due to which the Bund got washed/ damaged at different RD's and therefore the protection Bund is now designed in accordance to the 2022 monsoon flood discharge and scouring depth of 4.15 ft. but kept 4.5 ft. for added protection.

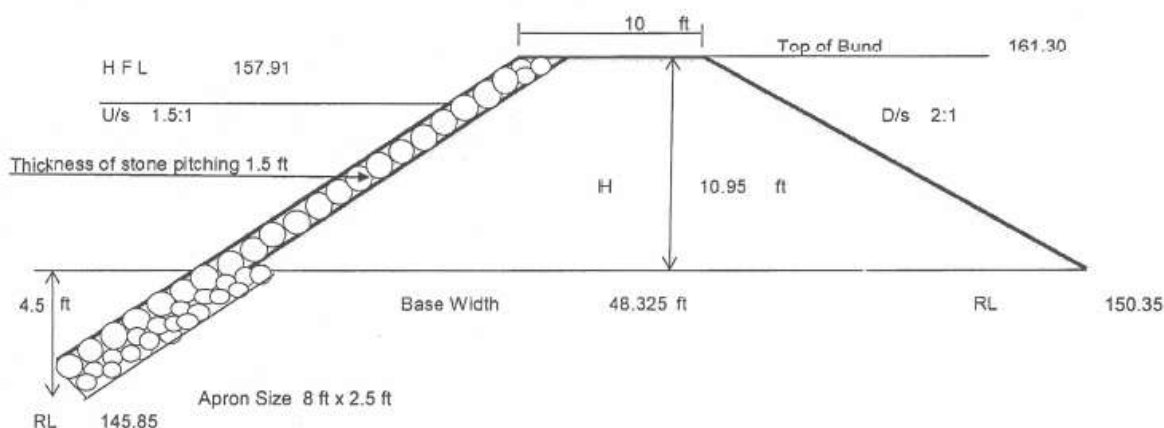


Figure 3-3: X-Section of Bund at 0+000 RD



Figure 3-4: Location of Killa Abdullah Bazar flood protection Bund

### 3. DOBANDAI FLOOD PROTECTION BUND

105. Dobandai (Toba area) flood protection bund is located along the left bank of Kadanai River, 63 kilometers north of Killa Abdullah district headquarters at 31°13'58.74"N and 66°51'18.20"E. The flood protection bund was constructed under the Balochistan Minor Irrigation and Agricultural development project in 1994-95, at a cost of Rs. 4.240 million. The flood protection bund has helped in protecting the main tehsil town of Dobandai.

106. The existing damaged flood Protection Bund of Dobandai area is located along left bank of Qadanai river, which was designed for a flood discharge of 14,670 cusecs and scouring depth of 4.0 ft. Owing to devastating floods of the 2022 monsoon season, the Qadanai river experienced a flood discharge of 23,751 cusecs, due to which the Bund got washed/damaged at different RD's. Therefore, the protection Bund has now been designed in accordance to the 2022 monsoon flood discharge and scouring depth of 6.46 ft (say 6.5 ft. for safe side) with the Lacy's Silt factor of 2.75.

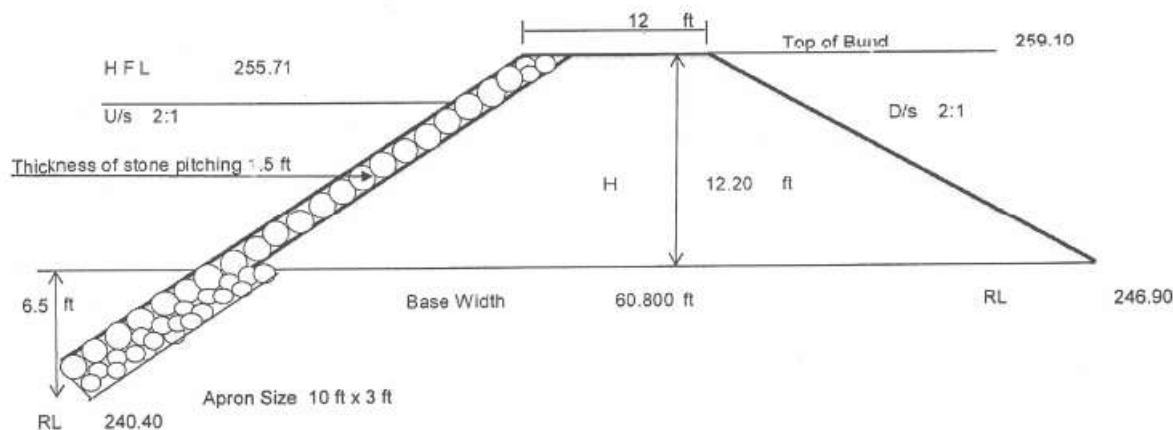


Figure 3-5: Typical X-section of Bund at 0+000 RD



Figure 3-6: Location of Dobandai Flood Protection Bund

#### 4. ESSARGAI DELAY ACTION DAM DOBANDAI



107. The Essargai Delay Action dam is located on the Essargai Manda (river), in the Essargai village of Tehsil Dobandai, about 38 Kilometers north of Killa Abdullah district headquarters, at  $31^{\circ}02'52.29''\text{N}$   $66^{\circ}47'02.80''\text{E}$ . The Essargai river has a total drainage area/ catchment area of 3.41 sq. miles, located upstream of the reservoir, with a flood discharge of 2,831 cusecs. The dam was constructed under the provincial PSDP 2003-2004 at a cost of Rs. 4.150 million and was designed to store water for the recharge of the valley's groundwater aquifer and flood control. The earth filled dam is 50 feet high above the riverbed, creating a reservoir with a live storage capacity of 190.59 acre feet.

108. The spillway was cut on the left side of the dam body in 330 feet of length and the base width was kept at 65 feet, designed for the safe passage of 2,831 cubic feet per second. PCC cutoff walls and gabion steps as well as gabion retaining walls on either side of the spillway were constructed to stop bed erosion, but were not anchored to the bedrock properly and thus failed.

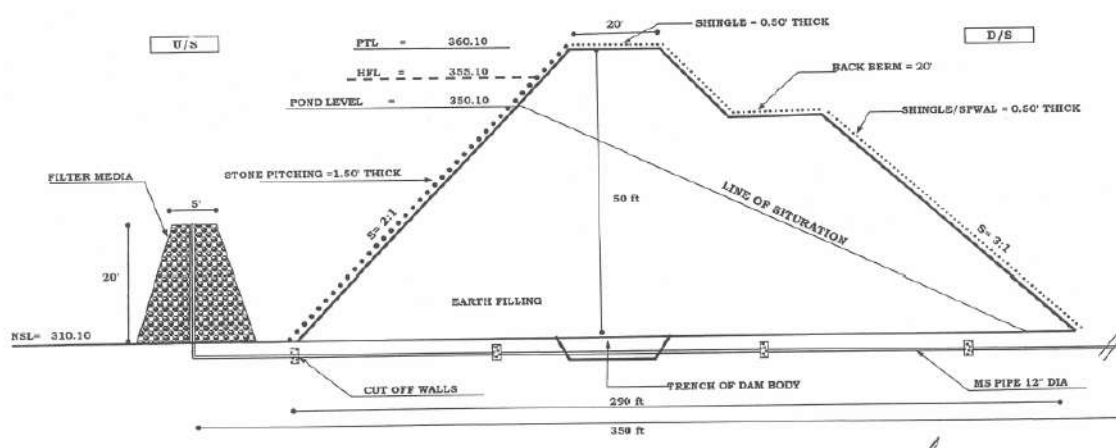


Figure 3-7: Typical X-Section of Dam Body



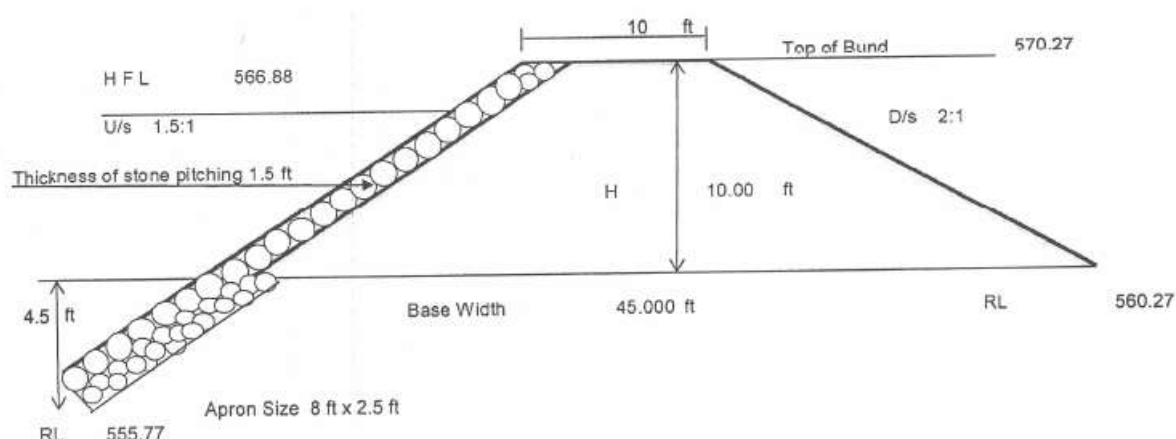


**Figure 3-8: Location of Essargai Delay Action Dam**

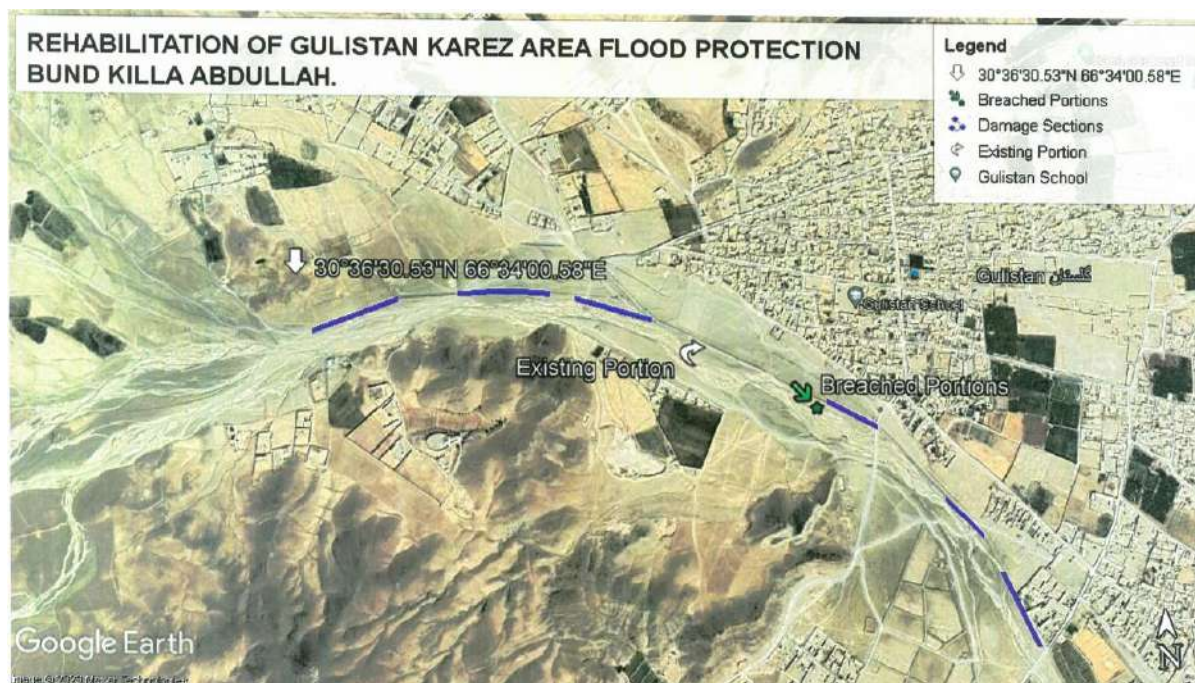
## 5. GULISTAN KAREZ AREA FLOOD PROTECTION BUND

109. The Gulistan Karez flood protection bund is located along the Khurhgai river to protect Killi Ahmed Khan Achakzai and the upper portion of Gulistan Bazar, 31 kilometres southwest of Killa Abdullah district headquarters, at 30°36'30.53" N and 66°34'00.58"E. It was constructed in different phases, firstly in 1983-84, then in 1987-88 and lastly in 2008-09. The flood protection Bund has helped in protecting the upper portion of Gulistan Bazar, about 14,500 people and 325 acres of cultivated land since 1984.

110. The existing damaged protection bund of Gulistan Karez area is located along Gulistan river, which was designed for a flood discharge of 4,125 cusecs and scouring depth of 2.50 ft. Owing to devastating flood of the 2022 monsoons, the Gulistan river experienced a flood discharge of 6,816 cusecs due to which the Bund got washed/damaged at different RD 's and therefore the protection bund has now been designed in accordance to the 2022 monsoon flood discharge and scouring depth of 4.20 ft. with the Lacy's Silt factor of 2.75 for materials such as shingle and sand.



**Figure 3-9: X-Section of Bund at 0+000 RD**



**Figure 3-10: Location Map of Gulistan Karez Area Flood Protection Bund**

## **6. SEGAI AREA FLOOD PROTECTION BUND**

111. The Segai flood protection is located along both banks of the Khurhgai river in the Segai area, 29 kilometres south west of Killa Abdullah district headquarters, at 30°34'59.40"N and 66°34'57.13"E. The flood protection bund was constructed under the Provincial PSDP 2013-14, at a cost of Rs. 33.00 million. The flood protection work was constructed to protect the agricultural lands/ orchards and the local settlements of the Segai area.

112. The existing damaged flood protection bund of Segai area is located along Segai river, which was designed for a flood discharge of 2860 cusecs and scouring depth of 2.30 ft. Owing to devastating flood of the 2022 monsoon season, the Gulistan river experienced a flood discharge of 5074 cusecs, due to which the Bund got washed/ damaged at different RD's and therefore the protection Bund has now been designed in accordance to the 2022 monsoon flood discharge and scouring depth of 4.46 ft. with the Lacy's Silt factor of 2.75 for materials such as shingle and sand.

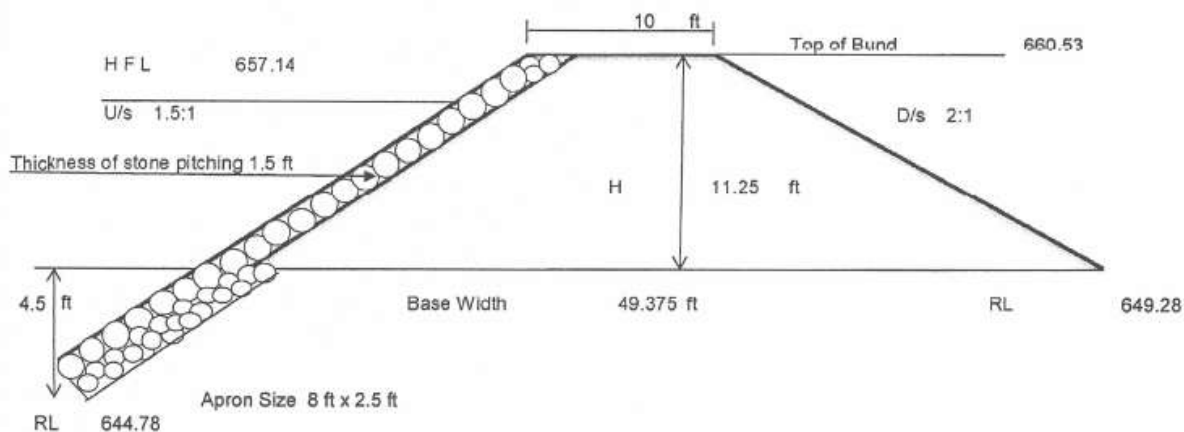


Figure 3-11: X-Section of Bund at 0+000 RD

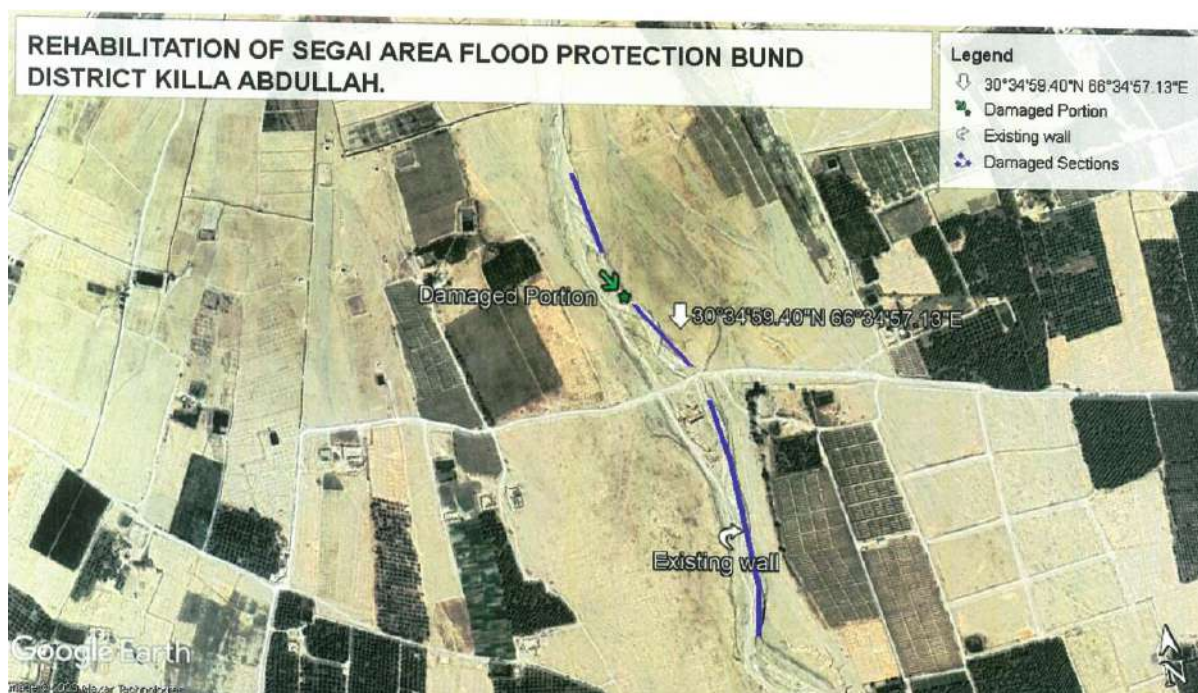


Figure 3-12: Location Map of Segai Area Flood Protection Bund

### 3.2.2 DISTRICT NASEERABAD

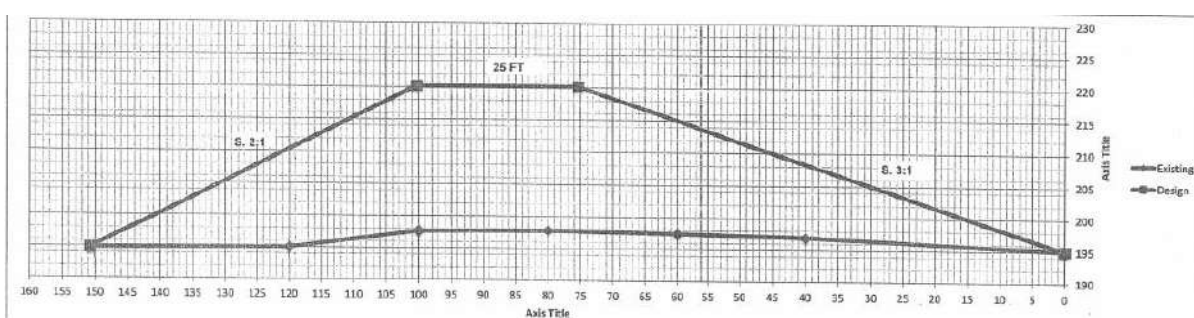
#### 1. FLOOD EMBANKMENT OF PAT FEEDER CANAL FROM RD.238+000 TO RD.395+000

113. Pat Feeder Canal system was constructed as a part of Guddu Barrage Project in 1969, with a designed capacity of 3,200 cusecs for irrigating a cultivable command area of 458,425 acres in Jaffarabad and Naseerabad districts. It has a total length of 171 km, out of which 37 km are located in Sindh province. Also, the Head Regulator along with 5 X-Regulators are constructed on the main canal for controlling and diverting flow in 13 distributaries in proportion to their design capacities (based on command area). From these distributaries, water is being provided to the farmers through minor and pipe outlets for irrigation of their lands located along the left side of the Canal.



114. Owing to devastating floods of monsoon 2010, 2012 and 2022, the entire Pat Feeder Canal system, including the Rabi Canal was severely affected. Besides, occurrence of a series of breaches, the canals were mostly submerged in flood water at different locations. The cross-regulator structure of RD-418 was damaged seriously. The continuous and heavy down pour caused rain-cuts / pierced the embankments top, slopes and berms throughout the length. The flood water containing mud, sand and silt particles caused deposition of heavy silt in the bed of canal. As a result, the Canals have almost lost their designed discharge capacity and it was not possible to regulate the system to cater for the demand until complete restoration and rehabilitation of flood damages.

115. The Pat Feeder Canal from R D 238+000 to R D 397+000 R/S Embankment is in poor condition and was badly damaged in the 2022 floods and a survey was made by the Pat Feeder Canal division.



**Figure 3-13: Closing of Breach of Main Pat feeder Canal X-Section at RD 206+000 (R/S)**



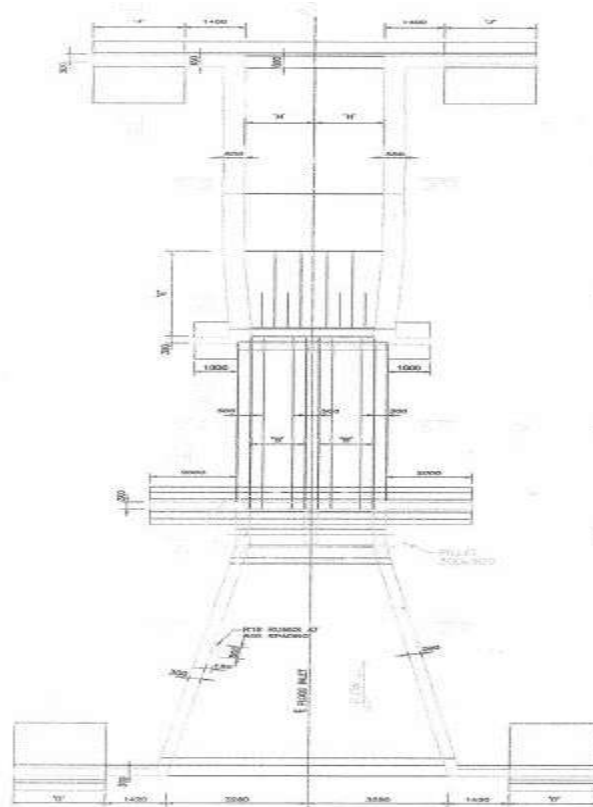
**Figure 3-14: Location Map of Pat Feeder Canal**

## **2. EMBANKMENT OF OUT FALL DRAIN USTA MUHAMMAD**

116. Hairdin main drain is the oldest and very important / major component of drainage system. The Drain and its congested network were constructed to reclaim an area of about 186,000 acres in the command of Uch, Manuthi, Pat Feeder and Desert canal system. The condition of drainage network was not in good condition since 2010 floods, which was further aggravated during floods of 2012 and 2022. The area under the command is located in depression and as such, entire flood flows, combined with rainfall run-off from local catchment in Sindh and Balochistan rushed to this area and caused severe destruction to the entire network of drains.

117. The drains were mostly submerged in flood water, while the structures like aqueducts, bridges, inlets, outlets and underpasses sustained heavy losses. The drain embankments are mostly used as approach tracks in the area and the embankments were interrupted. Although the damage to Hairdin main drain and its network / branch drains, sub drains and minor drains were considerable, yet it was considered a priority to initiate appropriate measures to be taken to reclaim the irrigable area and prevent losses to ancient towns of District Sohbat Pur, Jaffarabad, Usta Mohammad, Naseerabad and Jhal Magsi. In this context, the entire drainage network system requires complete rehabilitation.

118. In order to restore the scheme, which was damaged in 2022 monsoon flood season, the drainage crossing structures to cross the drain were mostly damaged and also washed away in the floods. So, the drainage irrigation division Dera Allah Yar has been proposed to be re-constructed at 03# V.R.B and 01# foot bridge alongwith stone pitching to save the structures from erosion as 1100 ft. U/ S as well as 1100 ft. D/S of structure in the proposal.



**Figure 3-15: Typical X-Section**



**Figure 3-16: Location Map of Out Fall Drain Usta Muhammad**



### 3.3 Project Cost

119. The estimated total cost for construction of proposed project is 1002.534 million PKR. This cost is tentative and will be finalized with the detailed technical design of the proposed project.

### 3.4 Project Administrative Jurisdiction

120. The proposed project falls under the jurisdiction of the deputy Commissioners of Killa Abdullah and Naseerabad, Balochistan province.

#### 3.1 Project Implementation Schedule

121. It is estimated that with efficient management, the work will be completed within 7 months after the commencement subject to availability of funds.

#### 3.2 Construction Activities and Civil Works

122. Proposed project involves following construction activities and civil works are:

##### **Dam - Civil Works:**

- **Excavation:** Spillway earthwork excavation, disposal, and dressing using shingle or gravel.
- **Foundation Concrete:** Laying cement concrete in foundation with crushed stone (1:4:8 mix ratio). Level, compact, and cure concrete properly.
- **Steel Reinforcement:** Providing and laying Grade 60 steel reinforcement for R.C.C. work, including preparation, cutting, bending, and binding.
- **Stone Pitching and Filling:** Performing stone pitching and dry hand-packed filling behind retaining walls and aprons.
- **In Situ Concrete for Walls and Piers:** Providing in situ cement concrete with approved sand and crushed aggregate. Including compacting, curing, formwork, and removal.
- **Excavation in Foundation (Dam):** Excavating foundation, considering layout, dressing, refilling, watering, and ramming, with lift and lead considerations.

##### **Flood Protection Bunds/Embankment - Civil Works:**

- **Excavation:** Earthwork excavation, disposal, and dressing using shingle or gravel.
- **Embankment Earthwork and Compaction:** Mechanically compacting earth embankment with optimal moisture content.
- **Stone Pitching for Top Layer:** Providing and laying stone pitching on the slope's top layer.
- **Crush Aggregate Application:** Laying crushed aggregate atop the bund, considering lift and lead.
- **Wire Crate Installation:** Providing, filling, and sewing wire crates, including lead and lift costs.
- **Hard Soil Compaction for Embankment:** Mechanically compacting hard soil embankment, including laying, leveling, and watering.



- **In-Situ Cement Concrete Lining:** Applying cement concrete on-site for canal lining, including scaffolding, formwork, removal, and curing.
- **Expansion Joints and Joint Sealing:** Forming expansion joints with cork sheet bitumen, preparing surfaces, and sealing.
- **Dismantling** of Stones in Wire Mesh Crates
- **Clearing and Grubbing:** Removing roots, scarifying natural ground, and disposing
- **Borrow Pit Excavation:** Excavating borrow pits with specified depth and undressed lead.
- **Crush Aggregate on Top of Bund:** Providing and laying crushed aggregate on top of the bund.

### 3.3 Construction Camps

123. The Camp sites will be selected based on following considerations:

- Number of workforces deployed;
- Type and quantity of machinery mobilized;
- Availability of adequate area for establishing camp sites including parking areas for machinery, stores and workshops;
- Access to communication and local markets;
- Appropriate distance from sensitive areas including settlements and religious and/or cultural facilities.

124. Final locations will be selected by the contractor with the assistance of Supervision Consultant. Care will be taken to safeguard the existing environment of the area and location, which shall be selected away from settlements. The Contractor(s) may acquire land on lease from private landowners.

### 3.4 .Water required for construction and Source of Construction material

125. It is estimated that about 48,000 gallons of construction water will be required for the project. This estimate is based on the information received from the project design which has provided an estimated water requirement of 6000 gallons per site which results in 48,000 gallons for the eight proposed sub-project work sites.

126. **For subprojects of District Killa Abdullah** Cement and steel will be procured from Quetta, sand and aggregate Crush from Killa Abdullah.

127. **For subprojects of District Naseerabad:** Sand and crush will be procured from district Kachi. Steel and cement are locally available.

128. No material will be sourced from any river/stream bed.

### 3.5 Workforce Requirement

129. Manpower demand estimation is an essential component to facilitate deployment of manpower.

#### **Workforce during Construction Phase**

130. Total manpower required for all the project sites of proposed project will be approximately 112 skilled and 340 unskilled workers per day, depending on the type of construction.

### 3.6. Solid Waste Generation

131. Due to construction activities, waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and waste construction materials (construction waste will be reused or recycled through vendors).

132. Considering the labourers (about 200 in numbers) residing in the construction camp and the locally available labour, an average solid waste generation rate of 0.5 kg/capita/day<sup>2</sup> is adopted for the estimation of solid waste generation<sup>3</sup>. Based on this assumption, a total of about 100 kg of solid waste will be generated from construction camps on daily basis. Solid waste generated during construction and camp sites shall be safely disposed in designated waste disposal sites after consultation with the concerned authorities of Killa Abdullah and Naseerabad Districts.

### 3.7. Water requirement

#### **Construction Phase**

133. The water consumption is estimated to be a total of 8000 gallons/day<sup>4</sup> for 200 construction workers during construction phase of the proposed sub-projects.

### 3.8 Wastewater Generation

134. The wastewater generation is estimated to be 6400 litres/day. Constructed wetland for wastewater treatment will be the best option considering local conditions. Its operation will result in treated water within the NEQS standards being discharged into the environment and thus it is expected to reduce the load on the aquatic and terrestrial habitats present in proximity to the receiving water bodies in the project areas.

### 3.9 Power Requirement

#### **Construction Phase**

135. The main source of electricity/electric power during construction phase will be diesel generators for construction camps and construction machinery.

2 The Asian Development Bank. (2022). Initial Environmental Examination Report (2023): Punjab Arterial Roads Improvement Project. Corridor 3: Depalpur–Pakpattan Sharif–Vehari. Pp. 58. [https://www.adb.org/sites/default/files/project-documents/54149/54149-001-iee-en\\_56.pdf](https://www.adb.org/sites/default/files/project-documents/54149/54149-001-iee-en_56.pdf).

<sup>4</sup> Tentative Work Force Requirements Contractor Staff =  
Water consumption per (1) worker = 40 liters/day  
(200 workers) x (40); = 8000 liters/day  
Wastewater generation=(200 workers) x (80% of water consumption)=6400 liters/day

### 3.10 CONSTRUCTION EQUIPMENT

136. Table 3-1 shows a tentative list of construction equipment required by the Contractor to enable him to undertake this work and meet the prescribed schedule.

**Table 3-1: List of Construction Equipment Required by the Contractor**

Sr. No.	Description	No. Required
1	Bulldozer D8 with ripper (Blade capacity = 12.9 m <sup>3</sup> )	Various depending upon contractor progress
2	Motor Grader cat 14G or Equivalent	
3	Front End Loader Bucket capacity = 6 m <sup>3</sup>	
4	Sheep foot roller for core compaction (10-ton capacity)	
5	Dump Trucks (capacity = 14 m <sup>3</sup> )	
6	Mobile water tanker 500 gallons	
7	Hydraulic Excavator with 14" wide bucket	
8	Concrete Batching Mixer	
9	Concrete Vibrators	
10	Centrifugal pumps ½ cfs	
11	Hand compactors	
12	Diesel generator	
13	Jeeps	

## 4. ENVIRONMENTAL AND SOCIAL BASELINE

### 4.1 GENERAL

137. The purpose of this chapter is to establish the baseline conditions for the physical, biological and the socio-economic aspects of environment of the project area. The data were collected regarding the physical environment, biological environment and social aspects of the study area during stakeholder consultation and technical visits conducted by the environment team.

### 4.2 AREA OF INFLUENCE(AOI)

138. This chapter describes the environmental, social and biological baseline conditions of the project area. The baseline conditions have been established on the basis of the data collected from the field, and through unstructured interaction with the local communities as well as the officials from various departments. In addition, the published data (secondary data) was also used to provide background information about the project area.

139. In this report, the Area of Influence (AOI) is referred where the potential impacts of the proposed project are anticipated. The Aol includes all those areas in the region within 0.5 km from the project site and which may be affected directly or indirectly by the project activities. This Aol of 500 meters is considered sufficient to assess any potential impacts that might take place on the biological and physical environment, particularly considering the limited and site-specific nature and scope of the proposed scope of works. This chapter describes the environmental setting of the proposed interventions.

### 4.3 PHYSICAL ENVIRONMENT

#### 4.3.1 Topography

140. Killa Abdullah district is surrounded by mountains which are intersected by long narrow valleys and the ground elevation of these valleys ranges from 1,205 to 2,675 m above mean sea level. The northern end of the district consists of the great plateau of the Toba Kakar Range which is the largest mass of mountains in the district stretching along its northern boundary and tapering off on the southwest into the Khwaja Amran Range and afterwards into the Sarlath Range. The Toba plateau drains northwards into Afghanistan. The hill ranges of the district are fairly uniform in feature and consist of long central ridges with numerous spurs. These spurs vary in elevation from 1,500 to 3,300 m.

141. The Khwaja Amran Range and its continuation, the Sarlath, form the southeastern boundary of the district separating it from Pishin district. The highest peak of the Khwaja Amran mountains is at the height of 2,702 m; at this peak, the shrine of Sufi Saint Khwaja Amran is located. The mountains derive their name from the name of this saint. The town of Killa Abdullah is situated at the foothills/piedmont fans of the Khwaja Amran Range.

142. District Naseerabad is located in the southeastern portion of the Balochistan province in the Kachhi Plain/ Basin area, which consists of flat valleys amid various mountain and hill ranges. It is surrounded on the west by the Kirthar and Central Bolan Ranges and on the northeast by the Marri and Bugti hills. Other smaller hill ranges skirting the district are ranges of low hills called Pab Hills.

#### 4.3.2 Geology and Soil

143. Killa Abdullah is a small valley surrounded by mountains. The valley floor is covered with unconsolidated alluvial sediment that is mostly composed of clay, silt, silt-clay and clayey-silt.<sup>5</sup>

144. The soil of Naseerabad 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 subdivision 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.<sup>6</sup>

#### 4.3.3 Surface and Ground Water Resources

145. There are no perennial streams or rivers in the district Killa Abdullah; however, some seasonal rivers and streams are found in the area. The Kurram river originates in the Toba Kakar Range in the northern part of the district and flows from the southwest to the northeast. The other river is the Pishin which flows eastward and makes the boundary of the district with Afghanistan. A large number of hill torrents emerge from the Toba Kakar Range and join the Pishin river. The drainage of the southern part of the district is from northeast to southwest. Some of the important streams of the district are Shora Rud, Hanna, Khojak, Arambi Manda, and Surkhab Lora. Some of the intermittent streams/springs of the district include Wuch, Toghai Manda, Mandrak Sheela, Girdai and Mastai. There are no perennial or seasonal lakes in the district. Rapid shift occurred in the changing of karez to tube-well irrigation in this district. There are about 400 tube-wells in the surrounding area of Inyatullah Karez. Today, 98% of irrigation in district Killa Abdullah is done through tube-wells and there is no hope of Karez revival in future. It has led to the lowering of water table, which now fluctuates between 130 and 470 feet in Killa Abdullah<sup>7</sup>.

146. There is no perennial river flowing through the district Naseerabad and the district depends on the canals for its surface water. A few hill torrents, occasionally bringing flood waters, enter the district on the north from the Bugti hills, but are lost in the sand hills before they proceed very far into the district. The principal of these hill torrents are Goranari, Nilagh, Phanyan, Ghari Manak, Dingrizo, Bari, Kabula, and Bagh. Put Feeder Canal(PFC) is the only perennial surface water channel in the project area. 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.

#### 4.3.4 Climate and Meteorology

##### a) Average Temperatures

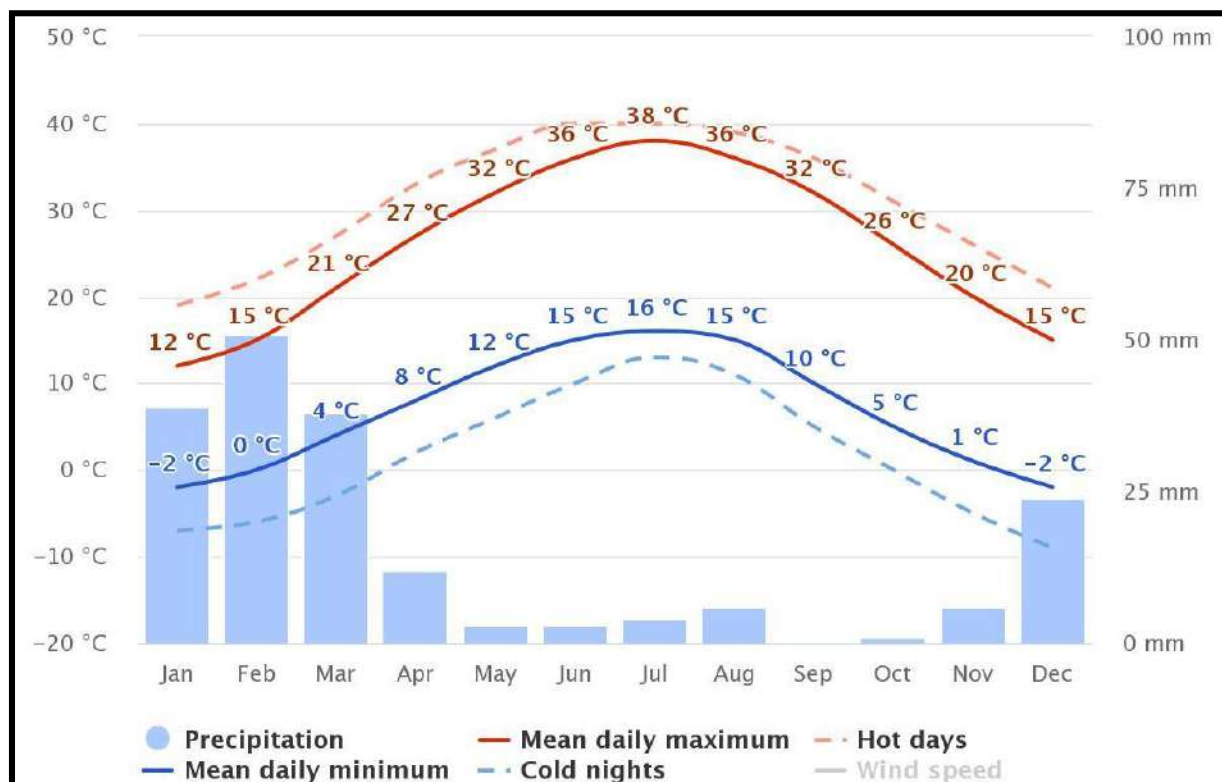
<sup>5</sup> Development Profile of Killa Abdullah District, PPAF

<sup>6</sup> Dera Murad Jamali Bypass on National Highway N-65 EIA Report, Feb 2018

<sup>7</sup> World Bank Funded Project - Balochistan Livelihoods and Entrepreneurship Project (2018): Environmental and Social Management Framework.

<https://documents1.worldbank.org/curated/en/734761567593644139/pdf/Environmental-and-Social-Management-Framework.pdf>

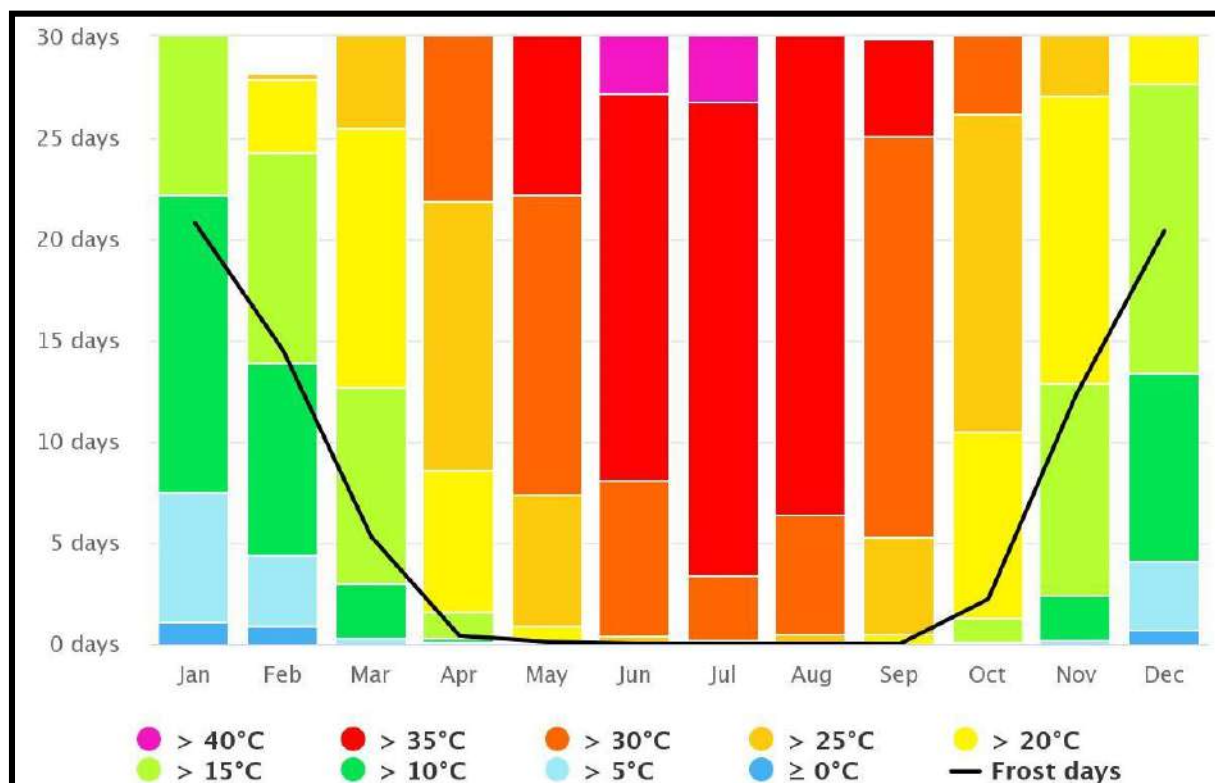
147. Figure 4-1 represents modelled data where mean monthly maximum and minimum temperatures for different months of the last 30 years. The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Killa Abdullah. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.<sup>8</sup>



**Figure 4-1: Average Temperatures**

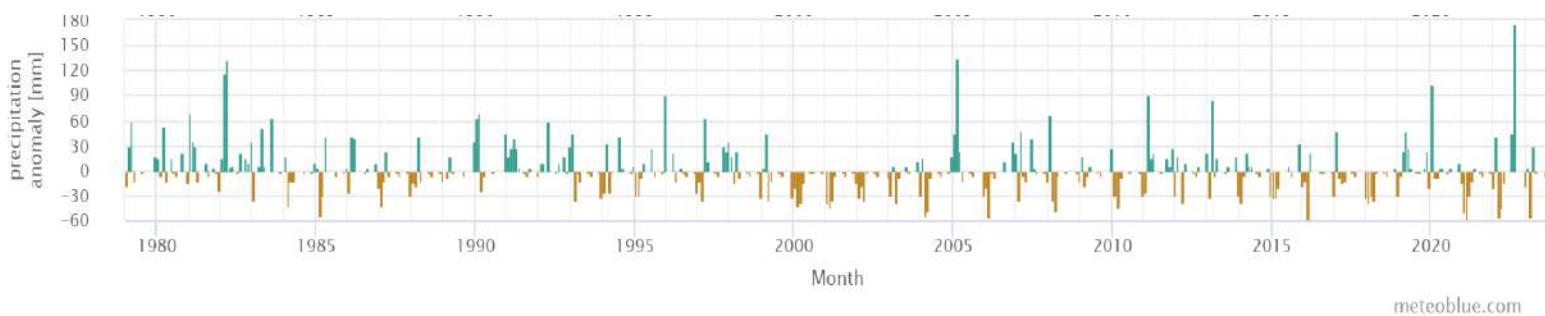
148. As it can be seen from Figure 4-1, the project area has extreme climate. It has hot summer and cold winters. The summer starts from May and lasts till September. July is the hottest month. The mean maximum and minimum temperature are 38°C and 16°C respectively for month of July. The winter seasons lasts from November to February. January is the coldest month. The mean maximum and mean minimum temperature are 12 °C and -2 °C in January. The maximum temperatures are presented in Figure 4-2.

<sup>8</sup> [https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qila-abdullah\\_pakistan\\_1167579](https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qila-abdullah_pakistan_1167579)



**Figure 4-2: Maximum Temperatures**

#### b) Rainfall

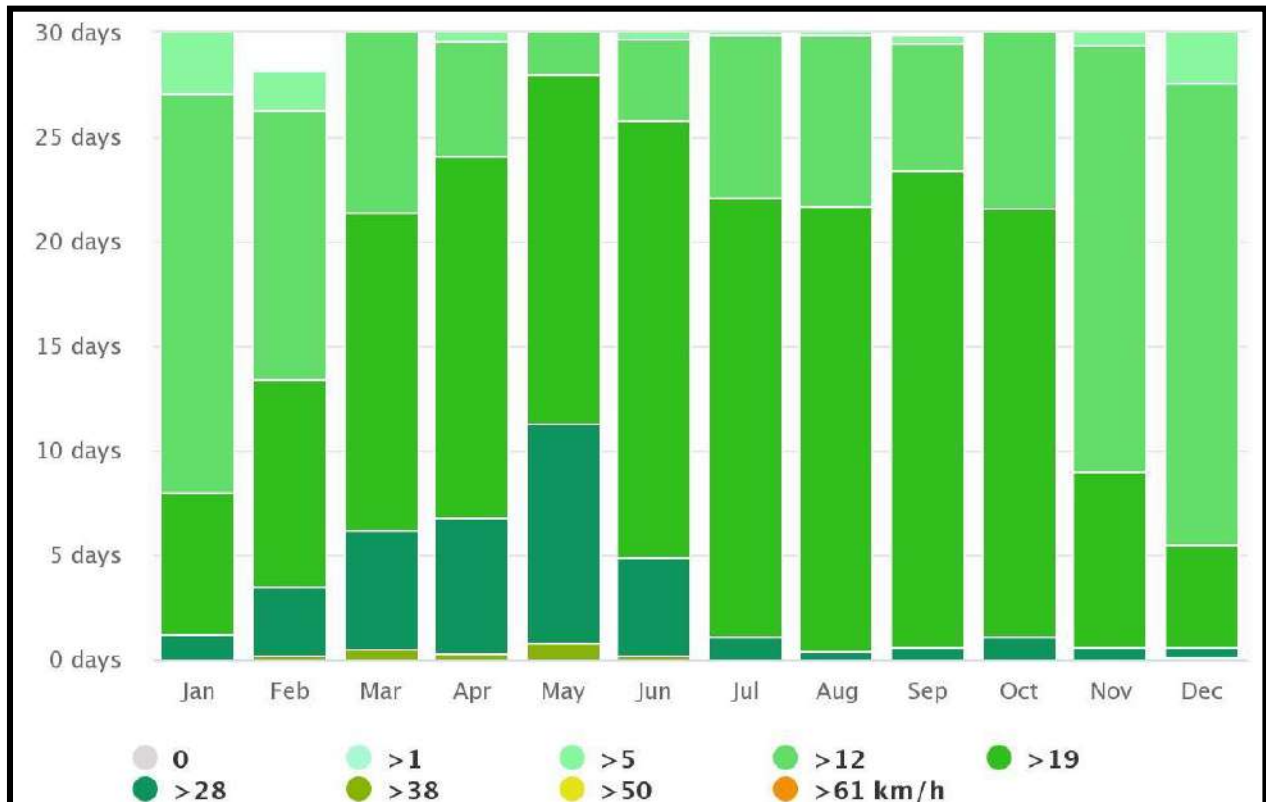


**Figure 4-3: Precipitation Data for Kill Abdullah**

#### c) Wind:

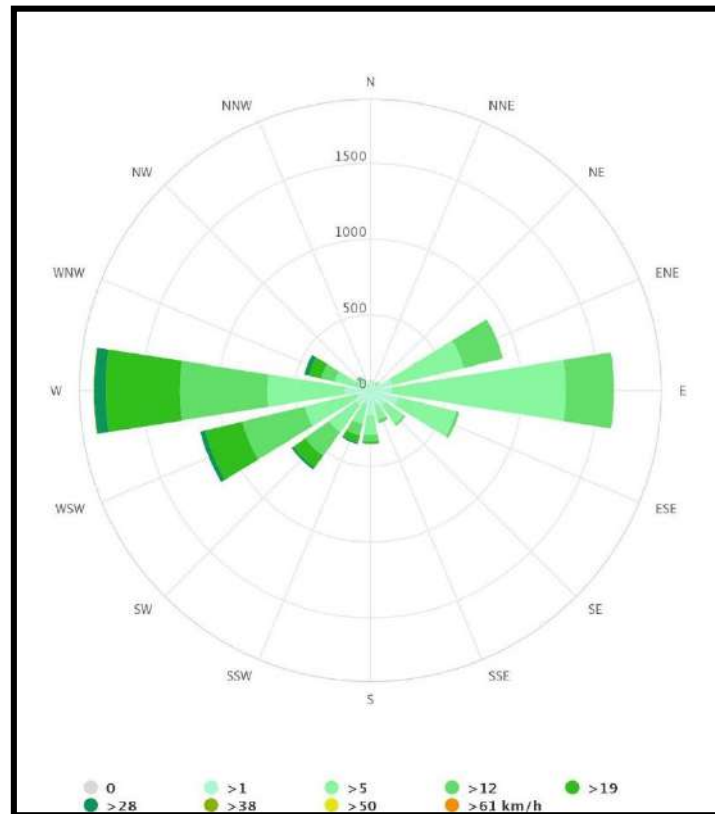
149. Figure 4-4 shows the days per month, during which the wind reaches a certain speed. Maximum wind speeds can be observed in the months of February to July which is >28 km/h. Wind speed >19 km/h dominates throughout the year.





**Figure 4-4: Wind Speed**

150. The wind rose for Killa Abdullah shows the number of hours per year the wind blows from the indicated direction. Wind rose is shown in Figure 4-5. It can be seen from the wind rose that dominant wind direction is towards West (W), East (E) and then WSW (West South-West) respectively.

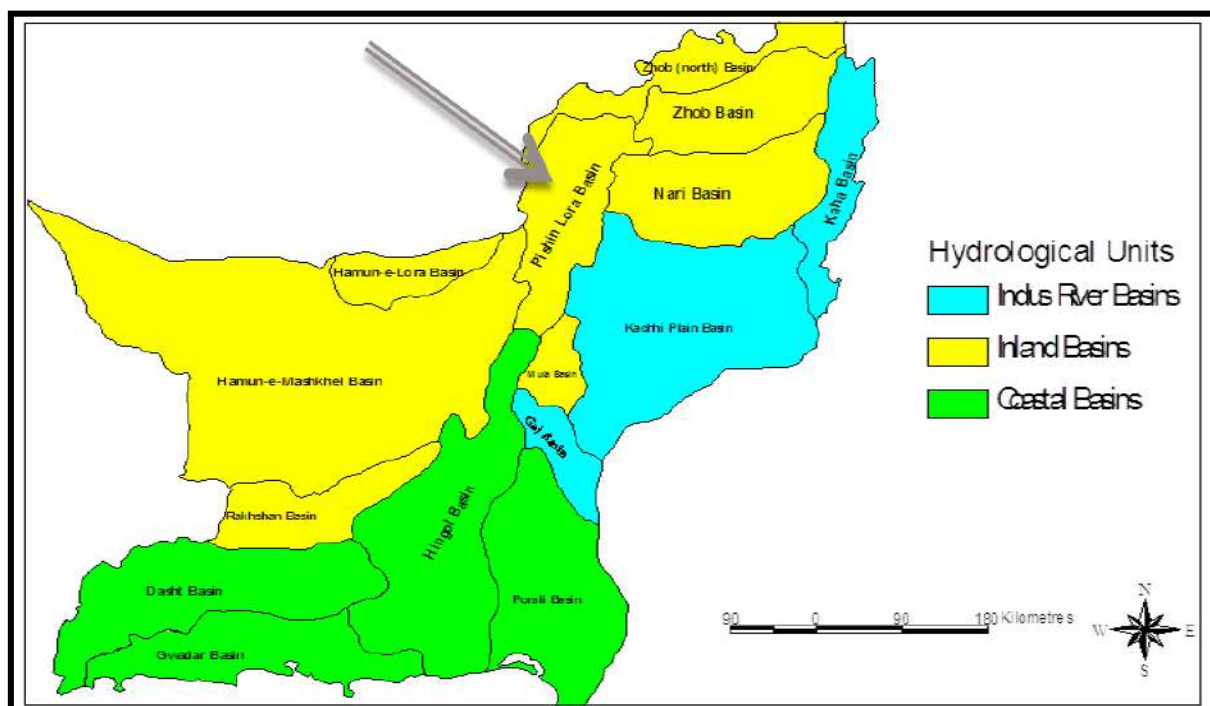


**Figure 4-5: Wind Rose**

#### 4.3.5 Climate Change.

151. According to the Global Climate Risk Index 2020, Pakistan was ranked as the 5th most affected nation by extreme weather events (1999-2018). Natural disasters, which already disrupt livelihoods and the economy, are expected to increase in frequency and intensity with climate change. Projected temperature increases are expected to be above global averages, negatively impacting agricultural production, water availability, and human health. This will be particularly true for large parts of Punjab, Sindh and Balochistan provinces, already considered intense heat zones.

152. Climate change will impact water conservation structures in myriad ways, depending on the mode and location specific characteristics. All water conservation structures are constructed under design standards that consider very specific temperature and precipitation ranges and return intervals for extreme events, such as floods and extreme heat. Water conservation structures malfunction if weather conditions diverge from the design range (as was experienced in 2022 flood in Killa Abdullah in this project area), which could occur more frequently as the climate continues to change. Heat waves are likely to occur with a higher frequency and longer duration in the future. Water conservation structures are particularly vulnerable to precipitation extremes.



**Figure 4-6: Maps showing the study area of Pishin Lora Basin is adjacent to Zhob and Mula River Basins of Balochistan**

#### ***Climate Risk and Vulnerability Assessment (CRVA)<sup>9</sup>***

153. The Pishin Lora Basin (PLB) is located in the uplands of Balochistan. It constitutes a significant river basin, covering an area of 16,928 square kilometers and encompassing 10 sub-basins. The combined population of these districts is approximately 1.2 million. The majority of the population of PLB relies on agriculture and livestock for a livelihood. This basin is distributed across five districts: Pishin, Killa Abdullah, Quetta, Mastung, and Kalat. This Basin is adjacent to Zhob and Mula River Basins. (as shown in Figure 4-6). Climate risk and vulnerability analysis of Zhob and Mula river basin was conducted under ADB funded Balochistan water resources development sector project through using different models i.e. Global Climatic Model (GCM), HEC-RAS and SWAT model.

154. Based on GCM data for Zhob watershed, the highest and the second highest flood years for Zhob Watershed are 2059 and 2031 respectively. While, for Mula River, the highest and the second highest flood years are 2059 and 2027.

155. Data from GCM for 83 years (2017-99) shows that year 2018, 2047, 2031, 2027, 2017, 2059, and 2080 are the highest 7 years for rainfall and ultimately flows for Zhob Watershed. Similarly, from the same span of GCM simulations, 2018, 2027, 2031, 2038, 2047, 2059, and 2080 are identified to be the top seven high flow years in Mula River Basin.

156. For vulnerability analysis, flood inundation modelling was done using HEC-RAS and SWAT models. A vulnerability and impact matrix were developed to evaluate the possible climatic effects on both the river basins. It was concluded from the matrix that Zhob river basin

<sup>9</sup> Climate Risk and Vulnerability Analysis Report (2017). Balochistan Water Resources Development Project Preparatory Technical Assistance (TA 8800-PAK)

<https://www.adb.org/sites/default/files/linked-documents/48098-002-sd-04.pdf>

is prone to losses associated with increasing temperatures, decreasing rainfall and more frequent droughts. Mula river basin is characterized by a decreasing maximum temperature yet increasing minimum temperatures, decreasing rainfall in winters and summers (two main rainfall seasons) and an increasing trend in frequency and magnitude of floods.

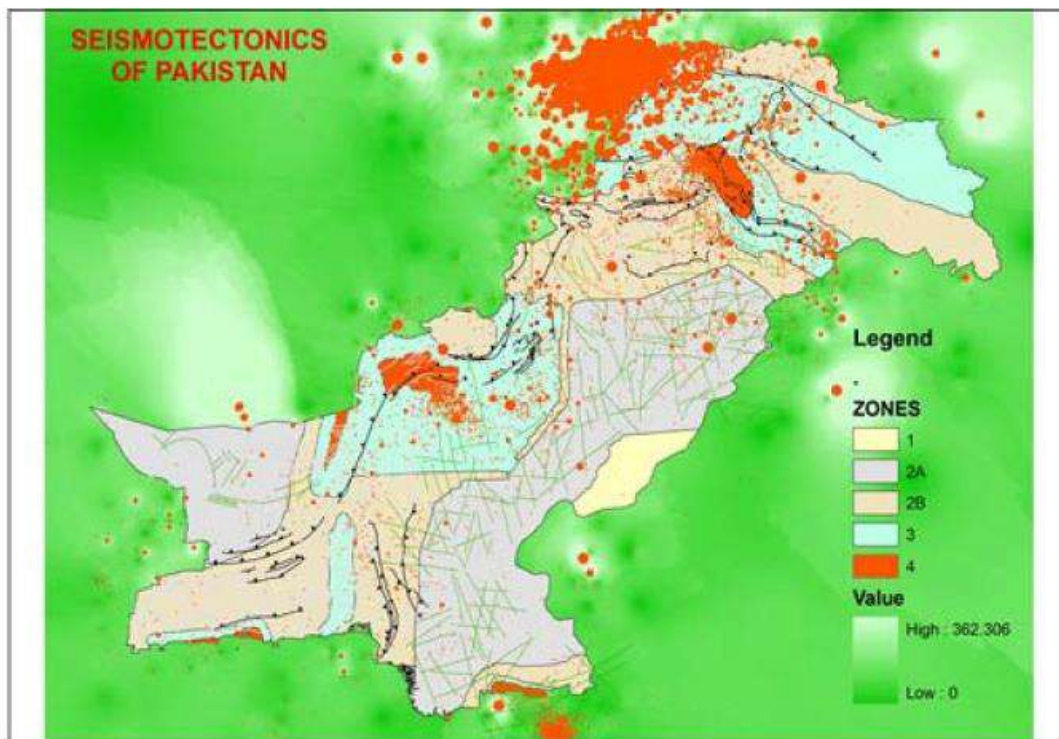
### **Climate Risks and Vulnerabilities in the Project Area**

157. The increasing trend in frequency and magnitude of floods in river basin adjacent to the PLB area indicated that flooding may be considered the most important climate risk for the Project. Water flow condition exceeding the systems' design capacity can cause flooding or inundation of water conservation structures. High flood events can also lead to increased deterioration or damage of project structures resulting in more frequent maintenance and rehabilitation.

#### **4.3.6 Seismology**

158. According to the seismic zone map of Pakistan, district Naseerabad lies in Zone 3 of the Pakistan Seismic zone map, which means 'moderate' to 'severe' damage due to earthquakes. While Killa Abdullah is located in the active seismic region, which is Zone 4 on the Seismic zone map of Pakistan, which means 'severe' damage due to earthquakes.

159. **Figure 4-7** shows the seismic zoning map of Pakistan indicating that project area is falling under Seismic Zone-3 and Zone 4.



**Figure 4-7: Seismic Zoning Map of Pakistan**

#### **4.3.7 Sensitive Receptors**

160. Apart from four project sites, all the settlements having sensitive receptors i.e. schools, masjids etc. are located away from the area of Influence (500 m) of the proposed sub-projects. Sensitive receptors and their respective sensitivity for the all-selected villages are listed in

**Table 4.1** for the four dams as in other subproject sites sensitive receptors are not located within COI.

161. For the proposed project, the sensitive receptors include, but not limited, to the educational, health, religious, cultural, archaeological and ecological resources. These are the areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals and other pollutants through air and noise emissions due to construction and project operation.

162. Major environmental sensitive receptors, including residential areas, religious places e.g. mosques, madrassas etc. educational institutes were recognized by using Arc GIS tool and further verified through field visit for the proposed project. Figure 4-1 shows the locations of these environmental sensitive receptors indicated on the map. These identified sensitive receptors along with their distances from the site has been provided in the Table 4-1 below.

**Table 4-1: Sensitive Receptors**

Sr.No	Name of Scheme	Nearby Village	Name of Physical Sensitive receptor
1	Pir Alizai and Majak flood protection Bund	Nearby villages are Kili Arambi pir Alizai Kili Majak that are at (more than <500m) distance	Madrassa (450 m)
2	Killa Abdullah Bazar flood protection Bund	Killa Abdullah Bazar (250m)	Govt High School (450 m)
3	Pat Feeder Canal from R D 238+000 to R D 397+000 R/S Embankment	Manjho shori (100m)	One Public High School, Girls Middle school, Two Masjids, three Health facilities (Civil Hospital, Rural Health Center and Private Health care Center)
4	Embankment of outfall drain, Usta Muhammad	Choki (250 m)	Civil Dispensary, Choki

#### 4.3.8 Ambient Air Quality

163. The ambient air quality monitoring was conducted by EPA registered Lab Pak Green Enviro-engineering in during May 2023 in the Pat Feeder Canal Area for BID. The sampling was conducted for 24 hours. The results of laboratory analysis of ambient air quality parameters are given in Table 4-2. Average value of PM<sub>2.5</sub> and PM<sub>10</sub> were exceeding WHO limits, which may possibly be due to the coal fired power plant present near to the project site.

164. Air quality monitoring results of EPA registered lab are in Annexure 3.

**Table 4-2: Ambient Air Quality of the Project Area<sup>10</sup>**

	Parameters	NO	NO <sub>2</sub>	SO <sub>2</sub>	CO	PM <sub>2.5</sub>	PM <sub>10</sub>
<b>Location</b>	<b>NEQS Limits</b>	24 hrs. (40 µg/m <sup>3</sup> )	24 hrs. (80 µg/m <sup>3</sup> )	24 hrs. (120 µg/m <sup>3</sup> )	8 hrs. (5 µg/m <sup>3</sup> )	24 hrs. (35 µg/m <sup>3</sup> )	24 hrs. (150 µg/m <sup>3</sup> )

<sup>10</sup> Environmental Monitoring conducted by BID for EIA Report of Remodelling of Pat Feeder Canal in May 2023



	WHO Limits	-	24 hrs. (25 µg/m <sup>3</sup> )	24 hrs. (40 µg/m <sup>3</sup> )	8 hrs. (4 µg/m <sup>3</sup> )	24 hrs. (15 µg/m <sup>3</sup> )	24 hrs. (45 µg/m <sup>3</sup> )
28°38'43.42" N 68°24'30.29" E	<b>Test Result</b>	3.60	12.95	12.78	0.493	25.9	102.6
28°27'15.11" N 68°2'11.16" E	<b>Test Result</b>	3.15	18.13	15.50	0.467	23.6	100.5

#### 4.3.9 Ambient Noise

165. Noise monitoring was conducted by EPA registered Lab Pak Green Enviro-Engineering during May 2023 in the project area along Pat Feeder Canal. Noise level was monitored with the help of a potable digital sound meter. Table 4-3 indicates that noise levels monitored in project area were within prescribe limits of NEQS and WHO values. Environmental monitoring report has been attached as Annexure-3.

**Table 4-3 Ambient Noise Quality**

Time	WHO Limits dB(A)	NEQS & BEQS Limits dB(A)	Average Results dB(A)	Average Results dB(A)
			28°38'43.42" N 68°24'30.29" E	28°27'15.11" N 68°2'11.16" E
<b>Day Time</b>	55	55	61.5	64.4
<b>Night Time</b>	45	45	<b>56.2</b>	55.0

#### 4.3.10 Drinking Water Quality

Water samples were collected from the Pat Feeder Canal (PFC) in the project area by the EPA-registered laboratory Pak Green Enviro-Engineering in May 2023. The tested parameters of the samples were compared to and complied with the National Environmental Quality Standards and WHO Standards for drinking water. Results showed that all parameters were within permissible limits except for E-Coli, Total Coliform, Fecal Coliform, Taste, Odor, Turbidity, Total Hardness, and TDS in both samples. The main reason for the increased bacterial contamination and turbidity is the presence of settlements along the PFC in the project area. These settlements are disposing of untreated municipal wastewater into the canal. Consequently, the water in the PFC is not suitable for drinking. Environmental Monitoring report has been attached as Annexure 3.

**Table 4-4: Water Quality of the project area**

Sr. No.	Parameters	Unit	Testing Method	NEQS & BEQS Limits	Average Results of Sampling Location	
					28°38'43.42" N 68°24'30.29" E	28°27'15.11" N 68°2'11.16" E
1.	E Coli	MPN/ 100ml	APHA-9221 F	Must not be detectable in any 100 ml sample	35.9*	95.0*
2.	Total Coli-form	MPN/ 100ml	APHA-9221 D	Must not be detectable	282.6*	282.6*

Sr. No.	Parameters	Unit	Testing Method	NEQS & BEQS Limits	Average Results of Sampling Location	
					28°38'43.42" N 68°24'30.29" E	28°27'15.11" N 68°2'11.16" E
				in any 100 ml sample		
3.	Fecal Coliform	MPN/100ml	APHA-9221 E	Must not be detectable in any 100 ml sample	95.0*	113.8*
4.	Color	TCU	APHA-2120 C	≤ 15	1.45	5.49
5.	Taste	-	APHA-2160 C	Non-Objectionable / Acceptable	Objectionable*	Objectionable*
6.	Odor	-	APHA-2150 B	Non-Objectionable / Acceptable	Objectionable*	Objectionable*
7.	Turbidity	NTU	APHA-2130 B	< 5	8.80*	7.10*
8.	Total Hardness ^	mg/L	APHA-2340 C	<500	170	280
9.	Total Dissolved Solids ^	mg/L	APHA-2540 C	< 1000	240	470
10.	pH ^	-	APHA-4500-H <sup>+</sup> B	6.5-8.5	8.22 at 20.1°C	7.66 at 38.4°C
11.	Aluminum (Al)	mg/L	APHA-3111 D	≤ 0.2	BDL	BDL
12.	Antimony (Sb)	mg/L	APHA-3111 B	≤0.005	BDL	BDL
13.	Arsenic (As)	mg/L	APHA-3114 B	≤ 0.05	BDL	BDL
14.	Barium (Ba)	mg/L	APHA-3111 D	0.7	BDL	BDL
15.	Boron (B)	mg/L	APHA-3111 D	0.3	BDL	BDL
16.	Cadmium (Cd)^	mg/L	APHA-3111 B	0.01	BDL	BDL
17.	Chloride (Cl <sup>-</sup> ) ^	mg/L	APHA-4500- Cl <sup>-</sup> B	< 250	20	35
18.	Chromium (Cr)^	mg/L	APHA-3111 B	≤ 0.05	BDL	BDL
19.	Copper (Cu)^	mg/L	APHA-3111 B	2	BDL	BDL
20.	Fluoride (F)	mg/L	APHA-4500-F-D	≤ 1.5	0.2	0.4
21.	Lead (Pb)^	mg/L	APHA-3111 B	≤ 0.05	BDL	BDL
22.	Manganese (Mn)^	mg/L	APHA-3111 B	≤ 0.5	0.0612	0.0437
23.	Mercury (Hg)	mg/L	APHA-3112 B	≤ 0.001	BDL	BDL
24.	Nickel (Ni)	mg/L	APHA-3111 B	≤ 0.02	BDL	BDL
25.	Nitrate^	mg/L	APHA-4500-NO <sub>3</sub> -1-E	≤ 50	BDL	1.463
26.	Nitrite^	mg/L	APHA-4500-NO <sub>2</sub> -1-B	≤ 3	BDL	BDL
27.	Selenium (Se)	mg/L	APHA-3114 C	0.01	BDL	BDL
28.	Residual Chlorine (Cl <sub>2</sub> )	mg/L	APHA-Cl-B	0.2-0.5 at the consumer end 0.5-1.5 at the source	0.02	0.02
29.	Zinc (Zn)^	mg/L	APHA-3111 B	5.0	0.0050	0.0157
30.	Phenolic Compound (As Phenol)	mg/L	APHA-5530 D	-	BDL	BDL
31.	Sodium (Na)^	mg/L	APHA-3111 B	-	47.7903	9.5237



Sr. No.	Parameters	Unit	Testing Method	NEQS & BEQS Limits	Average Results of Sampling Location	
					28°38'43.42" N 68°24'30.29" E	28°27'15.11" N 68°2'11.16" E
32.	Potassium (K) <sup>+</sup>	mg/L	APHA-3111 B	-	7.0526	7.6660

Source: Remodelling of Pat Feeder Canal Project of BID (May 2023)

#### 4.4 BIOLOGICAL ENVIRONMENT

##### 4.4.1 Flora

###### ***District Killa Abdullah***

166. There are only 2 ha of planted forest in the district and there is no tradition of commercial forestry in the district. Private sector involvement in commercial plantation is almost non-existent.

167. The soil of the district is suitable for vegetation, which is rain dependent. Nature has endowed the district with a variety of vegetation. Many areas are covered with bushes of Tarkha sperah (*Artemisia maritima*) and Shora (*Haloxylon griffithii*). These shrubs are brutally being used for fuel, including its commercial sale. Ghaz (*Tamarix gallica*) is used for fuel and for house roofing. Besides these, other vegetation varieties in the district are: Huma (*Ephedra intermedia*), Ghurezah (*Sophora alopecuroides*), Shin-shob (*Menthe sylvestris*), Shezgi (*Eremurus Aucherianus*), Zawal (*Achillea sanjolina*), Zira siyah (*Carum bulbo castanum*), Zoz (*Alhagi camelorum*), Khakshir (*Sisymbium sophia*), Kharorak (*Arnebia Cornuta*), Makhi (*Caragana ambigua*), Lokhae (*Scirpus wardianus*), Sarghasae (*Saecharum ciliare*), Murgha (*Andropogon annuatus*), Spina Maurai (*Thymus sp*), Barang (*Shkrae plantago major*).

168. Zira siyah, Huma and Khakshir are also used as herbal medicines, which are also being exploited for commercial purposes.

###### ***District Naseerabad***

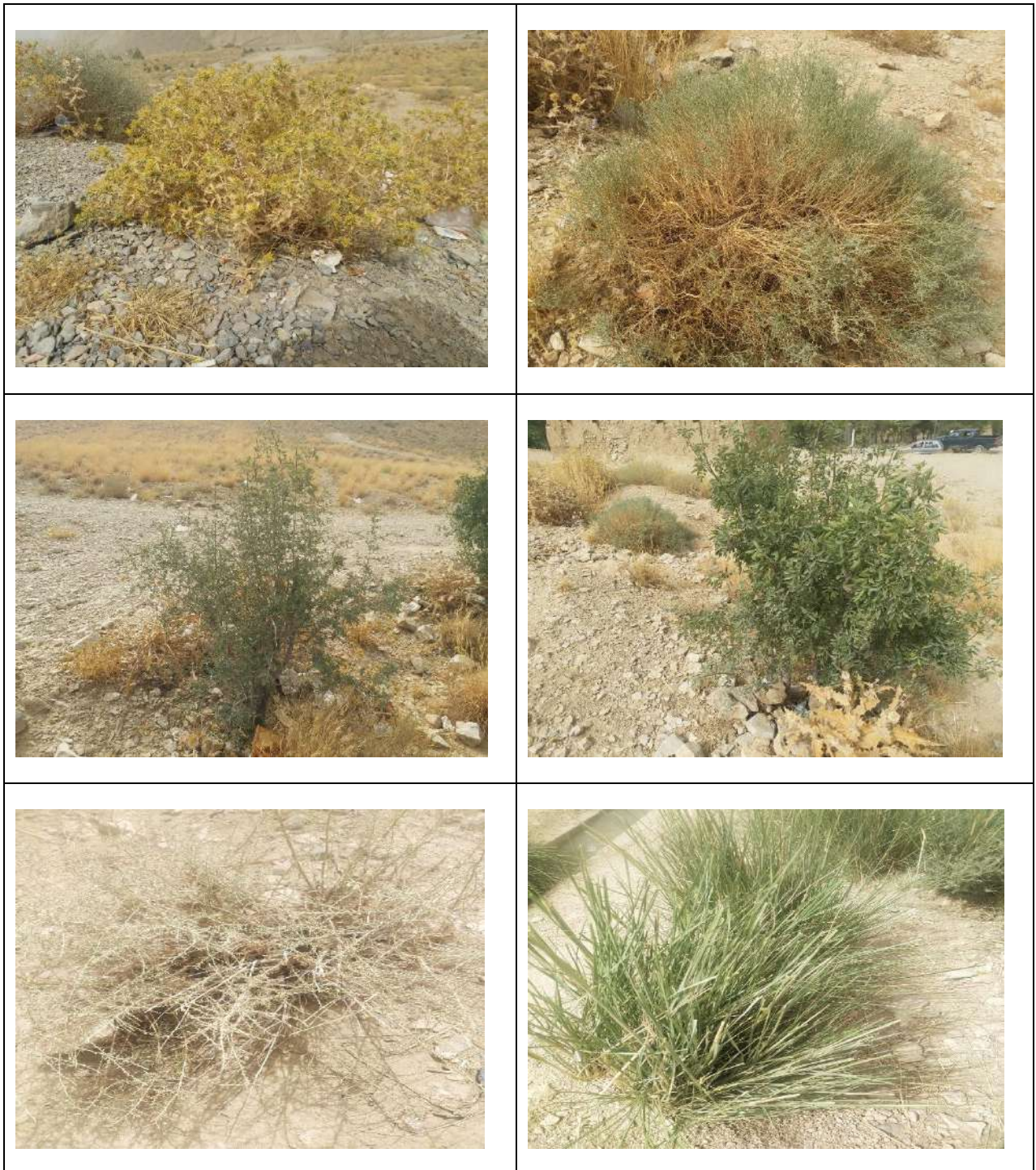
169. The types of vegetation found in the district belong to the tropical thorn forests Vegetation Zone, with major tree species including kandi (*Prosopis cineraria*), karir (*Capparisaphylla*), peelu (*Salvadora oleoides*), ghaz/farash (*Tamarix aphylla*), and ber (*Zizyphus mauritiana*).

170. Natural forests have been demolished to make space for agriculture. Overall, tree cover is good and the trees can be found in linear plantations along roadside/canal side plantations as well as around habitations or farmlands. The common tree species found in the district (either local or exotic) are babul (*Acacia nilotica*), shisham (*Dalbergia sissoo*), ber (*Zizyphus mauritiana* and *Zizyphus nummularia*), farash (*Tamarix aphylla*), karir (*Capparis aphylla*), peelu (*Salvadora oleoides*), black siris (*Albizia lebbek*), white siris (*Albizia procera*), neem (*Azadirachta indica*), jhand (*Prosopis cineraria*), and sufaida or eucalyptus (*Eucalyptus sp.*).

171. The shrubs include mesquite (*Prosopis juliflora*), prickly sesban (*Sesbania bispinosa*), aak (*Calotropis procera*), salt tree (*Haloxylon sp.*), and camel thorn (*Alhagi camelorum*).

Ground cover is constituted mainly by grasses like *Aristida depressa*, *Eleusine compressa*, *Panicum antidotale*, *Saccharum munja*, and *Typha angustifolia*.

**Figure 4-8: Flora in the vicinity of dams**





**Figure 4-9: Flora Near Settlements**



#### **4.4.2 Fauna**

##### ***District Killa Abdullah***

172. Commonly found fauna of the project area is given below  
**Mammals:** Commonly found mammals of the project area are Fox, Jackals, Rabbits, Wolf, and Mountain Sheep. **Birds:** Crows, Sparrows, Chukar and See See bird are the commonly found birds of the project area. **Reptiles:** The reptiles of the project area are Lizards (Agama, Monitor) and Snakes (Serpentes) are included.

173. Aquatic ecology is non-existent as there are seasonal hill torrents in the project area and no perennial stream or river, in addition, dams of this project are in damaged condition since last year floods (2022). There are no endangered species or critically threatened or endangered species in the project area.

##### ***District Naseerabad***

174. The fauna of the project area predominately belongs to Palaearctic zoogeographical region. However, some avian species of oriental region have been noticed here. Table 4.5 shows list of birds, mammals and reptiles observed during the site visit in the project area.

**Table 4-5 Fauna of Naseerabad**

Sr. No.	Common Name	Scientific name	IUCN Category
<b>Birds</b>			
1	Black Crowned Finch Lark	Eremopterix nigriceps	Least Concern(LC)
2	Black Kite	Milvus migrans	Least Concern(LC)
3	Blue Rock Pigeon	Columba livia	Least Concern(LC)
4	Cattle Egret	Bubulcus ibis	Least Concern(LC)
5	Common Myna/ Indian Myna	Acridotheres tristis	Least Concern(LC)
6	Desert Wheatear	Oenanthe deserti	Least Concern(LC)
7	Hoopoe	Upupa epops	Least Concern(LC)
8	House Crow	Corvus splendens	Least Concern(LC)
9	House Sparrow	Passer domesticus	Least Concern(LC)
10	Hume"s Wheatear	Oenanthe alboniger	Least Concern(LC)
11	Pied Bushchat	Saxicola caprata	Least Concern(LC)
12	Pied Kingfisher	Ceryle rudis	Least Concern(LC)
13	Purple Sunbird	Nectarinia asiatica	Least Concern(LC)
14	Red-vented Bulbul	Pycnonotus cafer	Least Concern(LC)
15	Red-wattled Lapwing	Hoplopterus indicus	Least Concern(LC)
16	White-breasted Kingfisher	Halcyon smyrnensis	Least Concern(LC)
17	White-cheeked Bulbul	Pycnonotus leucogenys	Least Concern(LC)
18	White / Pied Wagtail	Motacilla alba	Least Concern(LC)
<b>Mammals</b>			
1.	Asiatic Jackal	Canis auris	Least Concern(LC)
2.	Five Stripped Palm Squirrel	Funambulus pennant	Least Concern(LC)
3.	Indian Desert Jird	Meriones hurrianae	Least Concern(LC)
4.	Indian Gerbil	Tatera indica	Least Concern(LC)
5.	Long-eared Hedgehog	Hemiechinus auritus	Least Concern(LC)
6.	House Mouse	Mus musculus	Least Concern(LC)
7.	Little Indian Field Mouse	Mus booduga	Least Concern(LC)
<b>Reptiles</b>			
1.	Brilliant Agama	Trapelus agilis	Least Concern(LC)
2.	Indian Monitor	Varanus bengalensis	Least Concern(LC)

Sr. No.	Common Name	Scientific name	IUCN Category
3.	Saw Scaled Viper	Echis carinatus	Least Concern(LC)
4.	Glossy Bellied Racer	Coluber ventromaculatus	Least Concern(LC)
5.	Garden Lizard	Calotes versicolor	Least Concern(LC)

#### 4.4.3 Protected and Historical Area:

175. There is no wildlife protected areas in the project areas of both districts, nor are any of the historical buildings protected.

#### 4.4.4 Integrated Biodiversity Assessment Tool (IBAT)<sup>11</sup>

176. The project area was also screened for ecological sensitivities using the Integrated Biodiversity Assessment Tool (IBAT) with its outputs provided as Annexure 4. The tool was run for one buffer zone (5 km). The findings of IBAT were correlated with the primary and secondary data collected as part of the detailed scoping activities conducted during preparation of this study. It was observed that IBAT correctly stated that no protected areas and/or key biodiversity areas are present within buffer zone of 5 km. Furthermore, IBAT predicted that within a 50 km area of interest, there are possibly 35 species that are listed in the IUCN Red List, consisting of 16 Aves, 7 Reptiles, 8 mammals and 4 fish species.

177. Based on actual observations during local surveys, or review of the relevant literature, Annexure 4 presents the validated status of the threatened faunal species identified through IBAT. It is concluded from the validation table (Annex 4) that there are no threatened species at the sub-project sites.

### 4.5 SOCIO-ECONOMIC BASELINE STRUCTURE

#### 4.5.1 Population Size, Growth and Distribution

##### i. Population Size and Growth<sup>12</sup>

178. The population of Killa Abdullah and Naseerabad districts according to census 2017 is 758,354 and 487,847 respectively which was 360,724 and 245,894 respectively in 1998. Overall, the population of the districts has increased quite rapidly. The average annual growth rate of population in the Killa Abdullah district is 3.98 and in district Naseerabad it is 3.66 during the intercensal period i.e. 1998-2017.

**Table 4-6: Population of different intercensal period**

District	Description	1998	2017
Killa Abdullah	Population(thousand)	360,724	758,354
	Average annual growth rate %	4.46	3.98
Naseerabad	Population(thousand)	245894	487847
	Average annual growth rate %	4.13	3.66

<sup>11</sup> IBAT Proximity Report. Generated under licence 1400-48641 from the Integrated Biodiversity Assessment Tool on 11 September 2023 (GMT). [www.ibat-alliance.org](http://www.ibat-alliance.org)

<sup>12</sup> Pakistan Bureau of Statistics



179. The total area of the Killa Abdullah district is 4,894 and Naseerabad district is 3,387 square kilometres. According to census report 2017, the population density of district Killa Abdullah and Naseerabad is 154.96 and 144.04 persons per square kilometres respectively, which was 112.4 and 72.6 persons per square kilometres according to census report, 1998.

## ii. Household Size

180. According to census report 2017, the average household size for the district Killa Abdullah is 7.55 persons, while for district Naseerabad it is 6.82 persons.

## iii. Rural/ Urban Distribution

181. The rural population of the district Killa Abdullah is 609,024 constituting 80 percent of the total population. The average annual growth rate of rural population is 3.72, which was 4.57 percent during 1981-98. The urban population of the district is 149,330 constituting 20 percent of the total population. The average annual growth rate of urban population according to census report 2017 is 5.21 percent, which was 3.87 percent during 1981-98.

182. The rural population of the district Naseerabad is 391,531, constituting 80 percent of the total population. The average annual growth rate of rural population is 3.39, which was 3.27 percent during 1981-98. The urban population of the district is 96,316 constituting 20 percent of the total population. The average annual growth rate of urban population according to census report 2017 is 4.95 percent, which was 8.81 percent during 1981-98.

## iv. Sex Ratio

183. Sex ratio is an important demographic indicator which is defined as the “number of males per hundred females”. According to the census report 2017, the sex ratio of the district Killa Abdullah is 111.21 and district Naseerabad is 106.47, which was 121.8 and 111.1 in 1998 respectively. The sex ratio in rural and urban areas of the district Killa Abdullah is 110.95 and 112.27 respectively while the sex ratio in rural and urban areas of the district Naseerabad is 107.02 and 104.25 respectively which indicates that the male proportion is higher in the urban areas as compared to the rural areas in both districts.

## v. Religion

184. The population of both districts is almost completely Muslim. District Killa Abdullah constitutes 99.81 percent of the total population with a breakup of 99.9 percent in rural and 99.36 percent in urban while district Naseerabad constitutes 99.25 percent of the total population with a break down of 99.54 percent in rural and 98.13 percent in urban. There are few Christian, Hindu and other religious communities which are less than 1 percent of the total population.

**Table 4-7: Religion of the district**

District	Religion	All	Rural	Urban
Killa Abdullah	Muslim	99.81	99.9	99.36
	Christian	0.08	0.016	0.35
	Hindu (Jati)	0.05	0.0003	0.25
	Qadiani/ Ahmadi	0.05	0.06	0.03
	Scheduled (Lowest Hindu) Caste	0.001	0.016	0.002
	Others	0.0002	0.0003	-
Naseerabad	Muslim	99.25	99.54	98.13
	Christian	0.021	0.004	0.093
	Hindu (Jati)	0.65	0.38	1.73
	Qadiani/ Ahmadi	0.002	0.002	0.004
	Scheduled (Lowest Hindu) Caste	0.013	0.014	0.009
	Others	0.06	0.07	0.031

#### vi. **Castes and Tribes**<sup>13</sup>

185. Killa Abdullah district is inhabited mostly by Pashtoons. The major tribes of the district are Kakar, Tareen, Syed and Achakzai. Kakars are in the majority in tehsil Gulistan, while Achakzais dominate tehsil Chaman. There is no ethnic differentiation among them because they speak a common language, practice the same religion and share common cultural values. Being the descendants of Qias Abdul Rashid, they share an identical historical background as well. Pushto is the prevailing language, while Urdu is also understood and spoken in urban areas.

186. Naseerabad 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.

#### vii. **Mother Tongue**

187. The mother tongue refers to the language used for communication between parents and their children in the household. The question was asked about all individuals living in the housing unit.

188. In district Killa Abdullah, Pashto is the prevailing language, while Urdu is also understood and spoken in urban areas.<sup>14</sup>

189. In district Naseerabad, 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 Pashto and Punjabi speaking population in the district.

#### viii. **Source of Drinking Water**

190. In the project area, the major source of drinking water are springs, tube wells and dam reservoirs.

#### ix. **Migration**

191. Migration data covers movement of population from one district to another in the same province and from one province to another. It does not cover persons who changed their place of residence within their own district.

#### x. **Health**

192. Health facilities in major cities of district Killa Abdullah are satisfactory but these rural areas have very limited health facilities and mostly are devoid of these. Health facilities of the project have been provided in Table 4-8.

<sup>13</sup> Development Profile of Killa Abdullah District (2015). Pakistan Poverty Alleviation Fund PPAF. <https://www.ppaf.org.pk/doc/programmes/Situational%20Analysis%20Report%20of%20PPR%20-%20District%20Profile%20Killa%20Abdullah.pdf>

<sup>14</sup> Ibid., p. 4-17.

**Table 4-8: Health Facilities**

District	Health Institutions	Numbers
Killa Abdullah <sup>15</sup>	DHQ (District Headquarter Hospital )At Abdul Rahmanzai	1
	Trauma Center At Mezai	1
	RHCs ( Rural Health Centers )	7
	BHUs ( Basic Health Units )	16
	CDs ( Civil Dispensaries )	9
Naseerabad <sup>16</sup>	DHQ Hospital	1
	Dispensary	9
	Rural Health Centre	3
	Basic Health Units	18
	Maternal and Child Health Centre	3
	TB Clinic	1
	School Health Unit	1
	Health Auxiliary unit	1

**i. Education<sup>17</sup>**

193. Higher educational facilities are very limited in district Killa Abdullah and Naseerabad, however, basic educational facilities are satisfactory. Details of educational institutions in both districts are shown in the table 4-10 below.

**Table 4-9: Educational Institutions**

District	Educational Institutions	Numbers
Killa Abdullah <sup>18</sup>	Boys Colleges	03
	Girls Colleges	01
	Boys High Schools	18
	Girls High Schools	08
	Boys Middle Schools	21
	Girls Middle Schools	06
	Boys Primary Schools	280
	Girls Primary Schools	27
Naseerabad <sup>19</sup>	Boys Degree College	01
	Girls Degree College	01
	Boys High Schools	11
	Girls High Schools	10
	Boys Middle Schools	20
	Girls Middle Schools	05
	Boys Primary Schools	209
	Girls Primary Schools	83

**i. Communication**

194. In district Killa Abdullah, there are total 1677 km of roads, out of which 612 km are black topped roads and 1065 km are shingle roads.

<sup>15</sup> <https://quetta.balochistan.gov.pk/district-killah-abdullah/>

<sup>16</sup> <http://dghs.gob.pk/H.F%20Summary%202020.pdf>

<sup>17</sup> Killa Abdullah District Education Plan (2016-17 to 2021-22), Naseerabad District Education Plan (2016-17 to 2021-22)

<sup>18</sup> <https://quetta.balochistan.gov.pk/district-killah-abdullah/>.

<sup>19</sup> <https://nasirabad.balochistan.gov.pk/district-usta-muhammad/education/>

195. In district Naseerabad, the length of the railway track is 39 kilometers and there are three railway stations: Notal, Mangoli and Dera Murad Jamali. Naseerabad has a place for helicopter landings but there is no regular airway service. The nearest airport is in Jacobabad (35 km). Black topped road density per square kilometer is 0.12 and that of shingle is 0.07. The total length of roads in Naseerabad 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.

#### 4.5.2 Socio Economic Environment

##### i. Agriculture<sup>20</sup>

196. Killa Abdullah falls in the very cold agro-ecological zone bearing a total potential agricultural area of 14,181 hectares (Agriculture Statistics, 2008-09), which is approximately 4.4% of the total district area. Major Rabi crops include Wheat, Barley, Cumin, vegetables and fodder.

197. Kharif Crops are Fruits, Melons, Vegetables, Tobacco, Potato, Fodder and Onion. All these crops come under cash crops. Livestock sector is also a major contributor to the economy of the district. It not only provides rich food such as meat, milk, eggs, poultry meat but also produces essential raw material such as manure, offal, trotters, hides and skins, wool and blood for various kind of industries.

198. Major crops of District Naseerabad is Wheat, barley, rapeseed/mustard, gram, masoor, canola, sunflower, rice, jowar, bajra, sesame, moong, guarseed, cotton, and sugarcane and vegetables grown in the district area Onions, potatoes, tomatoes, okra, tinda, spinach, bitter gourd, bottle gourd, cauliflower, brinjal, luffa, cucumber, coriander, and peas while major fruits production include Mangoes, citrus, guavas, dates, watermelon, musk melon, chikoo, and ber<sup>21</sup>

##### ii. Irrigation

199. The main sources of irrigation in the Killa Abdullah district include tube wells and Karezes / springs, which are commonly used in the district. Privately owned tube-wells are maintained by the owners themselves, whereas, the government owned tube-wells are maintained by the Irrigation Department. Majority of the crop cultivation area of (12356 hectares) is irrigated by means of tube wells, encompassing 89.6 percent of the total irrigation sources, followed by Karezes/Spring sharing thereby 10 percent of the area (1067 hectares) in total. There are certain numbers of wells which are spread at (43 hectares) area contributing to the minimum source of irrigation at only 0.4 percent, respectively. The total number of tube wells (70) installed by the government at 6.17 percent against the privately installed (1,064) at 93.83 percent, is very low.

200. The main source of irrigation in the Naseerabad District is Pat Feeder and Rabi Canal. Agricultural activities in the district started after the construction of pat feeder canal.

#### 4.5.3 Important/ Historical places

201. Following are the land marks and important sites of District Killa Abdullah and Naseerabad.

<sup>20</sup> Killa Abdullah District Education Plan

<sup>21</sup> <https://nasirabad.balochistan.gov.pk/agriculture-in-district-naseerabad/>

**Killa Abdullah<sup>22</sup>****i. Chaman Town**

202. Chaman is an important boarder town which was established by the British as a garrison town and as part of their forward policy. Chaman is the head quarter of Killa Abdullah district and is linked with Quetta by rail, with the world famous Khojak tunnel enroute. Chaman is situated at 6000 feet above sea level. It is located approximately 25 km from the project area.

**ii. Spin Ghundi Mound**

203. It is located approximately 15 km from the project area at the foot of an offshoot of the Khawaja Amran range close to Habibzai village in Killa Abdullah. Evidently this is the mound which was executed in 1881 by Captain Lock.

**iii. Khawaja Amran Shrine**

204. This is a famous shrine near gulistan which is created with making married women who are unable to conceive fertile. the shrine has an acetic simplicity. The enclosing walls are made up of pitched stone within which lies the grave of Khawaja Amran. The grave is 16.5 meters long and nine meters wide and is covered with stones. It is located approximately 19 km from the project area.

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<sup>22</sup> District Census Report of Killa Abdullah ,1998



## 5. ANALYSIS OF ALTERNATIVES

### 5.1 GENERAL OUTLINE AND SCOPE .

205. The discussion and analysis of alternatives in this IEE study consider pragmatic strategies that will promote the elimination of negative environmental and social impacts. It is imperative to assess different alternatives to reach the most viable possible option. Different alternatives were considered at the design stage of the proposed project and at the time of preparing this IEE study.

### 5.2 Categorical Analysis of Alternatives

206. Categorical analysis of alternatives is an integral part of the IEE process to select the best preferable option among all the possible project options by comparing the potential positive and negative impacts for each alternative in terms of environmental, social and economic aspects as shown in Table 5-1. For the proposed project, different alternatives were analysed.

#### A. Alternative-I: Without Project

#### B. Alternative-II: With Project

207. Comparing the "No project" option with the execution of the project for the proposed project activity entails evaluating the potential benefits and drawbacks of each option.

##### 5.2.1 Alternative-I: Without Project

208. Without restoration and rehabilitation of the existing water conservation structures will result in the following potential issues:

- ***Water Level and Aquifer Depletion***

209. Without any intervention, the excessive withdrawal from the ground aquifer will continue, causing a rapid decline in the water level. This depletion can lead to water scarcity, affecting various sectors like agriculture, domestic use and industries.

- ***Insufficient Seepage and Flooding***

210. The streams flowing into Killa Abdullah have steep slopes, resulting in rapid discharge over the ground surface and limited seepage into the ground. This exacerbates water scarcity issues and leaves the area prone to flooding during heavy rains. The absence of a project means these problems will persist.

- ***Damages and Risk Reduction***

211. Without implementing any restoration or rehabilitation measures, the damaged structures will remain as they are, vulnerable to future extreme weather events. This in turn will leave the valley exposed to the risk of further damages and increased flooding, posing threats to lives and property.

- ***Cost and Time Considerations***

212. There may be no immediate financial cost associated with the "No project" option. However, the long-term consequences, such as water scarcity, increased flood risks and potential damages can result in substantial economic losses and increased expenditure on emergency response and recovery efforts.

## 5.2.2 Alternative-II: With Project (Restoration/Rehabilitation/Strengthening of Dams, Flood Protection Bunds, Embankments)

### • *Water Level and Aquifer Depletion*

213. By executing the project, there is a possibility of addressing the water level decline issue. The restoration and rehabilitation of dams and spillways can help in managing and conserving water resources, ensuring a sustainable supply for the region.

### • *Insufficient Seepage and Flooding*

214. The project aims to mitigate these issues by repairing the damaged works. This can enhance seepage into the ground, allowing for better groundwater recharge. Additionally, the rehabilitation efforts can help manage and reduce the impact of floods, protecting the project area from devastation during heavy rainfall.

### • *Damages and Risk Reduction*

215. By executing the project, the breached dam's bodies and damaged spillways can be restored and repaired, reducing the vulnerability to future flood events. This will enhance the capacity to handle high-velocity floods and minimize the devastation caused by flash floods from the surrounding hills.

### • *Cost and Time Considerations*

216. Implementing the project for restoration and rehabilitation requires financial investment and time for planning, execution and monitoring. However, the upfront costs are intended to provide long-term benefits, such as improved water management, reduced flood risks and overall resilience to extreme events.

217. In conclusion, the "No project" option maintains the status quo, leaving the District Killa Abdullah and Naseerabad vulnerable to water scarcity, excessive aquifer depletion, increased flood risks, and damages. On the other hand, executing the project offers the potential to address these challenges by restoring and rehabilitating the damaged structures, improving water management, and reducing flood risks. Although the project requires initial investment, it can provide long-term benefits and contribute to the overall sustainability and resilience of the area.

218. Table 5.1 provides brief comparison of both alternatives with respect to environment and social viewpoint.

**Table 5-1: Comparison of Alternatives**

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
<b>NO PROJECT OPTION VERSUS PROJECT OPTION</b>				
<b>No Project Option</b>	Under the "No project" option, there are no specific technical interventions or improvements planned or implemented. This means that the	Without any project intervention, the environmental consequences are likely to remain unaddressed. Aquifer	The "No project" option can have negative social implications. Water scarcity affects various aspects of people's lives, including	In the short term, the "No project" option may seem cost-effective as it does not involve any immediate financial expenditure.

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
	existing issues related to water scarcity, aquifer depletion, and flood risks will persist without any targeted solutions.	depletion can lead to ecological imbalances and impact vegetation, wildlife, and ecosystems that depend on water resources. Flooding during heavy rains can also result in damage to the environment and ecological habitats.	agriculture, domestic water supply, and industries. Flooding events can result in the displacement of communities, loss of livelihoods, and damage to infrastructure, impacting the overall social well-being of the affected population.	However, the long-term costs associated with water scarcity, increased flood damages, and emergency response efforts can be substantial.
<b>Project Option</b>	The project involves technical interventions such as the restoration and rehabilitation of breached dams and damaged spillways. These measures aim to improve water management, groundwater recharge, and flood mitigation, addressing the existing technical challenges in the region.	The project for restoration and rehabilitation seeks to mitigate the environmental impacts by promoting sustainable water usage through improved water management practices. It aims to reduce aquifer depletion, protect groundwater resources, and minimize the ecological damage caused by floods. The project may also consider incorporating environmentally friendly design and construction practices.	The execution of the project offers potential social benefits. By addressing water scarcity, it can improve agricultural productivity, provide a stable water supply for households, and support local industries. Additionally, the rehabilitation of flood mitigation structures can enhance community safety, reducing the risks and impacts of flooding on the population.	Implementing the project for restoration and rehabilitation incurs upfront costs for planning, execution, and monitoring. These costs include materials, labor, and engineering expertise. However, the investment aims to provide long-term benefits by addressing the underlying issues, reducing future damages, and promoting sustainable water management practices.
<b>RESTORATION/REHABILITATION/STRENGTHENING OF DAMS, FLOOD PROTECTION BUNDS, EMBANKMENTS VERSUS CONSTRUCTION OF NEW DAMS, FLOOD PROTECTION BUNDS, EMBANKMENTS</b>				
<b>Restoration/ Rehabilitation/ Strengthening</b>	<ul style="list-style-type: none"> <li>Utilizes existing infrastructure, which can capitalize on established site</li> </ul>	Generally, has a lower environmental impact as it	May be more readily accepted by local communities due	<ul style="list-style-type: none"> <li>Initial costs might be lower compared to constructing a</li> </ul>

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
<b>of Dam, Flood Protection Bunds, Embankments</b>	<p>features and configurations.</p> <ul style="list-style-type: none"> <li>Requires thorough inspection, assessment, and engineering expertise to determine the extent of damage and necessary repairs.</li> <li>Benefits from existing topographical and geological data.</li> </ul>	<p>involves working within the footprint of existing structures.</p>	<p>to as land acquisition and resettlement are not involved.</p>	<p>new dam. Costs depend on the extent of damage and required repairs.</p> <ul style="list-style-type: none"> <li>Could have lower long-term operational and maintenance costs if the existing structure is well-preserved.</li> </ul>
<b>New Construction of Dam, Flood Protection Bunds, Embankments</b>	<ul style="list-style-type: none"> <li>Involves planning and designing a new structure from scratch, including site selection, geological investigations, and engineering design.</li> <li>Requires permits, approvals, and compliance with current engineering standards and regulations.</li> <li>Can incorporate the latest technologies and design features for improved safety and efficiency.</li> <li>Might require more time for planning, design, and construction.</li> </ul>	<ul style="list-style-type: none"> <li>Could have a higher environmental impact due to land clearance, habitat disruption, and potential alteration of water flow patterns. It may require additional environmental assessments and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Could require land acquisition and relocation of communities. May face resistance from communities concerned about losing their homes or traditional lands.</li> </ul>	<ul style="list-style-type: none"> <li>Initial costs could be higher due to design, construction, and land acquisition expenses.</li> <li>Long-term operational and maintenance costs need to be considered.</li> </ul>

### 5.3 Recommended Option .

219. Based on a comprehensive analysis of alternatives between the restoration/rehabilitation/strengthening of dams, flood protection bunds, embankments and the construction of new dams, flood protection bunds, embankments the recommended option is the restoration/rehabilitation approach. This option demonstrates favourable technical, environmental and social outcomes, while also proving to be cost-effective. It capitalizes on existing infrastructure, minimizing environmental disruption, and addressing the region's water resource needs while maintaining ecological balance and community well-being.

## 6. PUBLIC CONSULTATION AND DISCLOSURE

### 6.1 GENERAL

259. This section describes the outcome of the public consultation sessions held with different stakeholders that may be affected (positive / negative) by the proposed project activities. Public consultation is a mandatory part of the IEE 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 laws.

260. The consultation process was carried out in accordance with the requirements of Pakistan environmental procedures and ADB SPS requirements. The objectives of this process were to:

- Informing the public about what is proposed project.
- Identify and involve all stakeholders, especially local residents, in the consultative and participation process;
- Share information with stakeholders on the design and construction of the proposed project and anticipated impacts (positive / negative) on the physical, biological and socio-economic environment of the project area;
- Understand stakeholders' concerns regarding various aspects of the project, including the existing available facilities and problems, construction of the project and the likely impacts of construction and operation related activities;
- Understand the perceptions, assessment of social impacts and concerns of the communities in the vicinity of the proposed project;
- Provide an opportunity to the public in the public consultation session to provide valuable suggestions for the project design in a positive manner; and
- Reduce the chances of conflict through the early identification of controversial issues, and consult them to find acceptable solutions.

### 6.2 Consultation and Participation Process

261. For ascertaining the perceptions of different stakeholders about the project (during construction/operation), consultation meetings were held with them. Site visits of dam sites were conducted in the month of August, 2023. Consultation meetings were carried out during the site visit with local communities of Killi Aiwaz Markhel, Killi Muhammad Shah, Killi Arambi Pir Ali Zia and Killi Majhic etc. Attendance sheets have been provided as Annexure 2.

### 6.3 METHODS OF PUBLIC CONSULTATION

262. Public consultations were conducted in order to establish stakeholder's opinion regarding project implementation. The following methods were used for public consultation with project stakeholders:

- Scoping sessions
- Informal meetings
- Individual interviews



## 6.4 IDENTIFICATION OF STAKEHOLDERS

263. Stakeholders are those who have a direct or indirect interest in project development, and who will be involved in the consultation process. During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. The stakeholders identified during field survey were the local residents, private land owners, shop keepers, farmers, job holders (Govt / pvt), drivers, daily wage labor and students. All the stakeholders had different type of stakes according to their professions which are listed down along with their comments and/or feedback. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders.

## 6.5 MAJOR STAKEHOLDERS AND THEIR APPREHENSIONS

264. The Table-6.1 contains the list of major stakeholders.

**Table 6-1 Stakeholders Contacted in the Project Area**

Sr. No.	Stakeholder Category	Number of Respondents
1	Local residents	13
2	Private land owners	3
3	Shop keepers	1
4	Farmers	7
5	Job (Govt / Pvt)	4
6	Drivers	3
7	Daily wage labor	9
8	Students	2

265. No major concerns were raised by the local residents during these consultation meetings. Participants showed their full support for project implementation. No private land acquisition is involved in the sub projects. The Figure: 6-1 below shows the pictorial view of interviews and consultation meetings held with the stakeholders. Attendance sheets of public consultations are attached as Annexure 2.

## 6.6 CONSULTATION MEETINGS AND FORMAL AND INFORMAL GROUP DISCUSSIONS

266. In order to get spontaneous responses, scoping sessions in the proposed project area were held to extract qualitative information about the perception and apprehensions about the project. The views of the locals were formally recorded and effort will be made to make those beneficial for the project.

267. Consultation meetings regarding project impacts, their magnitude and mitigation measures were held with the local residents, private land, shop keepers, farmers, job holders (Govt / pvt), drivers, daily wage labor and students to know their concerns regarding proposed project.

268. Generally, it was found that people were already aware of the proposed project. After the meetings, most of the respondents including all local residents and other stakeholders showed their full support for the proposed project. This project will be beneficial in terms of water resource management and agricultural development, not only for the local residents but also good for the development of the area. Concerns of the local communities and responses are provided in Table 6-2 below.

**Table 6-2: Community Concerns and Consultant Responses**

S. No.	Concerns and Suggestions	Responses
1.	The construction activities will cause inconvenience to local residents due to hindrance in routine activities.	The Contractor will ensure that construction work do not create disturbance for local people's access to the local route and their routine life activities.
2.	Noise and dust will be generated from construction activities and may cause health issues.	Regular sprinkling of water will be carried out to control the dust emissions at the construction site, whereas construction activities will be avoided during night time.
3.	Will there be tree cutting?	Efforts will be made to protect as much trees / plants as possible. Where avoidance will not be possible, ten saplings will be planted for each tree cut.
4.	Will employment opportunities be generated for locals during the construction phase?	Maximum workforce will be employed from the sub-project area.
5.	The rural women actively participate in outdoor socioeconomic activities such as herding livestock, agricultural activities, picking fuel wood etc. Their privacy should not suffer due to the project activities.	Local norms and customs will be respected.
6.	Safety of general public residing very near to sites where excavation is to be carried will particularly be at stake. The local people, particularly the children and women, may get injuries or even fatalities.	To enhance safety of local people the Contractor should use protective devices, including wire mesh containment, displaying warning signs along the work site, blowing sirens, etc.
7.	Does the project make the quality of existing Karez water worse?	No, protection measures will be taken to avoid the impact on surface water, like karez or other water channels.
8.	Will some trees be planted on our land along with the construction of bund?	Will discuss with the department and make it possible to plant some trees in this area to make the project environmentally friendly.
9.	How long this project will take time to be completed?	It is expected that, with efficient management, the work will be completed within seven months after the commencement, subject to the availability of funds.
10.	The cultivated land and infrastructure next to Killa Abdullah bazar has been damaged due to previous floods. How long will this protection bund be constructed to prevent future damages and losses?	Very soon, the construction work on the protection wall of Killa Abdullah bazar will be initiated.
11.	What level of involvement are you seeking from the local community?	Our organization/department hopes that during the project, our team and labor will receive full moral and ethical support from the local community, along with a safe working environment.
12.	With the protection wall, do you also build dams?	We can only make suggestions to the relevant department regarding dam construction.
13.	Why is this study/report important to this project? And how is it related to our community?	This environmental study is the major component of rehabilitation project. It will help to identify the major or minor consequences and impacts expected due to the project activities in this kili.
14.	Does this project require any land acquisition for development, or any demolish of house, building?	Land acquisition is not required, but in cases where it's necessary to demolish a building, the department will be consulted beforehand.
15.	What is the main purpose of this project?	In response to past flood damage, flood protection is a top priority. We're dedicated to promptly starting

		construction on the protective wall to safeguard against future flood-related losses and enhance community resilience."
16.	A lot of cultivated area was eroded in last flood, can these lands be recovered or leveled by the department?	We acknowledge the extensive damage to cultivated lands during the recent flood. Irrigation department will assess options for land recovery and leveling to minimize losses."

**Figure 6-1: Pictorial View of Interviews & Public Consultation**



Killi Pir Alizai (Pir Alizai and Majak Flood Protection Bund)

Killi Muhammad Shah (Killa Abdullah Bazar Flood Protection Bund)

Killi Haji Shakoor Khan (Gulistan bund)

Killi Haji Qasim Khan (Segai bund)

## 6.7 Departmental Consultation

269. Stakeholder consultations were conducted with relevant departments i.e. Forest department, Wildlife department etc. during the field visits in April, 2023 to obtain their views/concerns for the proposed sub-projects. The Table 6.3 below presents the details of consultations including stakeholder's designations/department and their views/concerns regarding the proposed project.

**Table 6-3: Departmental Consultation Concerns and Responses**

Sr. No.	Name of Department	Name & Designation of Official	Comments/Concerns	Consultant Response
1.	Irrigation Department, District, Naseerabad	Amanullah SDO	<ul style="list-style-type: none"> <li>Rehabilitation of irrigation channel should be prioritized if there is any channel damaging due to the</li> </ul>	<ul style="list-style-type: none"> <li>To address this concern, the design team will work closely with the project team to assess the potential impact of the construction activity on the</li> </ul>

Sr. No.	Name of Department	Name & Designation of Official	Comments/Concerns	Consultant Response
			<p>construction activity.</p> <ul style="list-style-type: none"> <li>Rehabilitation works will be conducted within the existing Right of Way (RoW), thereby negating the need for land acquisition and resettlement impacts.</li> </ul>	<p>irrigation channels in the area. The design team will also identify appropriate rehabilitation or realignment measures that can be implemented in case of any damage caused.</p> <ul style="list-style-type: none"> <li>Indeed, adhering to this approach will enhance the project's social acceptability and compliance.</li> </ul>
2.	Forest & Wildlife Department District, Jhal Magsi & Naseerabad	Ghulam Sarwar DFO Muhammad Khan RFO	<ul style="list-style-type: none"> <li>How much tree cutting is involved in this project?</li> <li>The clearing of vegetation for the contractor camp, haul routes or during construction activities will damage natural habitat</li> <li>Trees can be used as Fuel wood by contractor workforce</li> <li>Hunting, trapping, or harassment of wildlife can occur on-site by construction workers</li> </ul>	<ul style="list-style-type: none"> <li>As this is rehabilitation project being executed within existing RoW, no tree cutting is involved in this rehabilitation project. However, in the event of any tree removal, a commitment has been made to replant 10 new trees for each one cut.</li> <li>The contractor's camp location should be carefully selected to minimize tree cutting and wildlife habitat disturbance. Furthermore, the clearing of vegetation will be limited to the minimum area necessary for the project's operations</li> <li>Supply appropriate fuel in the work camps to prevent fuel wood collection.</li> <li>Contractor will ensure that no-hunting, trapping and/or harassing wildlife takes place at site. The wildlife protection laws would be strictly implemented.</li> </ul>
3.	Livestock Department, District Naseerabad	Dr. Abdus Salam Senior Veterinary Officer Dr. Sher Zaman Veterinary Officer	<ul style="list-style-type: none"> <li>Lined canal caused injuries to livestock when they entered the canal.</li> <li>Solid waste and Dead bodies of domestic animals are dumped in to the canal</li> <li>Sewage water disposed in to canal causing the water pollution</li> <li>Wildlife of the project area will be under impact due to construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>Entry of livestock into the main canal will be strictly prohibited to prevent any injuries caused by the lined canal.</li> <li>An awareness campaign will be launched regarding dumping of solid waste and domestic animal's dead bodies into the canal.</li> <li>Signboards should be placed on the canal regarding prohibition of dumping of solid waste, dead bodies of domestic animals and sewage water.</li> <li>Fines should be imposed who are polluting the canal water through dumping the solid waste and sewage water.</li> <li>a proactive approach to wildlife</li> </ul>



Sr. No.	Name of Department	Name & Designation of Official	Comments/Concerns	Consultant Response
				conservation and working closely with the experts and relevant authorities will help to minimize the impacts of the project on wildlife.
4.	Agriculture Extension Department	Rasool Bux Agriculture Officer	<ul style="list-style-type: none"> <li>Heavy machinery and equipment used during the rehabilitation of the canal can cause soil compaction, which can reduce soil fertility and negatively impact crop yields.</li> <li>The construction of the canal can lead to soil erosion, which can cause the loss of valuable topsoil and nutrients, reducing the productivity of nearby agricultural land.</li> </ul>	<ul style="list-style-type: none"> <li>Movement of machinery through agricultural fields will be strictly prohibited and only it will be allowed to move on defined routes.</li> <li>we can implement mitigation measures to minimize these effects and ensure that the project is sustainable and beneficial for the local community.</li> </ul>

**Figure 6-2: Pictorial View of Departmental Consultation**



Wildlife and Forest Department, District, Naseerabad

Live Stock Department District Naseerabad





Fisheries Department, District Naseerabad



Agriculture Department, District Naseerabad



Irrigation Department District, Naseerabad

## 6.8 Women Consultations

270. According to the ADB SPS requirement, conducting 'meaningful consultations' is necessary to ensure inclusive project planning and implementation, which includes consulting all stakeholders, including women. However, due to the conservative nature of the communities near project sites of District Killa Abdullah and Naseerabad concerning issues related to women, conducting consultations with women was not possible. It is important to mention here that in view of the highly conservative norms in the project areas, it was not possible to gain access to female respondents to obtain their responses. However, their views were indirectly obtained through their spouses and children to ensure the requirement of 'meaningful consultations' as per ADB SPS was fulfilled.

## 7. ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

### 7.1 GENERAL

271. This chapter identifies the significant potential environmental and socio-economic impacts which may occur during the project life. The appropriate mitigation measures are also discussed in this and the subsequent chapters of this report. A brief qualitative description of each aspect and the affected environment in the project Area is presented in the following sections.

### 7.2 METHODOLOGY FOR IMPACT SCREENING

272. Determining the significance of potential environmental impacts and their effects enables the identification of necessary mitigation and benefit enhancement measures as well as an estimation of the related financial costs associated with the impacts of a project. An impact can be either beneficial or adverse and is assessed by comparing the quality of the baseline conditions with the predicted quality once the project is under implementation or in place.

273. The procedure for determining the level of risk associated with each potential impact is described below. The likelihood that the activity will have an effect on the environment, as well as the consequence of the effect occurring, are used to assess risk. It is frequently described as follows:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

**Table 7-1: Likelihood Scale**

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventive measures are not applied	3
Unlikely	May occur once or twice during the activity if preventive measures are not applied	2
Rare	Unlikely to occur during the project	1

**Table 7-2: Consequence Scale**

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding communities	5
Major	The action will cause major adverse damage on the environment or surrounding communities.	3

Moderate	No or minimal adverse environmental or social impacts	2
Minor	No or minimal adverse environmental or social impacts	1

**Table 7-3: Risk Score Table**

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
	Certain	25	15	10	5
	Likely	15	9	6	3
	Unlikely	10	6	4	2
	Rare	5	3	2	1

**Risk:** Significant: 15-25

Medium: 6-10

Low 1-5

274. Any 'Medium' to 'Significant' risk requires an environmental management measure to manage the potential environmental risk. Judgment will be required concerning the application of an environmental management measure to mitigate low risk situations.

275. The impact assessment matrix presenting the potential impacts and expected impacts during the different project development phases are presented in the Table 7-4 below.

**Table 7-4: Impact Assessment Matrix**

Activity / Impact	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
<b>Design Phase</b>				
Flooding	Likely	Major	High	Low
Seismic damage	Likely	Moderate	Medium	Low
Land Acquisition	Unlikely	Minor	Low	Low
<b>Construction Phase</b>				
Air Quality	Likely	Moderate	Medium	Low
Noise Pollution	Likely	Moderate	Medium	Low
Vibration impacts	Likely	Minor	Medium	Low
Solid waste generation incl. Spoil material	Likely	Moderate	Medium	Low
Resource Conservation	Likely	Minor	Medium	Low
Soil Contamination	Likely	Moderate	Medium	Low
Soil erosion/ silt run-off	Likely	Moderate	Medium	Low
Community Health and Safety	Likely	Minor	Medium	Low
Occupational Health and Safety	Likely	Moderate	Medium	Low
Traffic management	Likely	Minor	Medium	Low
Communicable diseases	Likely	Minor	Medium	Low
Flora	Likely	Minor	Medium	Low

Fauna	Likely	Moderate	Medium	Low
Use of local water resources	Likely	Moderate	Medium	Low
Contamination of water resources	Likely	Moderate	Medium	Low
Social and Cultural Conflicts	Likely	Minor	Medium	Low
Religious and Cultural Heritage	Unlikely	Minor	Low	Low
<b>Operation Phase</b>				
Damage to infrastructure	Likely	Major	High	Medium
Biodiversity impacts	Unlikely	Minor	Low	Low

### 7.3 Anticipated Impacts during Pre-Construction/ Design Phase

276. Following is the description of impacts envisaged and the recommended mitigation measures during pre-construction/design phase.

#### 7.3.1 Land acquisition

##### Potential Impacts

277. The proposed works will be carried out on BID land and will utilize the department's owned Right of Way on all proposed sites. Therefore, there is no requirement for any type of land acquisition, including Voluntary Land Donation, for these sub-projects.

278. Currently, no community is occupying the existing structures for both permanent and temporary shelter and relief from floods, and no community asset has been identified for relocation. Therefore, no mitigation measures are needed.

##### Mitigation Measures

No measures required.

#### 7.3.2 Seismic Hazard

##### Potential Impacts

279. As per the seismic zone map of Pakistan, the district Naseerabad is located in Zone 3. This implies the potential for 'moderate' to 'severe' damage in the event of earthquakes. On the other hand, Killa Abdullah is situated in an active seismic region categorized as Zone 4 on the Seismic Zone Map of Pakistan. This indicates the likelihood of experiencing severe damage from earthquakes. In Zone 3 & 4, the design of various structures should be formulated considering the Peak Ground Acceleration (PGA). The occurrence of a highly intense earthquake in the vicinity of the project site could lead to detrimental impacts on its development, constituting a significant negative consequence. This factor underscores the necessity for careful consideration by the designers, especially in light of major earthquakes that occurred in 2015, 2013, 2012, and other relevant events. The resultant impact is expected to hold 'moderate' significance.

##### Mitigation Measures

280. At the detailed design stage, the safety of the proposed water conservation structures against the damages due to seismic activity need to be ensured. As such structural designs of dam body, spillway and other structures need to follow the applicable criteria for the zone 4

recommended in the Building Code of Pakistan, 2021. By adopting the aforementioned measures, the impact would be of low significance.

281.

### 7.3.3 Flooding

#### Potential Impacts

282. The valley is under a severe threat of flooding during heavy rains. The rapid floods originating from hill torrents in the surrounding area cause devastation in almost the entire region due to their high velocity and magnitude. Just like the flash floods of 2022, future flooding can breach the dam body and damage spillways and other infrastructure. This impact would be of high significance.

#### Mitigation Measures

- As per findings of the hydrological study, estimation of the discharge of streams/nullahs of the project area has been calculated against 500 years return period. Hydrological studies have considered peak historical floods to incorporate in dam design to avoid/minimize future flooding impacts.
- A pre-construction visit is recommended to be conducted by a team comprising Route Engineer, Hydrologist and Hydraulic Engineer to validate the crossing locations and design.

283. By adopting the aforementioned measures, the impact would be of low significance.

## 7.4 Construction Phase

### 7.4.1 Impact on Air Quality

#### o Fugitive Dust Emissions

#### Potential Impacts

284. Air quality will be affected by fugitive dust emissions from excavating activities of construction machinery, material stockpiles & material transportation, dust from the unpaved surfaces and movement of construction vehicles, which can be very harmful for the site worker, local population and natural vegetation. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. These emissions may also affect the bio-physical environment. List of air sensitive receivers is given in **Table 4-1**. This impact would be of medium significance.

#### Mitigation Measures

285. The measures are as follows:

- The material being transported or stored at the stockpiles will be kept covered with plastic to ensure protection of ambient air from fugitive emission during wind storm emissions.
- The contractor will monitor air quality on regular basis near the plant.



- Preventive measures against dust should be adopted for unloading operations. Regular water sprinkling of all excavation work the site should be carried out to suppress excessive dust emission(s);
- Grading operation will be suspended when the wind speed exceeds 20 km /hr.
- The plant should be located at least 500m away from any living area.
- Enforce the maximum speed limit to 20km/h for vehicles using embankments and access road.
- Road damage caused by project activities will be promptly attended to with proper road repair and maintenance work
- Proper Personal Protective Equipment (PPE) should be issued to the site worker and make sure the worker wears the PPE properly during working on site.

286. By adopting the aforementioned measures, the impact would be of low significance.

#### o **Smoke from Burning of Waste Material or Burning Firewood**

##### **Potential Impacts**

287. A number of big and small fires in the labor camp can produce smoke and smog, which can cut off visibility, reduce traffic ability and cause suffocation along with causing diseases of respiratory tract.

##### **Mitigation Measures**

288. The mitigation measures will be as follows:

- It is contractor's contractual obligation to use and provide clean and smoke free fuel in the labor camp.
- Cutting and burning trees or shrubs for fuel should be prohibited.
- Gas Cylinders should be used in the labor camp for cooking purposes.

#### o **Vehicular and Generator Exhaust Emissions**

##### **Potential Impacts**

289. Emissions of noxious gases from movement of heavy machinery, batching plant and generators etc. would release emissions which would certainly add to the ambient air levels of the immediate vicinity. Also, the movements of heavy machinery and vehicles of old make and poor engine condition tend to release more than new well-tuned vehicles while the use of low-grade fuels and lubricants also increase pollutant emission levels.

##### **Mitigation Measures**

290. The mitigation measures will be as follows:

- All vehicles during construction activities will be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair are needed to minimize the hazardous emissions.
- Batching plant should be set up considering the wind direction so that the nearby communities are not affected by the emissions from batching plant.

- NEQS / WHO applicable standards to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.
- Best quality fuel and lubes should be purchased where possible lead-free oil and lubes should be used.

#### 7.4.2 Impact of Noise Pollution

##### o Noise from Construction Activities

##### Potential Impacts

291. Noise is the most pervasive environmental nuisance. Noise is a by-product of human activity and area of exposure increases as a function of mobility and construction activities. The main sources for noise in the project area may be heavy machinery such as excavators, concrete mixing plant, stone crushers and other equipment. Noise generated by construction machinery is likely to affect sensitive receptors located within Aol (**Refer Table 4-1**). Health risks associated with exposure to continuous noise levels include high blood pressure, hypertension, annoyance and sleep disturbance, temporary threshold shift etc. This impact would be of medium significance.

##### Mitigation Measures

292. The mitigation measures will include the following:

- Vehicles and equipment used should be well fitted, as applicable, with silencers and properly maintained; that will reduce noise hazards according to permissible limits as fixed by Pak EPA (noise is 85 dB (A) while the WHO noise guidelines prescribed a limit of 55 dB (A).
- Construction workers will be provided suitable hearing protection like ear cap, or earmuffs and will be trained about their usage.
- Construction activities that are close to settlements will be stopped during night times if high noise values are observed.
- Consultations will be held to discuss appropriate solutions and techniques to control noise (e.g. mud or brick walls, bushes, etc.). Such hearings consultations should also be regularly conducted to solicit public feedback, to avoid public inconvenience and suggestions for improvement in working strategy / working environment and progress of project activities; and
- In accordance with the environmental monitoring plan, noise measurements will be carried out on regular basis at locations and schedule specified to maintain the level within the NEQS / WHO standards and to ensure the effectiveness of mitigation measures.

293. By adopting the aforementioned measures, the impact would be of low significance.

#### 7.4.3 Vibration

##### Potential Impacts

294. Construction activities i.e. soil compaction, excavation, moving of heavy trucks have the potential to produce vibration levels that may be annoying or disturbing to humans and may cause damage to structures if appropriate precautions are not taken. (Refer **Table 4-1**).

## Mitigation Measures

295. Following mitigation measures should be implemented to combat the potential vibration impacts during the construction stage:

- Use of heavy machinery should be allowed in limited time only from 07.00 a.m. to 10.00 p.m. except for any emergency for which contractor should take prior approval; and
- Low vibration level machinery should be used and a system of regular maintenance and repairs to be employed.
- Where vibration could become a major consideration (within say 100m of schools, religious premises, hospitals or residences) a building condition survey should take place prior to construction.
- The physical effect of piling should be assessed prior to construction and measures.
- should be discussed with the local population as well as timing of the works to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations.

296. By adopting the aforementioned measures, the impact would be of low significance.

### 7.4.4 Solid Waste Generation incl. Spoil material

#### Potential Impact

297. Considering the labourers residing in the construction camp and the locally available labour, solid waste generation will take place. The major components of the labour camp waste will be garbage, putrescible waste, rubbish and small portion of ashes and residues. Other type of wastes may include inorganic construction wastes including hazardous waste.

298. Spoils will be generated from the excavation activities. Disposal of spoil / surplus material may cause negative environmental impacts, if not properly mitigated during implementation of the proposed project. Potential impacts from spoils and its disposal are (i) land for disposal of spoil, (ii) conversion of those land areas into a permanent dumping area, (iii) potential erosion from the spoil areas and spoil material reaching the Nullahs/Streams, and (iv) aesthetic impacts. Approximately 1026.56 m<sup>3</sup> material will be excavated most of which will be reused after approval of quality control engineer. Estimated 200 m<sup>3</sup> spoil will be dumped safely and levelled to avoid any harm to aesthetic sense at approved disposal areas. This impact would be of medium significance.

#### Mitigation Measures

- All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system. The contractor will coordinate with local representatives and administration of the concerned solid waste management department for the disposal of solid waste;
- The contractor must develop a plan of action with the help of concerned solid waste management department for transporting the waste to the disposal site;
- Toxic waste will be handled, stored, transported and disposed separately;
- The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and

- Solid waste will be segregated at source so that it can be re-used or recycled.
- Waste management plan will be developed to implement an efficient and responsive solid waste management system during construction phase. Recyclable wastes e.g. steel bars will be sold to waste vendors;
- Reusable material will be used as a filling material during ground levelling;
- Solid waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; and
- The site will be restored back to its original condition after construction completion.
- The spoil material from the excavation will be dumped at designated places. The dumping sites must be approved by environment specialist of the Construction Supervision Consultant (CSC).
- The contractor will also ensure that no spoil material is disposed into stream/nullahs and into any other water body along the project site.
- As far as possible barren/waste lands available will be used for disposal of the excavated waste material.
- The spoil material shall be deposited in layers and properly rolled and sprinkled to avoid any negative environmental impacts.
- Contractor will prepare and approve a impspoil management plan, prior any disposal of spoil.

299. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.5 Resource Conservation**

##### **Potential Impact**

300. During the construction, overburden on local resources is possible if construction facilities such as workers camp and construction camp built near rural areas and can create problems for local communities. There can be a conflict for resources between workers and local community. This impact would be of medium significance.

##### **Mitigation Measures**

- Use potable water bowsers for construction works and mineral water bottles/ ground water for drinking purposes;
- Plan for the provision/purchase of adequate insulation to reduce heat loss through construction plants;
- Reduction of wastage of water through training of workers involved in water use;
- Reuse of construction waste materials may be adopted wherever possible;
- Aggregates will not be sourced from river and stream beds.
- Diesel and fuels with low sulphur content should be used to operate construction machinery and equipment;
- Efficient and well -maintained equipment and machinery will be used;

- The equipment and machinery will be turned off when not in use;
- A good camp design and an efficient worksite management plan can help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels.

301. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.6 Soil Contamination**

##### **Potential Impacts**

302. Surface soil has the potential to be contaminated by construction material, vehicle movements and various construction activities. Spillage of fuel, lubricants, cement and chemicals has the potential to result in contamination. Possible sources of spillage are:

- During transfer of fuel from one container to another or during refueling;
- Unloading of construction material due to careless handling;
- Maintenance of equipment and vehicles;
- Due to leakages from equipment and containers;
- It is anticipated that a large quantity of excavated material will need to be disposed of. If this waste material is not properly disposed of, it will contaminate the soil and water resources, especially during the rainy season. Improperly managed excavated material, if left exposed or not stored correctly, can easily erode and get washed away by rainwater. During the rainy season, the increased water flow can carry the eroded soil into nearby water bodies, causing sediment runoff.

303. This impact would be of medium significance.

##### **Mitigation Measures**

304. The following practices will be adopted to minimize the risk of soil contamination:

- The Contractor will be required to train its workforce in the storage and handling of materials like oils, diesel, petrol, other chemicals, concrete and cement, etc., that can potentially cause soil contamination. The Contractor will be required to prepare a training manual and module for all the construction related activities along with the schedule of training program and submit to the supervising consultants for approval.
- Refuelling areas will have impervious concrete bases with appropriate drainage to prevent spills from contaminating the surrounding area.
- During on-site maintenance of construction vehicles and equipment, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.
- Oils, fuels and hazardous materials will be stored in appropriately bounded areas. Fuel tanks will have to be placed within sealed bunds capable of containing 120% of the total volume of the tank in case of leakage.
- Regular inspections will be carried out to detect leakages from vehicles and construction machinery.
- Vehicles and/or equipment with leakage will not be used, until repaired.
- Solid waste generated during construction and at camp sites will be properly treated and safely disposed of only in demarcated waste disposal sites.
- The construction phase will consume lot of cement additives and oils and the empty containers will contain dangerous amount of chemicals inside, which can impact the humans as cancer producers. All such containers must not be sold to general public



and must be destroyed and sent for recycle. This will be contractor's responsibility who must seek consultant's supervision. The people must be warned against use of empty chemical containers through local press and erecting banners in project area.

305. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.7 Soil Erosion**

##### **Potential Impacts**

306. Major considerations are as follows:

- Soil erosion may occur in the workshop areas as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities. Potential sources of soil erosion (due to wind or rain) include clearing of area for construction, preparation of camp sites, workshop areas, equipment washing-yards access tracks for operations, off road vehicular traffic on unpaved roads during construction.
- The reduction in vegetative cover along sides of project infrastructure will reduce the binding capacity of the soil and susceptibility to erosion by the force of rainfall, resulting in increased soil erosion and removal of plant nutrients. The loss of vegetative cover can increase propensity for landslides.

307. This impact will be of medium significance.

##### **Mitigation Measures**

308. Good engineering practices will help controlling soil erosion both at construction sites and in peripheral areas, particularly in haul tracks. Soil erosion remedial measures will be based on geotechnical, geomorphic and hydrological conditions of the project area and these will vary from site to site. However, the following measures will be adopted as per site conditions:

- All the freshly cut surfaces will be restored/stabilized as soon as possible;
- Seeding or plantation of erodible surfaces will be done;
- Construction activities will be planned in such a way so as to avoid cutting of erodible surfaces and earth movement in rainy season;
- Along cross-drainage structures of the access road where embankments are more susceptible to erosion by water runoff stone pitching or a riprap will be provided across the embankment.
- Proper monitoring of the soil erosion prone areas will be carried out during operation phase and soil conservation measures (if needed) will be carried out like provision of physical structures e.g. retaining walls, etc.

309. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.8 Community Health and Safety**

##### **Potential Impacts**

310. The communities residing in the project areas might be at risk from the proposed works since deep excavation works will take place along with movement of heavy machinery and vehicles transporting the raw materials and spoils etc. to and from the work sites. This could

potentially result in injury and/or death to community members, particularly women and children if care and precautions are not taken while moving in the project areas. This impact will be of medium significance.

### Mitigation Measures

- The Contractor will prepare the site specific community health and safety plan in compliance with applicable national and international regulations and guidelines.
- The Contractor will clearly barricade work areas to prevent access by the public, while ensuring passage by providing safe pathways for pedestrians around construction zones;
- The Contractor will exclude parking, waiting vehicles and vendors from areas adjacent to the work by means of clearly marked barricades and posted signage;
- The Contractor will remove excavated earth, spoil, rubble, cut vegetation and refuse whether generated by the project or discarded by third parties from areas within the construction zone, where it has potential to interfere with the public or generate dust;
- The Contractor will provide temporary lighting to facilitate construction during night time;
- The Contractor will remove hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions and will barricade any excavations and materials placed near the public place (if applicable);
- Hard Barricades will be provided at the excavation deeper than 1.5 meter as per “NZS 3845:1999 Road safety barrier systems”;
- The Contractor will promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction, and maintain or provide temporary services that are interrupted by construction. The Supervisory Consultant will inspect and certify the adequacy of all reinstated services and facilities;
- Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas especially near the settlements;
- An Emergency Preparedness and Response Plan (EPRP) in coordination with the local emergency responders to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;
- Any environmental condition that is disagreeable to the public and causes an avoidable nuisance can be addressed with additional provisions over and above those described above, as determined necessary by the supervisory consultant.
- These requirements will be incorporated into the bidding specification and contract documents, and will be binding on the contractor, at risk of penalty for noncompliance, as charges to be recovered from contractor for unsafe act or condition.

## 7.4.9 Occupational Health and Safety

### Potential Impacts

311. Occupational Health and Safety (OHS) related impacts will arise during construction stage activities including clearing of earth, levelling, compaction, foundations, finishing, testing & commissioning. In a nutshell, occupational health and safety issues associated with the construction of proposed sub-projects will primarily include physical hazards; chemical hazards; and noise.

312. **Noise:** Construction and maintenance personnel may be potentially exposed to high levels of noise from heavy equipment operation and from working in proximity to vehicular traffic. As most of these noise sources can be prevented by using personal hearing protection by exposed personnel and implementation of work rotation programs to reduce cumulative exposure.

313. Lack of Emergency Response Plan (ERP) or an inefficient response plan may lead to an accident or critical injury. This impact would be of medium significance.

### Mitigation Measures

314. Following mitigation measures shall be adopted by the contractor to control accidents due to deep excavations:

- Proper barricading shall be applied to all excavation deeper than 6feet.
- Warning taps shall be applied to trenches which are around 3 feet deep.
- Isolation of area must be done during excavation activities to control accidents.
- Damping down of area to control fugitive dust.
- Where necessary, apply green sheet to control fugitive dust, especially during high wind season.
- Material shall be stored at least 3 feet away from the edges of excavations.
- Designated entry and exit points at all deep excavations.
- If any confined space encounters (excavation deeper than 10 feet or any main hole etc.), procedure for confined space entry shall be followed.

315. For further details, framework for Occupational Health and Safety Management plan has been developed to handle any health and safety issue of workers and community. Mitigation measures to prevent and control physical hazards include:

### Moving Equipment and Traffic Safety

316. Establishment of work zones to separate workers on foot from traffic and equipment by:

- Routing of traffic to alternative roads when possible;
- Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible;
- Reduction of maximum vehicle speeds in work zones; and
- Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper

illumination for the work space (while controlling glare so as not to blind workers and passing motorists).

- Provide appropriate PPE in conjunction with training, use, and maintenance of the PPE.
- Furthermore, the noise reduction options that should be considered which include:
- Selecting equipment with lower sound power levels;
- Installing suitable mufflers on engine exhausts and compressor components;
- Installing vibration isolation for mechanical equipment;
- Providing noise protection PPEs (ear plugs/ear muffs) to the construction workers;
- Re-locating noise sources to fewer sensitive areas to take advantage of distance and shielding;
- Developing a mechanism to record and respond to complaints; and
- Regular monitoring of noise levels at active sites or near noise producing equipment/machinery and compare it to the available occupational noise standards.

#### **Monitoring of OHS Activities:**

317. During the construction phase of proposed project, occupational health and safety monitoring programs of the contractor (s) should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards at the construction site and camps, and the implementation of prevention and control strategies. The occupational health and safety monitoring program should include:

- Regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used;
- Surveillance of the working environment: The contractors should document compliance using an appropriate combination of portable and stationary sampling and monitoring instruments. Monitoring and analyses should be conducted according to internationally recognized methods and standards. Monitoring methodology, locations, frequencies, and parameters should be established individually for each project following a review of the hazards;
- Continuous and efficient surveillance of worker's health during the entire construction phase by the nominated officials of contractors; and
- Training: Training activities for employees (construction contractor & supervision consultant staff) and visitors should be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills, should be documented adequately. Service providers and contractors should be contractually required to submit to the employer adequate training documentation before start of their assignment.

- Contractor(s) shall prepare a comprehensive OHS Plan as part of Site Specific Environmental Management Plan (SSEMP).

318. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.10 Traffic Management**

##### **Potential Impacts**

319. During construction activities, large number of light and heavy vehicles is expected to use the community roads. Similarly, heavy machinery will be stationed in and adjoining areas of the project site. This may create a burden on the capacity of the existing road network and the project-generated traffic may be a nuisance for surrounding communities. This impact would be of medium significance.

##### **Mitigation Measures**

- Construction traffic hindrance should be avoided by providing proper diversion and signage.
- Traffic management plan will be prepared by the contractor after consultation with RE for its implementation.
- GRM will be put in place to address community grievances in this regard.

320. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.11 Communicable diseases**

##### **Potential Impacts**

321. The laborers in the Contractor Camp, truck drivers and like personnel who interact with each other have the potential for the spread of HIV/AIDS if the incidence exists. Majority of the people living in the surrounding of the Project, and potential Labor are not aware of the source, mode of communication or consequences of HIV/AIDS. Although their religious and cultural value system, to a large extent excludes the outbreak or rapid communication of HIV/AIDS, yet its occurrence in such a situation cannot be precluded. It is necessary that awareness and preventive campaigns are run from time to time in the Labor camps and the field offices of the Project to prevent the communicable diseases like Cholera, Typhoid and Tuberculosis.

322. There is a chance of spreading of an epidemic of Coronavirus disease (COVID-19) due to close interaction of the labor force during construction not only among the workers but also in the area. This impact is medium adverse in nature.

##### **Mitigation Measures**

323. The Contractor shall:

- Arrange to run an active campaign, in the labour camp, to make people aware of the cause, mode of transmission and consequences of HIV/AIDS;
- Latest / Updated SOPs by WHO, national and provincial Government related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored;



- Strengthen the existing local health & medical services for the benefit of labour as well as the surrounding villages;
- Ensure cleanliness and hygienic conditions at the labour camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by the Health Department;
- Locating a labour camp at least away from the villages (local settlement), and
- Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents

324. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.12 Flora**

##### **Potential Impacts**

325. No tree cutting is expected as this is restoration /rehabilitation project and being executed within its already available ROW. The Contractor's workers may damage the vegetation and trees (for use as firewood to fulfil the camps requirements). The cutting of small trees and shrubs will cause degradation of local environment as under:

- It will enhance soil erosion. Without the branches and leaves, to break its fall, heavy storms can quickly wash away the soil from even a gentle slope. Cutting down of trees/shrubs also takes away the roots that would otherwise help in binding the soil.
- During the entire construction period dust, laden polluted air will form a dust film on leaves thus blocking sunshine and stomata consequently hindering photosynthesis processes causing detrimental effect on the plant health.

326. This impact would be of medium significance.

##### **Mitigation Measures**

327. Following measures will be adopted during construction and operation stages.

- Campsites and Elevated Ground Storage Tanks (EGST) will be established on waste/barren land rather than on forested or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth or agricultural area.
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement.
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as small trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands.
- Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed.
- The compaction of trenches should also be done properly. Inadequate compaction of trenches will result in flow of soil during rainy season resulting in increased soil erosion.
- As far as possible digging in the cultivated land should be done when the land is barren to avoid damage to agricultural crops.
- Open fires should be banned in the area to avoid hazards of fire in the project area.
- Tree cutting due to project intervention is not expected. However, ten saplings will be replanted in case a tree is cut as per EPA rule.

328. By adopting the aforementioned measures, the impact would be of low significance.

#### 7.4.13 Fauna

##### o Mammals and Reptiles

329. The impact on mammals and reptiles will include the following:

During the construction phase, there will be negative impacts on the mammals and reptiles of the area, due to construction activities involving excavation, movement of labour, carriage of goods and machinery to various sites.

The key terrestrial species in the project area are:

##### **Mammals:**

- red fox (*Vulpes vulpes*),
- Asian jackal (*Canis aureus*),
- Indian crested porcupine (*Hystrix indica*),
- Cape hare (*Lepus capensis*),
- Hedgehog (*Erinaceus europaeus*),

##### **Reptiles:**

- Lizards (Agama, Monitor),
- Saw-scale viper (*Echis carinatus*),
- Levantine viper (*Macrovipera lebetina*), etc

330. Mammals, such as jackal, fox, porcupine, etc. will avoid these areas for fear of being persecuted. Same will be the case with reptiles; some reptiles might be killed during the digging and dragging operations. Movements of the mammals and reptiles will be restricted during the construction phase.

331. Eatable and refuse goods of the Contractor's camps may attract wildlife that might be hunted by the workers. The accidental striking of all terrestrial fauna by project vehicles on access routes is a considerable risk during the project. This impact would be of medium significance.

##### o Birds-Avian Fauna

332. The presence of migratory and sedentary birds is considered likely throughout the area surrounding the project footprint. Avifauna prefers undisturbed marshy habitats, such as that surrounding the larger steams and away from agricultural land. However, they are also observed within cultivated lands and around settlements of the project area. The presence of avifauna will increase during the winter months, with the arrival of migratory birds. However, there are no landing zones used by migratory birds in the immediate project area.

333. The key avifauna species in the project area are:

- Chukar partridge (*Alectoris chukar*),
- See-See Partridge (*Ammoperdix griseogularis*)
- Chough (*Pyrrhocorax spp*)

334. During construction, avifauna may be disturbed due to sensory disturbance from construction; movement of vehicles and crew personnel; location and operation of camps; operation of large plant; and site restoration. This will be a temporary disturbance within the

project area. Following construction, there will be availability of wetland areas in the project area.

335. Birds will try to find shelter and food somewhere else and will tend to move away from the project area due to the activities mentioned above for fear of being hunted/trapped.

### **Mitigation Measures**

#### **o Mammals and Reptiles**

- Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will warn their labor accordingly.
- Noise generating activities will be avoided during the night.
- The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed off to prevent the chances of eating by wild animals, which may become hazardous to them.
- Vehicles will be maintained in good condition and provided with mufflers to reduce noise.

336. After adopting the above-mentioned mitigation measures, the residual impact will be of low risk of striking fauna on access routes.

#### **o Birds-Avian Fauna**

- Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.
- The contractor should be committed to ensuring the conservation and protection of wildlife within the project area. To achieve this goal, a strict "No Hunting" policy shall be implemented and enforced among all workers and personnel involved in the project.
- Staff working on the project should be given clear orders, not to shoot, snare or trap any bird.

337. By adopting the aforementioned measures, the impact would be of low significance.

### **7.4.14 Use of Local Water Resources**

#### **Potential Impacts**

338. The water resources of the project area mainly comprised of surface water (seasonal rivers and streams in District Killa Abdullah, Pat Feeder Canal in District Naseerabad etc) and groundwater that is being used by all communities for drinking purpose. There will be ample need of water not only for construction purposes (of concrete side slopes) but also for meeting the consumptive and non-consumptive needs of the campsites, workshop, washing yard, etc. It is obvious that these needs will be met from the existing resources of the areas in close proximity to the dam. This impact would be of medium significance.

### **Mitigation Measures**

339. Mitigation measures regarding use of local water supplies as follow.

- Availability of water for camp site facilities and construction purposes will be ensured by the contractor prior to start of construction activities. As per Local Government Act,

the contractor will seek approval from the Local Government for exploitation of the water resources.

- Contractor will ensure that the water availability of the existing local users remains unimpeded by the project interventions. The contractor will make arrangements for the availability of drinking water and construction works on his own. For this purpose, contractor will install hand pumps/tube wells accordingly.
- The Contractor will be required to act as a go-between closely with local communities to ensure that any potential conflicts related to common resource utilization for project purposes are resolved quickly.
- The contractor will prepare guidelines for the workers for minimizing the wastage of water during construction activities and at campsites.

340. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.15 Contamination of Water Resources**

##### **Potential Impacts**

341. The water resources (seasonal streams & rivers and PFC) may get polluted from hazardous construction materials, wastewater effluent, solid waste, silt from construction and soil erosion, etc. both during construction and operation phases. This normally occurs when waste material is disposed of improperly. Pollution of water resources and its consequences may occur through following ways:

- Implementation of the Project may aggravate the pollution of surface water resources of the Project area through contamination by the wastewater effluent and solid waste material generated from the kitchens and toilets at construction campsites.
- Subsurface water may be contaminated from the spills of chemicals, oil, lubricants, detergents, etc. through runoff from the construction area, construction camp, workshops and equipment washing-yards.

342. This impact would be of medium significance.

##### **Mitigation Measures**

343. Measures to prevent contamination of surface and ground water will include the following.

- Camps will be located at least 500 m away from the nearest local settlement to prevent the contamination of hill torrents & PFC, etc.
- Wastewater effluent from contractors' workshops and equipment washing-yards will be passed through an oil skimmer and to gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams. Similarly, the wastewater effluent from the campsite will be treated before disposal into a stream.
- Borrow pits and natural depressions lined with impervious liners will be used to dispose of scraped obnoxious material, and then covered with soil. Cost of this item will be made part of Contractor's Bill of Quantities (BOQs). This will check potential groundwater contamination. Such measures will also be provided at stream side disposal of waste material in addition to retaining walls or gabions. Available stone (boulders) from excavated rocks will be used for retaining walls as well as for gabions. It will reduce the quantity of dumping material. However, all types of hazardous waste will have to be collected on site separately and stored in appropriate containers to be

finally removed from site and be brought to adequate handling, recycling or disposal facilities.

344. Specific measures for water quality protection to be taken on the construction site will be the following:

- Fuels, lubricants and other hazardous material will have to be properly stored in adequate containers in sites equipped with retaining structures, including oil skimmers for the treatment of contaminated runoff water.
- Repair and maintenance work on machines and vehicles will only be done in specific places designed and equipped for this purpose (oil skimmer). These must be at a safe distance from the stream/nullah. No washing of vehicles will be done in or near the stream/nullah.
- Water contaminated with concrete will have to be collected in sedimentation ponds and, if required, will have to be neutralized before being discharged to the natural streams/Wetlands. Contamination of the springs/nullah with concrete or cement must be avoided.
- Sewage water from the camp will have to be collected and treated in a suitable septic tank before being released into the streams.
- Generally, waste should be reduced, re-used, recycled and the disposal has to be controlled

345. By adopting the aforementioned measures, the impact would be of low significance.

#### **7.4.16 Social and Cultural Conflicts**

##### **Potential Impact**

346. During the construction phase of the proposed project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local residents. This impact would be of medium significance.

##### **Mitigation Measures**

- Local labor especially from nearby communities should be given preference for the construction works;
- Careful planning and training of work force to minimize disturbance to the local people;
- Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and
- Adequate training especially for the transitive workforce of the station (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.

347. By adopting the aforementioned measures, the impact would be of low significance.



## 7.4.17 Religious and Cultural Heritage

### Potential Impacts

348. No graveyard will be disrupted due to this project. No historical or archaeological site has been observed or reported along the project area. So no mitigation measured for graves, cultural and historical sites needed.

### Mitigation Measures

349. Currently no graveyard is affected by this project. However, if any graves affected by the project, they will have to be shifted. The proponent will obtain Fatwa from local Mufti before shifting the graves. During such operation the proponent will inform local administration and seek their assistance for security. The request will also be extended to Health Department for deputation of medical and paramedical staff during the operation. As referred earlier, no relocation of historical site is involved, so no mitigation is required except that contractor will follow the prayer timing particularly at prayer of Juma and the workforce will observe the sanctity of religious properties.

350. There are no cultural sites located within the study area and no impacts on archaeological sites are envisaged. However, the Contractor will be required to instruct the construction crews and site supervisors in respect of archaeological site recognition, conservation procedures, and temporary site protection. In case of a chance finding during excavation, the contractor will protect the site and notify the Engineer who will inform Department of Archaeology & Museums through Irrigation Department and hand over such sites to the department if instructed by Engineer / Irrigation Department. The Chance Find Procedure is provided as Annexure 9.

## 7.5 Operational Phase

### 7.5.1 Damage to infrastructure

#### Potential Impacts

351. Breach of dam, damage to spillway and other irrigation structures is likely to occur. This impact would be of high significance. However, it will threat system sustainability and following factors may also contribute to this process:

- Improper operation of water control facilities;
- Reservoir sedimentation
- Deterioration of free board due to cattle trespass and other factors;
- Inadequate supervision;
- Lack of timely and adequate repairs; and
- Lack of coverage of hydraulic gradient.
- Natural hazard i.e. flooding and earthquakes

#### Mitigation Measures

352. To mitigate the above-mentioned impacts, the following measures shall be adopted:

- BID to monitor the system regularly;

- Annual checks and maintenance of embankment dam, falls and control structures and bed levels which are affected by siltation or scour.
- Repairs on urgent basis; and
- Emergency response plan for dam breach shall be followed, which is attached as Annexure-5 of this report.
- By adopting the aforementioned measures, the impact would be of medium significance.

### **7.5.2 Biodiversity impacts**

#### **Potential Impacts**

353. The proposed works are limited rehabilitation works of the dam structures are proposed to repair and reconstruct the dam structural aspects damaged by the floods. Since these dams have already been operational in the past, thus, the respective ecological characteristics have already adjusted to the flow regimes from these dams and thus there will be no changes and/or negative impacts on the ecology/biodiversity and environmental flows (e-flows)<sup>23</sup> in the respective water bodies downstream of these dams. Furthermore, the rehabilitation of the dams will restore the pre-flood ecological and e-flow dynamic that was present downstream of these dams.

#### **Mitigation Measures**

No mitigation measures required.

### **7.6 Induced Impacts**

354. The proposed works will not result in any induced impacts. The works to be conducted will be in remote locations that will be away from any settled areas and based on the limited nature of the scope and scale of works, no stress on any of the resources or infrastructure will be caused and thus no induced impacts will take place.

### **7.7 Cumulative Impacts**

355. There are no cumulative impacts expected from the proposed project activities since there will be no other works going on in parallel while the works proposed in this IEE study are being conducted in the respective project areas.

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<sup>23</sup> Environmental flows describe the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well being that depend on these ecosystems.

## 8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

### 8.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

#### 8.1.1 General

356. The EMP is a strategic approach towards the effective implementation of the mitigation measures and environmental protection of the project area and its surroundings. This EMP ensures that the undue or reasonably adverse impacts of a project are prevented and the positive benefits of the project are enhanced. According to this plan, all the activities related to various phases of the project are controlled and monitored.

357. This EMP encompasses all the phases of the project and may be used as a quick reference by the personnel(s) of client and contractors for effective implementation of the proposed mitigation measures and tracking the overall environmental performance of the project.

358. This EMP addresses all the significant impacts that are identified during the impact's identification process. It will be amended in consultation with the concerned regulatory authority; if any issue has been overlooked or if any need would arise as the project continues.

#### 8.1.2 Structure of EMP

359. The contents of this chapter are given below:

- Regulatory requirements
  - Purpose & need of the EMP
  - Objectives of EMP
  - Scope of EMP
  - Institutional arrangement for implementation of EMP
- ☐ Institutional arrangements for implementation of EMP during Construction phase
- Role and responsibilities of the functionaries involved in EMP implementation
  - Reporting mechanism
  - Non-compliance of the EMP
- ☐ Institutional arrangements for implementation of EMP during Operation phase
- Role and responsibilities of the functionaries involved in EMP implementation
  - Reporting mechanism
  - Environmental mitigation plan
  - Environmental monitoring plan
  - Implementation of EMP
- ☐ NOC and other approvals
- ☐ Stakeholder coordination
- ☐ Trainings
- ☐ Communication and documentation
- Environmental management cost

- Change management

### **8.1.3 Regulatory Requirements**

360. This EMP refers to the applicable national and international legal framework for the proposed project for the protection of the environment.

### **8.1.4 Purpose & Need of the EMP**

361. Primarily, the purpose of this EMP is to serve as a quick reference for the consultants, contractor as well as BID to implement the proposed mitigation measures effectively and to monitor the overall environmental performance of the project.

362. Furthermore, to house the procedure, which the BID follows to implement and maintain this EMP. The need of the EMP is mentioned as follows:

- Ensure that attention is paid to the actual environmental effects arising from construction and operation of the proposed sub-projects;
- Ensure that anticipated impacts are maintained within the predicted levels;
- Ensure that unanticipated impacts are managed or mitigated before they become a problem; and
- Ensure that environmental management brings about real environmental benefits and achieves environmental sustainability.

### **8.1.5 Objectives of the EMP**

363. The main objectives of the EMP during different phases of the project is to implement mitigation measures and to evaluate the effectiveness of mitigation measures as proposed in the IEE and recommend improvement if any need would arise.

### **8.1.6 Scope of the EMP**

364. The scope of the EMP includes the following phases of the project:

- Design phase
- Construction phase; and
- Operation phase.

365. All the activities performed during these phases will be controlled and monitored according to this EMP.

### **8.1.7 Institutional Arrangement for Implementation of EMP**

366. The following is a broad guideline that has been proposed for institutional setup under this project as a reference for BID.

#### **a) Institutional Arrangements for Implementation of EMP during Construction Phase**

367. The BID is the project's executing agency (EA). The key players involved during construction stage of the proposed project are the Project Director –Environmental safeguards staff; BEPA, the Contractor and the Supervisory Consultants (SCs).

368. The following staff will be involved in the implementation of EMP:

- Project Director –Environmental safeguards staff;
- SC's Environmental specialist/engineer; and
- Contractor's Environmental engineer/scientist.
- BEPA

369. The Construction Contractor will make a bond through contract documents to implement the EMP. The IEE study and EMP will be included as a clause of the contract documents. The organizational setup for implementation of EMP is given below:

### **Roles and Responsibilities**

370. The roles, remits and responsibilities of organizations that will be involved in EMP implementation are outlined below.

#### **a) BEPA**

371. BEPA is the regulatory authority for issuance of NOC for the proposed sub-projects. As part of its mandate, protection of environment is its responsibility. Therefore, this agency will undertake inspection (as and when required) of project activities with respect to the protocols as defined in the EMP.

#### **b) Project Director:**

372. Project Director through environmental safeguards staff will have responsibility for assuring implementation of EMP. This includes the following:

- Ensuring that required environmental training is provided to the concerned staff.
- Carrying out random site visits to the construction site to review the environmental performance of the construction contractors.
- Review monitoring reports for the progress of environmental related activities.
- Make sure that the construction contractor is implementing the additional measures suggested by the supervision consultant in environmental monitoring reports.
- To assist contractor for obtaining necessary approval from the concerned departments.
- Maintaining interference with the other lined departments / stakeholders.
- Reporting to BEPA on status of EMP Implementation.
- Reporting to ADB on status of EMP implementation.

#### **c) Supervision Consultant: Resident Engineer**

373. Resident Engineer's (RE) roles and responsibilities will be:

- To oversee the performance of construction Contractor to make sure that the Contractor is carrying out the work in accordance with the tender design and follow the specifications;
- Ensuring that the day-to-day construction activities are carried out in an



environmentally and socially sound and sustainable manner;

- Strong coordination with the Contractor and EA.

**d) Supervisory Consultant: Environmental Specialist-Field**

374. Supervisory consultant (SC)'s Environmental Engineer / Scientist will perform following responsibilities.

- Directly reporting to R.E
  - Preparing training materials and implementing programs
  - Ensure the implementation of the mitigation measures suggested in the EMP.
  - To supervise and monitor environmental activities being performed at site
  - To organize periodic environmental training programs and workshops for the Consultants and Contractor staff.
  - Periodic reporting as mentioned in the EMP.
  - Suggest any additional mitigation measures if required.
- Ensure that no civil works are started without submitting and approval of Contractor SSEMP.

**e) Construction Contractor: Environmental Engineers / Managers**

375. Its contractor contractual obligation to appoint site Environmental Engineer / Manager with relevant educational background and experience. Contractor Environmental Engineer manager will carry out the following activities:

- Implementation of mitigation measures and SSEMP recommendations at construction sites.
- Plan, manage, monitor and coordinate the entire construction phase in term of HSE.
- Take account of health and safety risk to everyone effected by the work.
- Liaise with the client and consultant for the duration of the project to ensure that all the risks are effectively managed.
- Maintain and practice good housekeeping and keep everything at work in its proper place.
- Ensure suitable welfare facilities are provided from the start of project and maintained throughout the construction phase.
- Contractor will be bound through contract to take action against all the special and general provision of contract document.
- Ensure the provision of Personal Protective Equipment (PPE), conduct the environmental, health & safety training to the workers / Labour and coordinate with Environmental Engineer of SC.
- The Contractor will prepare and submit the Site-Specific Environmental Management Plan (SSEMP) to the CSC and PMU for approval at least ten (10) days prior to commencement of the physical works.

**8.1.8 Employees/ Workers Responsibility/ Obligations**

376. Employees / workers have obligation to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions at work. The other responsibilities are:

- To cooperate with employer in assisting them to fulfill their statutory duties.
- Comply with safety instructions and procedures.
- Use all safety equipment properly and do not tamper it.
- Not to interfere with deliberately or misuse anything provided, in accordance with health and safety legislation, to further health and safety at work.

#### **8.1.9 Reporting Mechanism**

377. Progress reporting related to environmental activities will be responsibility of Supervision Consultant, Environmental specialist. He will also be responsible for submitting monthly EMP compliance report for the project to the PD Office. A semi-annual report of environmental activities shall be submitted to NDRMF by BID.
378. PD will in turn add his remarks / comments / feedback and submit the report to NDRMF and BEPA in accordance with the frequency defined by them. In case the frequency is not defined and/or communicated, semi-annual monitoring reports based on the monthly monitoring report will be submitted to ADB for disclosure on ADB website.

#### **8.1.10 Inclusion of EMP in Contract documents**

379. In order to make Contractors fully aware and responsible of the implications of the EMP and to ensure compliance, it is recommended that mitigation measures be treated separately in the tender documentation and that payment milestones should be linked to performance, measured by execution of the prescribed mitigation measures. Such a procedure would help ensure adequate management of project impacts is carried out during the construction and operation phases, where a consistent approach will be expected on behalf of the Contractor and its sub-contractors so that data and information collected from monitoring programs is comparable with baseline monitoring data.
380. The Contractor shall be made accountable through contract documents and/or other agreements for fulfilling the environmental safeguard obligations and delivering on the environmental safeguard components of the Project. Contractors shall be prepared to co-operate with the executing agency and supervising consultants and local population for the mitigation of adverse impacts. After the EMP's inclusion in the contract documents, the Contractor will be bound to implement the EMP and will engage appropriately trained environmental and social management staff to ensure the implementation and effectiveness of the mitigation measures.
381. The Contractor is required to bid for executing the EMP, including the recommended mitigation measures and monitoring programs, as part of its Bill of Quantities (BoQ).

#### **8.1.11 Environmental Management and Monitoring Plan**

382. Potential impacts and their mitigation measures are devised against the project activities to minimize their significance. Responsibilities for the collection and analysis of data as well as the reporting requirements have been outlined in Table 8-1. Implementation of environmental impact mitigation measures during construction is to avoid and reduce short- and long-term potential environmental impacts. Incorporation of environmental impact mitigation considerations into the tender and contract documents is a fundamental pre-requisite for effective implementation of the EMP.

**Table 8-1: ENVIRONMENT MANAGEMENT AND MONITORING PLAN (EMP)**

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
A. Design & Planning Phase					
1.	Seismic Hazard	Failure of design	<ul style="list-style-type: none"><li>At the detailed design stage, the safety of the proposed water conservation structures against the damages due to seismic activity need to be ensured. As such structural designs of dam body, spillway and other structures need to follow the applicable criteria for the zone 4 recommended in the Building Code of Pakistan 2021.</li></ul>	Design Engineer	BID
2.	Flooding	Failure of design	<ul style="list-style-type: none"><li>As per findings of the Hydrological Study, estimation of the discharge of streams/Nullahs of the project area has been calculated against 500 years return period.</li><li>A pre-construction visit is recommended to be conducted by a team comprising Route Engineer, Hydrologist and Hydraulic Engineer to validate the crossing locations and design.</li></ul>	Design Engineer	BID
B. Construction Phase					
1.	Impact on Air Quality	Air quality will be affected by fugitive dust emissions from excavating activities of construction machinery, material stockpiles & material	<b><u>Fugitive Dust Emissions</u></b> <ul style="list-style-type: none"><li>The material being transported or stored at the stockpiles will be kept covered with plastic to ensure protection of ambient air from fugitive emission during windstorm emissions.</li></ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		transportation, dust from the unpaved surfaces and movement of construction vehicles, which can be very harmful for the site worker, local population and natural vegetation.	<ul style="list-style-type: none"> <li>The contractor will monitor air quality on regular basis near the plant.</li> <li>Preventive measures against dust should be adopted for unloading operations. Regular water sprinkling of all excavation work the site should be carried out to suppress excessive dust emission(s);</li> <li>Grading operation will be suspended when the wind speed exceeds 20 km /hr.</li> <li>The plant should be located at least 500m away from any living area.</li> <li>Enforce the maximum speed limit to 20km/h for vehicles using embankments and access road.</li> <li>Road damage caused by project activities will be promptly attended to with proper road repair and maintenance work.</li> <li>Proper Personal Protective Equipment (PPE) should be issued to the site worker and make sure the worker wears the PPE properly during working on site.</li> </ul> <p><b><u>Smoke from Burning of Waste Material or Burning Firewood</u></b></p> <ul style="list-style-type: none"> <li>Clean and smoke free fuel will be used in the labor camp.</li> <li>Cutting and burning trees or shrubs for fuel should be prohibited.</li> <li>Gas Cylinders should be used in the labor camp for cooking purposes.</li> </ul>		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<b><u>Vehicular and Generator Exhaust Emissions</u></b> <ul style="list-style-type: none"> <li>All vehicles during construction activities will be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;</li> <li>Proper maintenance and repair of power generators and construction machinery will be ensured to minimize hazardous emissions.</li> <li>Batching plant should be set up considering the wind direction so that the nearby communities are not affected by the emissions from batching plant.</li> <li>NEQS / WHO applicable standards to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works.</li> <li>Best quality fuel and lubes will be purchased and where possible, lead free oil and lubes will be used.</li> </ul>		
2.	Impact of Noise Pollution	The main sources for noise in the project area may be heavy machinery such as excavators, concrete mixing plant, stone crushers and other equipment.	<ul style="list-style-type: none"> <li>Vehicles and equipment used should be well fitted, as applicable, with silencers and properly maintained; that will reduce noise hazards according to permissible limits as fixed by Pak EPA (noise is 85 dB (A) while the WHO noise guidelines prescribed a limit of 55 dB (A).</li> <li>Construction workers will be provided suitable hearing protection like ear cap, or earmuffs and will be trained about their usage.</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>Construction activities that are close to settlements will be stopped during night times if high noise values are observed.</li> <li>Consultations will be held to discuss appropriate solutions and techniques to control noise (e.g. mud or brick walls, bushes, etc.). Such hearings consultations should also be regularly conducted to solicit public feedback, to avoid public inconvenience and suggestions for improvement in working strategy / working environment and progress of project activities; and</li> <li>In accordance with the environmental monitoring plan, noise measurements will be carried out on regular basis at locations and schedule specified to maintain the level within the NEQS / WHO standards and to ensure the effectiveness of mitigation measures.</li> </ul>		
3.	Vibration impacts	Construction activities i.e. soil compaction, excavation, moving of heavy trucks have the potential to produce vibration levels that may be annoying or disturbing to humans and may cause damage to structures if appropriate precautions are not taken.	<ul style="list-style-type: none"> <li>Use of heavy machinery should be allowed in limited time only from 07.00 a.m. to 10.00 p.m. except for any emergency for which contractor should take prior approval; and</li> <li>Low vibration level machinery should be used and a system of regular maintenance and repairs to be employed.</li> <li>Where vibration could become a major consideration (within say 100m of schools, religious premises, hospitals or residences) a building</li> </ul>	CC	SC



S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>condition survey should take place prior to construction.</p> <ul style="list-style-type: none"> <li>The physical effect of piling should be assessed prior to construction and measures.</li> <li>should be discussed with the local population as well as timing of the works to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations.</li> </ul>		
4.	Solid Waste Generation incl. Spoil Material	Waste and Spoils will be generated from the camps and from excavation activities. Disposal of spoil / surplus material may cause negative environmental impacts, if not properly mitigated during implementation of the proposed project.	<ul style="list-style-type: none"> <li>All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system. The contractor will coordinate with local representatives and administration of the concerned solid waste management department for the disposal of solid waste;</li> <li>The contractor must develop a plan of action with the help of concerned solid waste management department for transporting the waste to the disposal site;</li> <li>Toxic waste will be handled, stored, transported and disposed separately;</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and</li> <li>Solid waste will be segregated at source so that it can be re-used or recycled.</li> <li>Waste management plan will be developed to implement an efficient and responsive solid waste management system during construction phase. Recyclable wastes e.g. steel bars will be sold to waste vendors;</li> <li>Reusable material will be used as a filling material during ground levelling;</li> <li>Solid waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; and</li> <li>The site will be restored back to its original condition after construction completion.</li> <li>The spoil material from the excavation will be dumped at designated places. The dumping sites</li> </ul>		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>must be approved by environment specialist of the Construction Supervision Consultant (CSC).</p> <ul style="list-style-type: none"> <li>The contractor will also ensure that no spoil material is disposed into stream/nullahs and into any other water body along the project site.</li> <li>As far as possible barren/waste lands available will be used for disposal of the excavated waste material.</li> <li>The spoil material shall be deposited in layers and properly rolled and sprinkled to avoid any negative environmental impacts.</li> <li>Contractor will prepare and approve a spoil management plan, prior any disposal of spoil.</li> </ul>		
5.	Resource Conservation	During the construction, overburden on local resources is possible if construction facilities such as workers camp and construction camp built near rural areas and can create problems for local communities.	<ul style="list-style-type: none"> <li>Use potable water bowsers for construction works and mineral water bottles/ ground water for drinking purposes;</li> <li>Plan for the provision/purchase of adequate insulation to reduce heat loss through construction plants;</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>Reduction of wastage of water through training of workers involved in water use;</li> <li>Reuse of construction waste materials may be adopted wherever possible;</li> <li>Aggregates will not be sourced from river and stream beds.</li> <li>Diesel and fuels with low sulphur content should be used to operate construction machinery and equipment;</li> <li>Efficient and well -maintained equipment and machinery will be used;</li> <li>The equipment and machinery will be turned off when not in use;</li> <li>A good camp design and an efficient worksite management plan can help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels.</li> </ul>		
6.	Soil Contamination	Surface soil has the potential to be contaminated by construction material, vehicle movements and	<ul style="list-style-type: none"> <li>The Contractor will be required to train its workforce in the storage and handling of materials like oils, diesel, petrol, other chemicals, concrete and</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		various construction activities. Spillage of fuel, lubricants, cement and chemicals has the potential to result in contamination.	<p>cement, etc., that can potentially cause soil contamination. The Contractor will be required to prepare a training manual and module for all the construction related activities along with the schedule of training program and submit to the supervising consultants for approval.</p> <ul style="list-style-type: none"> <li>• Refuelling areas will have impervious concrete bases with appropriate drainage to prevent spills from contaminating the surrounding area.</li> <li>• During on-site maintenance of construction vehicles and equipment, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.</li> <li>• Oils, fuels and hazardous materials will be stored in appropriately bounded areas. Fuel tanks will have to be placed within sealed bunds capable of containing 120% of the total volume of the tank in case of leakage.</li> <li>• Regular inspections will be carried out to detect leakages from vehicles and construction machinery.</li> <li>• Vehicles and/or equipment with leakage will not be used, until repaired.</li> <li>• Solid waste generated during construction and at camp sites will be properly treated and safely disposed of only in demarcated waste disposal sites.</li> </ul>		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>The construction phase will consume lot of cement additives and oils and the empty containers will contain dangerous amount of chemicals inside, which can impact the humans as cancer producers. All such containers must not be sold to general public and must be destroyed and sent for recycle. This will be contractor's responsibility who must seek consultant's supervision. The people must be warned against use of empty chemical containers through local press and erecting banners in project area.</li> </ul>		
7.	Soil erosion/ silt run-off	Phenomenon may pose serious environmental impacts like landslides, slumps, slips and other mass movements.	<ul style="list-style-type: none"> <li>All the freshly cut surfaces will be restored/stabilized as soon as possible;</li> <li>Seeding or plantation of erodible surfaces will be done;</li> <li>Construction activities will be planned in such a way so as to avoid cutting of erodible surfaces and earth movement in rainy season;</li> <li>Along cross-drainage structures of the access road where embankments are more susceptible to erosion by water runoff stone pitching or a riprap will be provided across the embankment.</li> <li>Proper monitoring of the soil erosion prone areas will be carried out during operation phase and soil conservation measures (if needed) will be carried out like provision of physical structures e.g. retaining walls, etc.</li> </ul>	CC	SC



S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
8.	Community Health and Safety	The communities residing in the project areas might be at risk from the proposed works since deep excavation works will take place along with movement of heavy machinery and vehicles transporting the raw materials and spoils etc. to and from the work sites.	<ul style="list-style-type: none"> <li>The Contractor will prepare the site specific community health and safety plan in compliance with applicable national and international regulations and guidelines.</li> <li>The Contractor will clearly barricade work areas to prevent access by the public, while ensuring passage by providing safe pathways for pedestrians around construction zones;</li> <li>The Contractor will exclude parking, waiting vehicles and vendors from areas adjacent to the work by means of clearly marked barricades and posted signage;</li> <li>The Contractor will remove excavated earth, spoil, rubble, cut vegetation and refuse whether generated by the project or discarded by third parties from areas within the construction zone, where it has potential to interfere with the public or generate dust;</li> <li>The Contractor will provide temporary lighting to facilitate construction during night time;</li> <li>The Contractor will remove hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions and will barricade any excavations and materials placed near the public place (if applicable);</li> <li>Hard Barricades will be provided at the excavation deeper than 1.5 meter as per "NZS 3845:1999 Road safety barrier systems";</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>The Contractor will promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction, and maintain or provide temporary services that are interrupted by construction. The Supervisory Consultant will inspect and certify the adequacy of all reinstated services and facilities;</li> <li>Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas especially near the settlements;</li> <li>An Emergency Preparedness and Response Plan (EPRP) in coordination with the local emergency responders to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills;</li> <li>Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;</li> <li>Timely public notification on planned construction works;</li> <li>Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;</li> <li>Any environmental condition that is disagreeable to the public and causes an avoidable nuisance can be addressed with additional provisions over and above those described above, as determined necessary by the supervisory consultant.</li> </ul>		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>These requirements will be incorporated into the bidding specification and contract documents, and will be binding on the contractor, at risk of penalty for noncompliance, as charges to be recovered from contractor for unsafe act or condition.</li> </ul>		
9.	Occupational Health and Safety	Occupational Health and Safety (OHS) related impacts will arise during construction stage activities including clearing of earth, levelling, compaction, foundations, finishing, testing & commissioning.	<ul style="list-style-type: none"> <li>All suggested project-specific health and safety plans would include appropriate training and supervision of employees and enforcement of workplace safety policies.</li> <li>All processes and equipment will be designed and constructed for safe operation.</li> <li>A process of safety management program will be developed and implemented to identify hazards associated with each applicable chemical.</li> <li>All project related staff will be provided with the required personal PPE and shall be trained to make sure that they are aware of the usefulness and correct use.</li> <li>Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.</li> <li>Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them.</li> <li>Use of correct signage for better understanding of all the health safety instructions and precautions for</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			the workers. Signage will be in languages appropriate to the workforce employed.		
10.	Traffic Management	During construction activities, large number of light and heavy vehicles is expected to use the community roads. Similarly, heavy machinery will be stationed in and adjoining areas of the project site.	<ul style="list-style-type: none"> <li>Construction traffic hindrance should be avoided by providing proper diversion and signage.</li> <li>Traffic management plan will be prepared by the contractor after consultation with RE for its implementation.</li> <li>GRM will be put in place to address community grievances in this regard.</li> </ul>	CC	SC
11.	Communicable diseases	The laborers in the Contractor Camp, truck drivers and like personnel who interact with each other have the potential for the spread of HIV/AIDS if the incidence exists.	<ul style="list-style-type: none"> <li>Arrange to run an active campaign, in the labour camp, to make people aware of the cause, mode of transmission and consequences of HIV/AIDS;</li> <li>Latest / Updated SOPs by WHO, national and provincial Government related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored;</li> <li>Strengthen the existing local health &amp; medical services for the benefit of labour as well as the surrounding villages;</li> <li>Ensure cleanliness and hygienic conditions at the labour camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by the Health Department;</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>Locating a labour camp at least away from the villages (local settlement), and</li> <li>Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents.</li> </ul>		
12.	Flora	No tree cutting is expected as this is restoration /rehabilitation project and being executed within its already available ROW. The Contractor's workers may damage the vegetation and trees (for use as firewood to fulfil the camps requirements).	<ul style="list-style-type: none"> <li>Campsites and Elevated Ground Storage Tanks (EGST) will be established on waste/barren land rather than on forested or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth or agricultural area.</li> <li>Construction vehicles, machinery and equipment will remain confined within their designated areas of movement.</li> <li>The Contractor's staff and labour will be strictly directed not to damage any vegetation such as small trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands.</li> <li>Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed.</li> <li>The compaction of trenches should also be done properly. Inadequate compaction of trenches will</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>result in flow of soil during rainy season resulting in increased soil erosion</p> <ul style="list-style-type: none"> <li>As far as possible digging in the cultivated land should be done when the land is barren to avoid damage to agricultural crops.</li> <li>Open fires should be banned in the area to avoid hazards of fire in the project area.</li> <li>Ten trees will be replanted for each tree cut as per EPA rule.</li> </ul>		
13.	Fauna	<p>The accidental striking of all terrestrial fauna by project vehicles or equipment/machinery</p> <p>Avifauna may be disturbed due to sensory disturbance from construction equipment; movement of vehicles and crew personnel; location and operation of camps</p>	<p><b><u>Mammals and Reptiles</u></b></p> <ul style="list-style-type: none"> <li>Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will warn their labor accordingly.</li> <li>Noise generating activities will be avoided during the night.</li> <li>The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed off to prevent the chances of eating by wild animals, which may become hazardous to them.</li> <li>Vehicles will be maintained in good condition and provided with mufflers to reduce noise.</li> </ul> <p><b><u>Birds-Avian Fauna</u></b></p> <ul style="list-style-type: none"> <li>Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.</li> </ul>	CC	SC



S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>The contractor should be committed to ensuring the conservation and protection of wildlife within the project area. To achieve this goal, a strict "No Hunting" policy shall be implemented and enforced among all workers and personnel involved in the project.</li> <li>Staff working on the project should be given clear orders, not to shoot, snare or trap any bird.</li> </ul>		
14.	Use of local water resources	Burden on local water resources and possible social conflicts.	<ul style="list-style-type: none"> <li>Availability of water for camp site facilities and construction purposes will be ensured by the contractor prior to start of construction activities. As per Local Government Act, the contractor will seek approval from the Local Government for exploitation of the water resources.</li> <li>Contractor will ensure that the water availability of the existing local users remains unimpeded by the project interventions. The contractor will make arrangements for the availability of drinking water at site. The contractor will arrange for the water required for construction works on his own. For this purpose, he will install hand pumps/tube wells accordingly.</li> <li>The Contractor will be required to act as a go-between closely with local communities to ensure that any potential conflicts related to common resource utilization for project purposes are resolved quickly.</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> <li>The contractor will prepare guidelines for the workers for minimizing the wastage of water during construction activities and at campsites.</li> </ul>		
15.	Contamination of Water Resources	The water resources, may get polluted from may get polluted from hazardous construction materials, wastewater effluent, solid waste, silt from construction and soil erosion, etc.	<ul style="list-style-type: none"> <li>Camps will be located at least 500 m away from the nearest local settlement to prevent the contamination of hill torrents, etc.</li> <li>Wastewater effluent from contractors' workshops and equipment washing-yards will be passed through an oil skimmer and to gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams. Similarly, the wastewater effluent from the campsite will be treated before disposal into a stream.</li> <li>Borrow pits and natural depressions lined with impervious liners will be used to dispose of scraped obnoxious material, and then covered with soil. Cost will be added in Contractor's BOQs.</li> <li>Fuels, lubricants and other hazardous material will have to be properly stored in adequate containers in sites equipped with retaining structures, including oil skimmers for the treatment of contaminated runoff water.</li> <li>Repair and maintenance work on machines and vehicles will only be done in specific places designed and equipped for this purpose (oil skimmer). These must be at a safe distance from</li> </ul>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>the stream/nullah. No washing of vehicles will be done in or near the stream/nullah.</p> <ul style="list-style-type: none"> <li>Water contaminated with concrete will have to be collected in sedimentation ponds and, if required, will have to be neutralized before being discharged to the natural streams/Wetlands. Contamination of the springs/nullah with concrete or cement must be avoided.</li> <li>Sewage water from the camp will have to be collected and treated in a suitable septic tank before being released into the streams.</li> <li>Generally, waste should be reduced, re-used, recycled and the disposal has to be controlled.</li> <li>Contractor will have to get water quality testing of dam sites at the start of construction and biannual basis as per NEQS.</li> </ul>		
16.	Social and Cultural Conflicts	During the construction phase of the proposed project, conflicts may arise between labor force and local community.	<ul style="list-style-type: none"> <li>Local labor especially from nearby communities should be given preference for the construction works;</li> <li>Careful planning and training of work force to minimize disturbance to the local people;</li> <li>Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and</li> </ul> <p>Adequate training especially for the transitive workforce of the station (involved both in the construction process</p>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.		
17.	Religious and Cultural Heritage	No graveyard will be disrupted due to this project. No historical or archaeological site has been observed or reported along the project area.	<ul style="list-style-type: none"> <li>If any graves affected by the project, they will have to be shifted. The proponent will obtain Fatwa from local Mufti before shifting the graves. During such operation the proponent will inform local administration and seek their assistance for security. The request will also be extended to Health Department for deputation of medical and paramedical staff during the operation.</li> <li>Contractor will follow the prayer timing particularly at prayer of Juma and the workforce will observe the sanctity of religious properties.</li> <li>Contractor will be required to instruct the construction crews and site supervisors in respect of archaeological site recognition, conservation procedures, and temporary site protection.</li> <li>In case of a chance finding during excavation, the contractor will protect the site and notify the Engineer who will inform Department of Archaeology &amp; Museums through Irrigation Department and hand over such sites to the department if instructed by Engineer / Irrigation Department.</li> </ul>	CC	SC

Table 8-2: Environmental Management Plan (Operation Phase)

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
<b>C. Operation Phase</b>				
1.	Damage to Infrastructure	Fatal accidents System sustainability	<ul style="list-style-type: none"> <li>BID (Irrigation Department) to monitor the system regularly;</li> <li>The important facilities that need attention and annual maintenance are embankment dam, falls and control structures and bed levels which are affected by siltation or scour. The dam section has been designed to ensure safety by adhering to standard design principles.</li> <li>The construction and rehabilitation of flood protection bunds as part of the project will be regularly checked to undertake any prone damage;</li> <li>Repairs on urgent basis; and</li> <li>Emergency response plan for Dam breach shall be followed, which is attached as Annexure5 of this report.</li> </ul>	EA Staff
2.	Biodiversity impact	Low impacts are envisioned for any biodiversity impacts since these are existing schemes and thus minimal risks are posed during the operation phase.	<ul style="list-style-type: none"> <li>Prohibit hunting of animals by Irrigation site staff</li> <li>Prohibit any damage to terrestrial and aquatic flora and fauna.</li> </ul>	EA Staff

**Key:** CC=Construction Contractor, DC=Design Consultant, EA=Executing Agency, SC=Supervision Consultant, PD = Project Director

## 8.2 Monitoring Parameters

383. A monitoring plan for the pre-construction/design and construction phases of the project, indicating environmental parameters, mitigation measures of the negative environmental impacts, responsible authority and frequency is provided below as Error! Reference source not found. and Error! Reference source not found. below.
384. During the procurement/pre-construction period, the monitoring activities will focus on (i) checking the contractor's bidding documents particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time.
385. During the construction period, the monitoring activities will focus on ensuring that any required environmental mitigation measures are implemented to address possible impacts.
386. In general, the construction impacts will be manageable, and no insurmountable impacts are predicted, provided that the EMP is implemented to its full extent as required in the Contract documents. However, experience suggests that some Contractors may not be familiar with this approach or may be reluctant to carry out some measures. For the proposed project, in order that the Contractor is fully aware of the implications of the EMP and to ensure compliance, environmental measures must be costed separately in the tender documentation and listed as BOQ items, and that payment milestones must be linked to environmental performance, vis a vis the carrying out of the EMP.
387. The effective implementation of the EMP will be inspected as part of the loan conditions by both NDRMF and ADB, and as part of regulatory/NOC compliance by BEPA. In this regard, the PMU/CSC will guide the design engineers and Contractors on the environmental aspects and necessary EMP documentation.



**Table 8-3: 'Pre-Construction' Environmental Monitoring Plan for Baseline Development**

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility	
						Implementation	Monitoring
<b>Ambient Air Quality</b>	To establish baseline air quality levels	CO, NO <sub>2</sub> & PM <sub>10</sub> (particulate matter smaller than 10 microns) concentration at receptor level, PM <sub>2.5</sub>	1-hr and 24-hr concentration levels	At one random receptor location at <u>each</u> of the sub-project sites.	Once	Contractor	CSC
<b>Ambient Noise</b>	To establish baseline noise levels	Ambient noise level near receptors in project area	A-weighted noise levels 24 hours, readings taken at 15 s intervals over 15 min. every hour, and then averaged	At one random receptor location at <u>each</u> of the sub-project sites.	Once	Contractor	CSC
<b>water Quality in vicinity of project area</b>	To establish water quality in project area	water quality in project area	Water samples for comparison against NEQS parameters	At <u>each</u> of the sub-project locations.	Once	Contractor	CSC

**Table 8-4: Construction Phase Monitoring Requirements**

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
<b>Noise</b> Disturbance due to noise from construction activity	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level at different locations in project area	A-weighted noise levels 24 hours, readings taken at 15 s intervals over 15 min. every hour at 15 m from receptors, and then averaged	At two random sensitive receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
<b>Air Quality</b> Dust emissions from construction vehicles and equipment	To determine the effectiveness of dust control program on dust at receptor level	CO, NO <sub>2</sub> & PM <sub>10</sub> (particulate matter smaller than 10 microns), PM <sub>2.5</sub> concentration at receptor level	1-hr and 24-hr concentration levels	At two random sensitive receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
		Visible dust	Visual observation of size of dust clouds, their dispersion and the direction of dispersion	Construction site	Once daily during peak construction period	Contractor's Environmental officer, CSC
<b>Water quality</b> monitoring for drinking water and wastewater	To determine the effectiveness of mitigation measures	As per WHO/NEQS	Water samples for comparison against NEQS parameters	Worker's camp and active construction site	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC

<b>Safety precautions</b> by Safety workers	To prevent accidents for workers and general public	Number of near miss events and accidents taking place	Visual inspections	Construction site	Once Daily	Contractor's Environmental officer, CSC
<b>Soil Contamination</b>	To prevent contamination of soil from oil and toxic chemical spills and leakages	Incidents of oil and toxic chemical spills	Visual inspections	At construction site and at vehicle and machinery refueling & maintenance areas	Once a month	Contractor's Environmental officer, CSC
<b>Solid Waste &amp; Effluent disposal</b>  Insufficient procedures for waste collection, storage, transportation and disposal	To check the availability of waste management system and implementation	Inspection of solid and liquid effluent generation, collection, segregation, storage, recycling and disposal will be undertaken at all work sites in project area	Visual inspections	At work sites in project area	Once daily	Contractor's Environmental officer, CSC

### **8.3 Environmental Training**

#### **8.3.1 Capacity Building and Training**

388. Capacity building and training programs are necessary for the project staff in order to control the negative impacts resulting from the project construction and during its operation phase. They will also require trainings on monitoring and inspecting of such a project for environmental impacts and for implementation of mitigation measures.
389. The details of capacity building and training program are presented in the Error! Reference source not found..

Table 8-5: Capacity Development and Training Programme

Provided by	Organized by	Contents	Target Audience	Venue	Duration
<b>Pre-construction Phase</b> PMC offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan Group exercise and participatory workshop to measure effectiveness of program	Contractor staff	BID Office	One day long training seminar including group exercise/workshop
<b>Construction Phase</b> PMC offering specialized services in social management and monitoring	CSC & PMU	Short seminar on Environmental risks associated with construction phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues Group exercise and participatory workshop to measure effectiveness of program	Contractor staff	BID Office	One day long training seminar including group exercise/workshop

#### 8.4 Environmental Management Costs

390. The **Error! Reference source not found.** below provides cost estimates for 'Pre-Construction phase' monitoring while **Error! Reference source not found.** provides cost estimates for 'Construction phase' monitoring of key environmental parameters.
391. The costs associated with implementation of the EMP and the necessary mitigation measures are provided as
392. below. The **Error! Reference source not found.** below provides the cost for capacity development and training programme for project contractors for the proposed sub-projects.

**Table 8-6: Annual Cost Estimates for 'Pre-Construction Phase' Environmental Monitoring**

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Air Quality <sup>24</sup>	CO, NO <sub>2</sub> , SO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	8 (Once only at each of the 8 sub-project locations)	240,000	8 readings @ PKR 30,000 per sample
Noise Levels <sup>25</sup>	dB(A)	8 (Once only at each of the 8 sub-project locations)	240,000	8 readings @ PKR 30,000 per reading
Groundwater Quality	BEQS /NEQS	8 (Once only at each of the 8 sub-project locations)	160,000	8 readings @ PKR 20,000 per sample
Surface water Quality	BEQS /NEQS	8 (Once only at each of the 8 sub-project locations)	160,000	8 readings @ PKR 20,000 per sample
Contingencies			40,000	5% of monitoring cost
<b>Total (PKR)</b>			<b>840,000</b>	

<sup>24</sup> For air quality monitoring: 'Passive samplers' such as test tubes can be used or 'Active samplers' with sorbent tubes can also be used

<sup>25</sup> For noise monitoring: sampling equipment with duration greater than 1 hour can be used.



**Table 8-7: Annual Cost Estimates for 'Construction Phase' Environmental Monitoring**

Monitoring Component	Parameters	Quantity	Amount PKR	Details
<b>Surface water Quality</b>	NEQS / WHO	16 (Quarterly basis at 8 locations)	320,000	16 readings @ PKR 20,000 per sample
<b>Ground water quality</b>	NEQS / WHO	16 (Quarterly basis at 8 locations)	320,000	20 readings @ PKR 16,000 per sample
<b>Air Quality</b>	CO, NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub>	16 (Quarterly basis at 8 locations)	480,000	16 readings @ PKR 30,000 per sample
<b>Noise Levels</b>	dB(A)	16 (Quarterly basis at 8 locations)	480,000	16 readings @ PKR 30,000 per reading
<b>Total</b>				<b>1,600,000</b>
<b>Contingencies</b>			80,000	5% of monitoring cost
<b>Total (PKR)</b>			<b>1,680,000*</b>	

\*Subject to monitoring requirements of EPAs as per conditions of Environmental Approval for construction phase.

**Table 8-8: Estimated Costs for EMP Implementation**

Item	Sub-Item	Estimated Total Cost (PKR)
<b>Contractor Environment Specialist</b>	4 persons for 7 months (@ 100,000 per month)	<b>2,800,000</b>
<b>Monitoring Activities</b>	Provided separately in Tables 8.6 and 8.7.	-
<b>Mitigation Measures</b>	As prescribed under EMP and IEE.	<b>4,300,000</b>
(i) Water sprinkling	To suppress dust emissions	800,000
(ii) Solid waste collection & disposal (including hazardous waste)	From construction sites (based on initial estimates)	1,500,000
(iii) Cost of Hard Barricades	Provision of hard barricades in case the trench is 1.5 meter deep	1,000,000



(iv) SSEMP preparation and Implementation	Preparation and Implementation of SSEMP	1,000,000
<b>Total</b>		<b>7,100,000</b>
Contingencies	5% of EMP implementation cost	355,000
<b>Total Estimated Cost (PKR)</b>		<b>7,455,000</b>

Table 8-9: Cost of Capacity Development and Training Programme for Project Contractor(s)

Provided by	Organized by	Contents	No.of training events	Duration	Cost (PKR)
<b>Pre-construction Phase</b> Monitoring Consultants / Organizations offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan	Two seminars for Contractor management staff and project staff	1 day	100,000
<b>Construction Phase</b> Monitoring Consultants / Organizations offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars on Environmental risks associated with construction phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues	Two seminars for Contractor management staff and project staff dealing in environment and social issues	1 day	100,000
<b>Total</b>			<b>200,000 (PKR 0.2 million)</b>		

## 8.5 Performance Indicators

393. For evaluating the performance of the environmental management and monitoring plan, performance indicators are identified for the efficient and timely implementation of measures/actions proposed in EMP. The indicators are defined both for the implementation phase and for the operation phase. QA/QC Consultant will be responsible for compiling the information on these indicators and report to PMU.

394. To measure the overall environmental performance of the project, a list of performance indicators is given below:

- The number of inspections carried out by environmental team of CSC per month.
- The number of non-compliances observed by CSC.
- Availability of environmental, and OHS specialists in CSC .
- Availability of environmental, and OHS specialists with Contractors.
- Timely reporting of documents (as defined in EMMP and monitoring plan).
- Number of training imparted to stakeholders/other capacity building initiatives.
- Number of grievances received.
- Number of grievances resolved.
- Number of constructions related accidents.

## 9. GRIEVANCE REDRESSAL MECHANISM

### 9.1 General

395. This section deals with the Grievance Redressal Mechanism (GRM) to be developed for proposed sub-projects. The proposed project, at stage of construction may involve some disturbance to local community and thus this GRM is necessary for the successful resolution of potential disputes.

396. The ADB Policy (SPS 2009) requires establishment of a local grievance redress mechanism to receive and facilitate resolution of concerns and grievances regarding the project's social and environment performance. The measures have been identified to mitigate any potential environmental and social impacts to be caused due to implementation of the project works.

397. However, despite of best efforts, there is chance that the individuals / households affected by the project or other stakeholders are dissatisfied with measures adopted to address adverse social impacts of the project. To address, such situation an effective GRM will be established at the time of award of contracts to ensure timely and successful implementation of the project. It will also provide a public forum to the aggrieved to raise their objections and the GRM would address such issues adequately. It will receive, evaluate and facilitate the resolution of complaints and grievances about the social and environmental performance at the level of the project.

398. The GRM will aim to investigate charges of irregularities and complaints received from any displaced persons and provide a time-bound early, transparent and fair resolution to voice and resolve social and environmental concerns link to the project.

399. The PMU shall make the public aware of the GRM through public awareness campaigns. The name of contact person(s) and his/her phone number, PMU contact numbers will serve as a hotline for complaints and shall be publicized through the media and placed on notice boards outside their offices, construction camps of contractors, and at accessible and visible locations in the project area. The project information brochure will include information on the GRM and shall be widely disseminated throughout the project area. Grievances can be filed in writing, via web-based provision or by phone with any member of the PMU.

400. **First tier of GRM:** The PMU is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. The PMU staff for environment and social safeguards will be designated as the key officers for grievance redressal. Resolution of complaints will be completed within seven (7) working days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, traffic police, etc.). Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included, unless anonymity is requested. A tracking number will be assigned for each grievance, including the following elements:

401. Initial grievance sheet (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered;

402. Grievance monitoring sheet, mentioning actions taken (investigation, corrective measures);

403. Closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off.

404. The updated register of grievances and complaints will be available to the public at the PMU office, construction sites and other key public offices in the project area. Should the grievance remain unresolved, it will be escalated to the second tier.

405. **Second Tier of GRM:** The PMU will activate the second tier of GRM by referring the unresolved issue (with written documentation) to the PMU, who will pass unresolved complaints upward to the Grievance Redress Committee (GRC). The GRC will be established by PMU before start of site works. The GRC will consist of the following persons: (i) Project Director; (ii) representative of district government; (iii) representative of the affected person(s); (iv) representative of the local deputy Commissioners office (land); and (v) representative of the BEPA (for environmental-related grievances). A hearing will be called with the GRC, if necessary, where the affected person can present his/her concerns/issues. The process will facilitate resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within fifteen (15) working days. The Contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the GRC will not impede the complainant's access to the Government's judicial or administrative remedies.

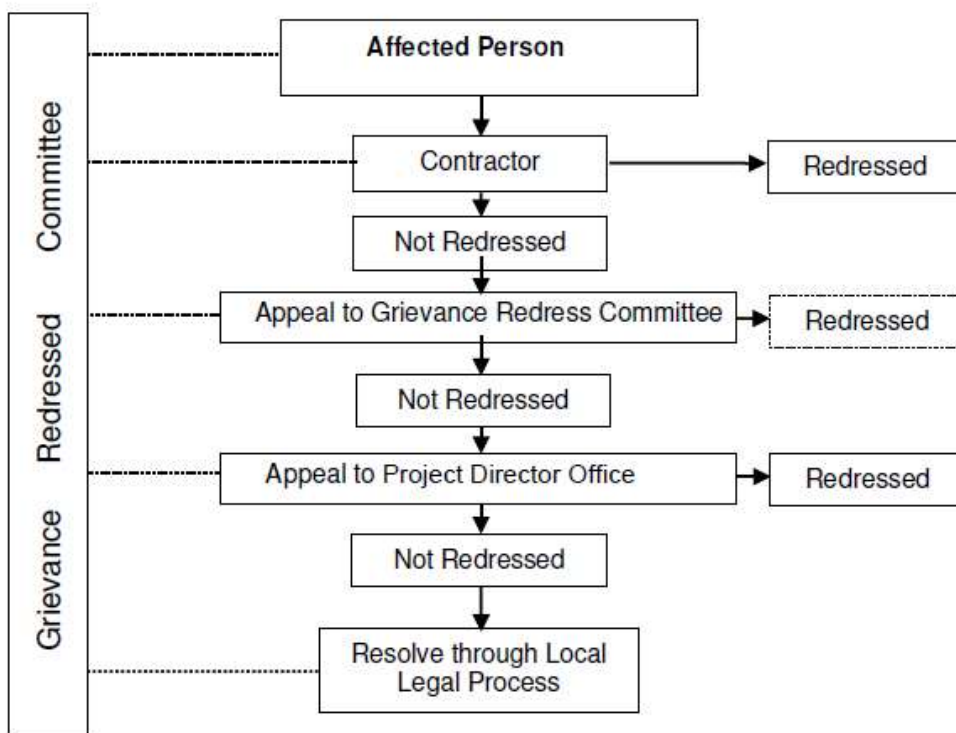
406. The functions of the local GRC are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues and including dust, noise, utilities, power and water supply, waste disposal, traffic interference and public safety as well as social issues and land acquisition (temporary or permanent if any); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) reconfirm grievances of displaced persons (if any at any stage of project), categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

407. The PMU officers will be responsible for processing and placing all papers before the GRC, maintaining a database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out.

408. **Third tier of GRM:** In the event that a grievance cannot be resolved directly by the PMU (first tier) or GRC (second tier), the affected person can seek alternative redressal through the district or sub-district committees, as appropriate. The PMU or GRC will be kept informed by the district, municipal or national authority. The grievance redress mechanism Process Flow Diagram (PFD) is provided in the **Figure 9-1** below. The monitoring reports of the EMP implementation will include the following aspects pertaining to progress on grievances: (i) Number of cases registered with the GRC, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e. open, closed, pending). In order to provide greater clarity, the pictorial description of the GRM is provided in **Figure 9-1** below.



Figure 9-1 Process Flow Diagram of Grievance Redressal Mechanism



## 10. CONCLUSIONS AND RECOMMENDATIONS

### 10.1 Conclusion

409. The proposed sub-projects are of high significance considering the urgent need for rehabilitating the damaged infrastructure in both these districts. Primary and secondary data has been collected and used to assess the environmental impacts of the project. This IEE report highlights the potential environmental impacts associated with the project and recommends mitigation measures accordingly. Any environmental impacts associated with the project need to be properly mitigated, through the existing institutional arrangements described in this report.

410. The majority of the environmental impacts are associated with the construction phase of the proposed project and majority of these impacts are short term and reversible.

411. Major impacts during construction phase will be related to deep excavations, occupational and community health and safety issues along with ensuring debris and spoils are disposed in an effective and efficient manner during the sub-project works.

412. The implementation of mitigation measures during construction period will be the responsibility of the Contractor. Therefore, the required environmental mitigation measures will have to be clearly defined in the bidding and contract documents, and appropriately qualified environmental staff retained by the Construction Supervision Consultant (CSC) to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution, waste generation etc.

413. The EMP prepared for the proposed project under this IEE document is considered sufficient for issuance as part of the contracts to the successful bidder(s) and for subsequent use during the project works.

414. It should be mentioned that prior to the commencement of works, this EMP must be further updated by the Contractor into site specific EMPs (SSEMPs) for review and approval of ADB. In these SSEMPs, aspects such as a detailed traffic management plan, identification of locations for disposal of debris and spoil and any other details which shall become available later must be included for efficient implementation of all proposed mitigation measures and the subsequent monitoring of these measures.

415. NOC from concerned department for disposal of mucking material, spoil and municipal solid waste from worker camps will be taken which will be the responsibility of the Contractor.

416. Based on the above, this report concludes that there are no potential adverse environmental impacts from the proposed sub-project activities. Impacts of less significance can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified and suggested in EMP, hence, no significant or unacceptable change in the baseline environmental conditions will occur.

417. Furthermore, BID will ensure that selected construction Contractor has contractual obligation with respect to EMP implementation and will ensure appropriate staffing and budgeting for effective implementation and monitoring of project EMP.

418. Based on the findings of the IEE, the project is unlikely to cause any significant, irreversible or unprecedented environmental impacts. The potential impacts are localized, temporary in nature and can be addressed through proven mitigation measures. Hence, the

classification of the project as "Category B" as per ADB SPS, 2009 is confirmed and this IEE study has been conducted. No further study or assessment is required at this stage.

## 10.2 Recommendations

419. Based on the findings of this IEE report, following recommendations have been formalized for smooth functioning of proposed project:

- BID shall obtain statutory clearances prior to award of contract and ensure conditions/requirements are incorporated in the project design and documents;
- Upon mobilization of the contractors, PMU to provide a safeguards orientation as per IEE and project administration manual;
- Contractor to appoint environmental and social safeguards, responsible for environmental compliance, occupational health and safety and core labour standards.
- The templates for different management plans are attached as annexures. However, detailed plans shall be developed by the contractor before mobilization of construction teams.
- SSEMPs shall be developed and implemented by the contractor during the construction phase. PMU will supervise the implementation status through CSC.
- Prior approval for setting up of construction camps shall be obtained by the Contractor from PMU, BID.
- Employment opportunities shall be given to local community as per plans discussed in the IEE report.

# ANNEXURES

## Annexure 1: Rapid Environmental Assessment Checklist

The projects are screened through Rapid Environmental Assessment (REA) checklist to determine environmental categorization. The environmental and social rapid screening depicts that:

- (i) the subproject will not require any land acquisition;
- (ii) the subproject will not involve any involuntary resettlement
- (iii) the subproject does not fall in any protected area.

Screening Questions	Yes	No	Remarks
<b>A. Project Site</b>			
Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Protected Area		✓	
▪ Wetland		✓	
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	
▪ Special area for protecting biodiversity		✓	
<b>B. Potential Environmental Impacts</b>			
Will the proposed project cause.....			
▪ Loss of precious ecological values (e.g. result of encroachment into forest/swampland or historical/cultural buildings/area, disruption of hydrology of natural waterways, regional flooding and drainage hazards)?		✓	
▪ Conflicts in water supply rights and related social conflicts?		✓	
▪ Impediments to movements of people and animals?		✓	
▪ Potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		✓	
▪ Insufficient drainage leading to salinity intrusion		✓	
▪ Over pumping of groundwater, leading to salinization and ground subsidence?		✓	Limited use of water for project activities which will not be significant
▪ Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		✓	
▪ Dislocation or involuntary resettlement of people?		✓	No dislocation or involuntary resettlement of people will occur
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups		✓	
▪ Potential social conflicts arising from land tenure and land use issues?		✓	No land acquisition will be required
▪ Soil erosion before compaction and lining of canals?			N/A

Screening Questions	Yes	No	Remarks
▪ Noise from construction equipment?	✓		It will be managed through mitigation measures and will be documented in EMP
▪ Dust during construction?	✓		It has moderate Impact for labors during construction, but It will be managed by water sprinkling. Dust generated will be managed through sound planning and good management practices with implementation of EMP
▪ Waterlogging and soil salinization due to inadequate drainage and farm management?		✓	
▪ Leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		✓	
▪ Reduction of downstream water supply during peak seasons?		✓	
▪ Soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?		✓	
▪ Soil erosion (furrow, surface)?		✓	
▪ Scouring of canals?		✓	
▪ Clogging of canals by sediments?		✓	
▪ Clogging of canals by weeds?		✓	
▪ Seawater intrusion into downstream freshwater systems?		✓	
▪ Introduction of increase in incidence of waterborne or water related diseases?		✓	
▪ Dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?	✓		The subproject does not have usage of any hazardous chemicals during construction. However, health and safety measures for laborers will be taken to implement HSE Plan that will be developed and documented in EMP
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	✓		Local people will be employed as much as possible from close by villages/ towns and the same will be documented in EMP
▪ Social conflicts if workers from other regions or countries are hired?	✓		Priority will be given to local for employment and the same will be documented in EMP



Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?</li> </ul>	✓		Earth work will not lead to any risk for community during construction time, however, Health and safety Plan and Emergency response procedures will be prepared and implemented. The same will be documented in EMP.
<ul style="list-style-type: none"> <li>Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?</li> </ul>	✓		Safety measures for community will be taken to avoid any risk and consequence. It will be documented in EMP. However, it has major positive impact, because the construction of the new dam will save community/infrastructure from flood threat if any.
<b>Climate Change and Disaster Risk Questions</b>			
<ul style="list-style-type: none"> <li>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.</li> </ul>	<b>Yes</b>	<b>No</b>	<b>Remarks</b>
<ul style="list-style-type: none"> <li>Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?</li> </ul>	✓		<p>Project area is prone to floods and earthquakes.</p> <p>Appropriate engineering measures to minimize negative impacts, such as designing water diversion structures on the basis of calculating 500 years return period of Nullahs to maintain downstream flows and considering seismic resilience in construction.</p>
<ul style="list-style-type: none"> <li>Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased glacial melt affect delivery volumes of irrigated water; sea level rise increases salinity gradient such that source water cannot be used for some or all of the year)?</li> </ul>	✓		climate resilience considerations will be incorporated into the project design and Restoration and rehabilitation of water conservation structures will be done
<ul style="list-style-type: none"> <li>Are there any demographic or socio-</li> </ul>		✓	

Screening Questions	Yes	No	Remarks
economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			
<ul style="list-style-type: none"> <li>▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by diverting water in rivers that further increases salinity upstream, or encouraging settlement in earthquake zones)?</li> </ul>		✓	

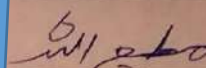
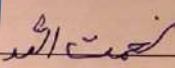
## Annexure 2: Attendance Sheets

Killi Haji Shakoor Khan and Killi Aiwarz Khan Market

100/2023

List of Participants

Oralistan Karez Area Flood Protection Bond

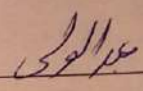
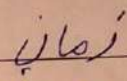
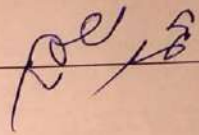
Sr. No.	Name	Signature/ Thumb
1)	Mallik ullah	
2)	Abdullah	Abdullah
3)	Naimat ullah	
4)	M. Ajmal	Ajmal

Killi Muhammad Shah and Killi Haji Qaseem

07/08/2023

List of Participants

Killa Abdallah Bazar Flood Protection Bund

Sr. No.	Name	Signature/ Thumb
1)	Abdul wali	
2)	Zaman Shah	
3)	M. Naeem	

BB

7/08/2023

PIR Alizai and Majari Flood Protection Bund

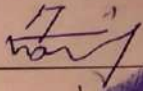

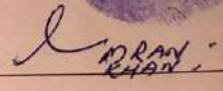
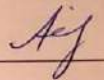
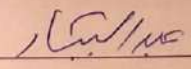

[illegible]

Killi Haji Qasim Khan

07/08/2023

## List of Participants

Segai Area Flood Protection Band

Sr. No.	Name		Signature/ Thumb
1)	Haji M. Habsim		
2)	Haji M. Yar		
3)	Imran		
4)	M. Asif		
5)	Abdul Qasim		
7)	Boor Muhammad		
	=		



## Annexure 3: Secondary Environmental Monitoring Data

### Ambient Air Quality Monitoring Results



# PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.

ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Doc #: PGG/IMS/FF/063 Rev. Date: 27-Jan-22 Rev. # 01

Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +9242-35441444 Cell: 0303-4442334

EPA Certified

### TEST REPORT

Date: 30-May-23

Ref #: PGG/LAB/2023-2969/AA

Name of Industry/Client: M/S Rehman Habib Consultants Pvt. Ltd  
 Name of Project: Rehabilitation/Remodeling of Pat Feeder Canal System  
 Site Location: Pat Feeder Canal, Balochistan  
 Nature of Monitoring: Ambient Air  
 Monitoring Instrument: AQMS  
 Monitoring Location: Point 3, 128 Km Pat Feeder Canal  
 Monitoring Coordinates: 28° 38' 43.42" N  
 68° 24' 30.29" E  
 Monitoring Date: 24-May-23 to 25-May-23

#### Results:

Parameters	CO	NO	NO <sub>2</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	mg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
Methodology	Non-Dispersive Infrared Absorption (NDIR)	Reduced Pressure Chemiluminescence (CLD)	Reduced Pressure Chemiluminescence (CLD)	UV fluorescence (UVF)	β Ray Absorption method	β Ray Absorption method
Result (24-hour Average)	0.493	3.60	12.95	12.78	102.6	25.9
NEQS for Ambient Air	5 (8 hour)	40 (24 hour)	80 (24 hour)	120 (24 hour)	150 (24 hour)	35 (24 hour)

End of Report.....

NEQS: National Environmental Quality Standards

Remarks: All Parameters are in compliance with NEQS limits.

#### Terms & Conditions:

- Analysis was conducted on the request of project proponent for IEE/EIA Baseline Study.
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- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge



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## TEST REPORT

Ref #: PGG/LAB/2023-2972/AA

Date: 30-May-23

Name of Industry/Client: M/S Rehman Habib Consultants Pvt. Ltd  
 Name of Project: Rehabilitation/Remodeling of Pat Feeder Canal System  
 Site Location: Pat Feeder Canal, Balochistan  
 Nature of Monitoring: Ambient Air  
 Monitoring Instrument: AQMS  
 Monitoring Location: Point 6, 171 Km Pat Feeder Canal  
 Monitoring Coordinates: 28° 27' 15.11" N  
 68° 2' 11.16" E  
 Monitoring Date: 27-May-23 to 28-May-23

### Results:

Parameters	CO	NO	NO <sub>2</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	mg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
Methodology	Non-Dispersive Infrared Absorption (NDIR)	Reduced Pressure Chemiluminescence (CLD)	Reduced Pressure Chemiluminescence (CLD)	UV fluorescence (UVF)	β Ray Absorption method	β Ray Absorption method
Result (24-hour Average)	0.467	3.15	18.13	15.50	100.5	23.6
NEQS for Ambient Air	5 (8 hour)	40 (24 hour)	80 (24 hour)	120 (24 hour)	150 (24 hour)	35 (24 hour)

End of Report.....

NEQS: National Environmental Quality Standards

Remarks: All Parameters are in compliance with NEQS limits.

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Field Analyst	Chief Analyst	Laboratory Incharge



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## Noise Level Results



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### TEST REPORT

Ref. #: PGG/LAB/2023-2976/NL

Issue date: 30-May-23

Name of Industry/Client:

M/S Rehman Habib Consultants Pvt. Ltd

Name of Project:

Rehabilitation/Remodeling of Pat Feeder Canal System

Site Location:

Pat Feeder Canal, Balochistan

Nature of Monitoring:

Noise Level

Monitoring By:

Pak Green Laboratories

Monitoring Location:

Point 3, 128 Km Pat Feeder Canal

Monitoring Coordinates:

28° 38' 43.42" N

68° 24' 30.29" E

Monitoring Instrument:

Noise Meter Land Tek SL 5868-P

Monitoring Duration:

24 hours

Monitoring Date:

24-May-23 to 25-May-23

#### Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	7:00 AM	57.5
2.	8:00 AM	58.7
3.	9:00 AM	61.2
4.	10:00 AM	60.9
5.	11:00 AM	62.2
6.	12:00 PM	61.3
7.	1:00 PM	62.1
8.	2:00 PM	63.5
9.	3:00 PM	61
10.	4:00 PM	61.9
11.	5:00 PM	62.3
12.	6:00 PM	64.6
13.	7:00 PM	64.8
14.	8:00 PM	64.1
15.	9:00 PM	62.6
16.	10:00 PM	61.1
Average		61.9
Sr. No.	Night Time	Equivalent Noise
		dB (A)
17.	11:00 PM	55
18.	12:00 AM	55.6
19.	1:00 AM	56
20.	2:00 AM	54.8
21.	3:00 AM	57.2
22.	4:00 AM	56.8
23.	5:00 AM	56.9
24.	6:00 AM	57.6
Average		56.2

.....End of Report.....



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## TEST REPORT

Ref. #: PGG/LAB/2023-2979/NL

Issue date: 30-May-23

Name of Industry/Client:

M/S Rehman Habib Consultants Pvt. Ltd

Name of Project:

Rehabilitation/Remodeling of Pat Feeder Canal System

Site Location:

Pat Feeder Canal, Balochistan

Nature of Monitoring:

Noise Level

Monitoring By:

Pak Green Laboratories

Monitoring Location:

Point 6, 171 Km Pat Feeder Canal

Monitoring Coordinates:

28° 27' 15.11" N

68° 2' 11.16" E

Monitoring Instrument:

Noise Meter Land Tek SL 5868-P

Monitoring Duration:

24 hours

Monitoring Date:

27-May-23 to 28-May-23

### Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	7:00 AM	62.3
2.	8:00 AM	64.4
3.	9:00 AM	63.2
4.	10:00 AM	63.5
5.	11:00 AM	63.4
6.	12:00 PM	65.6
7.	1:00 PM	68.2
8.	2:00 PM	66.6
9.	3:00 PM	67.4
10.	4:00 PM	65.2
11.	5:00 PM	64.2
12.	6:00 PM	62.5
13.	7:00 PM	63.2
14.	8:00 PM	64
15.	9:00 PM	63.3
16.	10:00 PM	62.9
Average		64.4
Sr. No.	Night Time	Equivalent Noise
		dB (A)
17.	11:00 PM	56.5
18.	12:00 AM	54.9
19.	1:00 AM	53.4
20.	2:00 AM	55.9
21.	3:00 AM	54.2
22.	4:00 AM	53.6
23.	5:00 AM	56.5
24.	6:00 AM	55.1
Average		55.0

.....End of Report.....



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## Ground Water Tests Results



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EPA Certified

### TEST REPORT

Ref #: PGG/LAB/2023-2884/DW

Date: 30-May-23

Name of Industry/Client:

M/S Rehman Habib Consultants Pvt. Ltd

Name of Project:

Rehabilitation/Remodeling of Pat Feeder Canal System

Site Location:

128-Km Pat Feeder Canal, Balochistan

Nature of sample:

Drinking Water

Sample Code:

DW-1054

Source:

Canal Water

Monitoring Coordinates:

28° 38' 43.42" N 68° 24' 30.29" E

Sampling By:

Pak Green Laboratories

Sampling type (Grab/Composite):

Grab

Date of sampling:

23-May-23

#### Results:

Sr. No.	Parameters	Unit	WHO	NEQS	Method/Technique	Results
1.	E Coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 F	35.9*
2.	Total Coli-form	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 D	282.6*
3.	Fecal Coliform	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 E	95.0*
4.	Color	TCU	≤ 15	≤ 15	APHA-2120 C	1.45
5.	Taste	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable	APHA-2160 C	Objectionable*
6.	Odor	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable	APHA-2150 B	Objectionable*
7.	Turbidity	NTU	< 5	< 5	APHA-2130 B	8.80*
8.	Total Hardness ^	mg/L	-	< 500	APHA-2340 C	170
9.	Total Dissolved Solids ^	mg/L	< 1000	< 1000	APHA-2540 C	240
10.	pH ^	-	6.5-8.5	6.5-8.5	APHA-4500-H+ B	8.22 at 20.1°C
11.	Aluminum (Al)	mg/L	0.2	≤ 0.2	APHA-3111 D	BDL
12.	Antimony (Sb)	mg/L	0.02	≤ 0.005	APHA-3111 B	BDL
13.	Arsenic (As)	mg/L	0.01	≤ 0.05	APHA-3114 B	BDL
14.	Barium (Ba)	mg/L	0.7	0.7	APHA-3111 D	BDL
15.	Boron (B)	mg/L	0.3	0.3	APHA-3111 D	BDL
16.	Cadmium (Cd)^	mg/L	0.003	0.01	APHA-3111 B	BDL
17.	Chloride (Cl <sup>-</sup> ) ^	mg/L	250	< 250	APHA-4500-Cl <sup>-</sup> B	20
18.	Chromium (Cr)^	mg/L	0.05	≤ 0.05	APHA-3111 B	BDL



Page 1 of 2



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EPA Certified LAB/2023-2884/DW

Date: 30-May-23

Sr. No.	Parameters	Unit	WHO	NEQS	Method / Technique	Results
19.	Copper (Cu)^	mg/L	2	2	APHA-3111 B	BDL
20.	Fluoride (F)	mg/L	1.5	≤ 1.5	APHA-4500-F-D	0.2
21.	Lead (Pb)^	mg/L	0.01	≤ 0.05	APHA-3111 B	BDL
22.	Manganese (Mn)^	mg/L	0.5	≤ 0.5	APHA-3111 B	0.0612
23.	Mercury (Hg)	mg/L	0.001	≤ 0.001	APHA-3112 B	BDL
24.	Nickel (Ni)	mg/L	0.02	≤ 0.02	APHA-3111 B	BDL
25.	Nitrate^	mg/L	50	≤ 50	APHA-4500-NO <sub>3</sub> -1-E	BDL
26.	Nitrite^	mg/L	3	≤ 3	APHA-4500-NO <sub>2</sub> -1-B	BDL
27.	Selenium (Se)	mg/L	0.01	0.01	APHA-3114 C	BDL
28.	Residual Chlorine (Cl <sub>2</sub> )	mg/L	-	0.2-0.5 at the consumer end 0.5-1.5 at the source	APHA-Cl-B	0.02
29.	Zinc (Zn)^	mg/L	3	5.0	APHA-3111 B	0.0050
30.	Phenolic Compound (As Phenol)	mg/L	-	-	APHA-5530 D	BDL
31.	Sodium (Na)^	mg/L	-	-	APHA-3111 B	47.7903
32.	Potassium (K)^	mg/L	-	-	APHA-3111 B	7.0526

End of Report.....

NEQS: National Environmental Quality standard

WHO: World Health Organization

Remarks: Parameters with \* are exceeding the NEQS Limits.

Terms & Conditions:

- Analysis was conducted at the request of the project proponent for IEE/EIA Baseline Study.
- Report cannot be used to comply with any complaint, EPO, or other court case.
- This report should be reproduced as a whole and not in parts.
- The responsibility for the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.

BDL: Below Detection Limits

^PNAC Accredited

Lab Analyst	Chief Analyst	Laboratory Incharge



Page 2 of 2







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EPA Certified

## TEST REPORT

Ref #: PGG/LAB/2023-2887/DW

Date: 30-May-23

Name of Industry/Client:

M/S Rehman Habib Consultants Pvt. Ltd

Name of Project:

Rehabilitation/Remodeling of Pat Feeder Canal System

Site Location:

171, km Pat Feeder Canal, Balochistan

Nature of sample:

Drinking Water

Sample Code:

DW-1057

Source:

Canal Water

Monitoring Coordinates:

28° 27' 15.11" N 68° 2' 11.16" E

Sampling By:

Pak Green Laboratories

Sampling type (Grab/Composite):

Grab

Date of sampling:

23-May-23

### Results:

Sr. No.	Parameters	Unit	WHO	NEQS	Method / Technique	Results
1.	E Coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 F	95.0*
2.	Total Coli-form	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 D	282.6*
3.	Fecal Coliform	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	APHA-9221 E	113.8*
4.	Color	TCU	≤ 15	≤ 15	APHA-2120 C	5.49
5.	Taste	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable	APHA-2160 C	Objectionable*
6.	Odor	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable	APHA-2150 B	Objectionable*
7.	Turbidity	NTU	< 5	< 5	APHA-2130 B	7.10*
8.	Total Hardness ^	mg/L	-	<500	APHA-2340 C	280
9.	Total Dissolved Solids ^	mg/L	< 1000	< 1000	APHA-2540 C	470
10.	pH ^	-	6.5-8.5	6.5-8.5	APHA-4500-H+ B	7.66 at 38.4°C
11.	Aluminum (Al)	mg/L	0.2	≤ 0.2	APHA-3111 D	BDL
12.	Antimony (Sb)	mg/L	0.02	≤ 0.005	APHA-3111 B	BDL
13.	Arsenic (As)	mg/L	0.01	≤ 0.05	APHA-3114 B	BDL
14.	Barium (Ba)	mg/L	0.7	0.7	APHA-3111 D	BDL
15.	Boron (B)	mg/L	0.3	0.3	APHA-3111 D	BDL
16.	Cadmium (Cd)^	mg/L	0.003	0.01	APHA-3111 B	BDL
17.	Chloride (Cl <sup>-</sup> ) ^	mg/L	250	< 250	APHA-4500- Cl <sup>-</sup> B	35
18.	Chromium (Cr)^	mg/L	0.05	≤ 0.05	APHA-3111 B	BDL



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# PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.

ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Doc.#: PGG/IMS/FF/063 Rev. Date: 27-Jan-22 Rev. # 01

Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +9242-35441444 Cell: 0303-4442334

Ref #: PGG/LAB/2023-2887/DW

Date: 30-May-23

Sr. No.	Parameters	Unit	WHO	NEQS	Method / Technique	Results
33.	Copper (Cu)^	mg/L	2	2	APHA-3111 B	BDL
34.	Fluoride (F)	mg/L	1.5	≤ 1.5	APHA-4500-F-D	0.4
35.	Lead (Pb)^	mg/L	0.01	≤ 0.05	APHA-3111 B	BDL
36.	Manganese (Mn)^	mg/L	0.5	≤ 0.5	APHA-3111 B	0.0437
37.	Mercury (Hg)	mg/L	0.001	≤ 0.001	APHA-3112 B	BDL
38.	Nickel (Ni)	mg/L	0.02	≤ 0.02	APHA-3111 B	BDL
39.	Nitrate^	mg/L	50	≤ 50	APHA-4500-NO <sub>3</sub> <sup>-</sup> -E	1.463
40.	Nitrite^	mg/L	3	≤ 3	APHA-4500-NO <sub>2</sub> <sup>-</sup> -B	BDL
41.	Selenium (Se)	mg/L	0.01	0.01	APHA-3114 C	BDL
42.	Residual Chlorine (Cl <sub>2</sub> )	mg/L	-	0.2-0.5 at the consumer end 0.5-1.5 at the source	APHA-Cl-B	0.02
43.	Zinc (Zn)^	mg/L	3	5.0	APHA-3111 B	0.0157
44.	Phenolic Compound (As Phenol)	mg/L	-	-	APHA-5530 D	BDL
45.	Sodium (Na)^	mg/L	-	-	APHA-3111 B	9.5237
46.	Potassium (K)^	mg/L	-	-	APHA-3111 B	7.6660

End of Report.....

NEQS: National Environmental Quality standard

WHO: World Health Organization

Remarks: Parameters with \* are exceeding the NEQS Limits.

Terms & Conditions:

- Analysis was conducted at the request of the project proponent for IEE/EIA Baseline Study.
- Report cannot be used to comply with any complaint, EPO, or other court case.
- This report should be reproduced as a whole and not in parts.
- The responsibility for the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.

BDL: Below Detection Limits

^PNAC Accredited

Lab Analyst	Chief Analyst	Laboratory Incharge



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### Pictorial Evidence of Environmental Monitoring







#### Annexure 4: Validation of IBAT Proximity Report

Sr. No	Scientific Name	Common Name	Red List Category	Validation Status (Local survey)	Validation Status (Literature Review)
1.	<i>Vanellus gregarius</i>	Sociable Lapwing	CR	Not found	Reported in Hingol National Park, Balochistan <sup>26</sup>
2.	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	Not found	Not reported in Balochistan. Reported in District Tharparker <sup>27</sup> and Nagarparker <sup>28</sup> Sindh
3.	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	EN	Not found	Reported in Khario Dhand Sindh, 180 Km away from Usta Muhaammad Project Area <sup>29</sup>
4.	<i>Hardella thurjii</i>	Crowned River Turtle	EN	Not found	According to IUCN Red List, geographically not present in the Balochistan
5.	<i>Manis crassicaudata</i>	Indian Pangolin	EN	Not found	According to IUCN Red List, geographically not present in the Project area Districts
6.	<i>Panthera tigris</i>	Tiger	EN	Not found	According to IUCN Red List, it is extinct in Pakistan geographically
7.	<i>Nilssonina gangetica</i>	Indian Softshell Turtle	EN	Not found	Not reported in Balochistan. Reported in North Punjab (Rawalpindi/Islamabad and Chakwal) <sup>30</sup>
8.	<i>Nilssonina hurum</i>	Indian Peacock Softshell Turtle	EN	Not found	Reported in Sindh <sup>31</sup> and KP <sup>32</sup>
9.	<i>Oxyura leucocephala</i>	White-headed Duck	EN	Not found	Reported only few lakes of Punjab including Uchalli, Jahlar, Nammal and Rawal <sup>33</sup>
10.	<i>Haliaeetus leucoryphus</i>	Pallas's Fisheagle	EN	Not found	Reported in chotiari wetlands complex, sangahr, sindh, pakistan <sup>34</sup>

26 Syed Ali Ghalib, Abdul Jabbar, Jan Wind, Afsheen Zehra, Darakhsan Abbas. (2008), Avifauna of Hingol National Park, Balochistan, Pakistan J. Zool, pp. 317–330

27 Murn, C., Saeed, U., Khan, U., & Iqbal, S. (2015). Population and spatial breeding dynamics of a Critically Endangered Oriental White-backed Vulture *Gyps bengalensis* colony in Sindh Province, Pakistan. Bird Conservation International, 25(4), 415-425.

28 Iqbal, M. M. Distribution and Status of Oriental White-backed Vulture *Gyps bengalensis* in Nagar Parkar, Sindh, Pakistan.

29 Safi, A., Khan, M. Z., Kanwal, R., & Karl, H. V. (2021). Population Status, Threats and Conservation of the Spotted Pond Turtle; *Geoclemys Hamiltonii* (Gray, 1830)(*Geoemydidae*) of Pakistan. Journal of Zoological Research, 3(1).

30 Rais, M., BALOCH, S., REHMAN, J., ANWAR, M., HUSSAIN, I., & MAHMOOD, T. (1997). Diversity and conservation of amphibians and reptiles in North Punjab, Pakistan. Bridges, 1999(2000), 2000.

31 Khan, M. Z., Kanwal, R., Ghalib, S. A., Fatima, F., Zehra, A., Siddiqui, S., ... & Ullah, U. (2016). A review of distribution, threats, conservation and status of freshwater turtles in Sindh. Canadian Journal of Pure and Applied Sciences, 10(3), 3997-4009.

32 Safi, A., & Khan, M. Z. (2014). Distribution and current population status of freshwater turtles of District Charsadda of Khyber Pakhtunkhwa, Pakistan. Journal of Zoological Studies, 1(4), 31-38.

33 Ali, Z., Ahmed, S., Khan, M., & Akhter, M. (2007). Recent records of globally endangered whiteheaded duck *Oxyura leucocephala* in Pakistan. J. Anim. Pl. Sci, 17(1-2), 36-40.

34 Rais, M., Khan, M. Z., Ghalib, S. A., Nawaz, R., Akbar, G., Islam, S. L., & Begum, A. (2013). Global conservation significance of Chotiari Wetlands Complex, Sangahr, Sindh, Pakistan. J. of Animal and Plant Sc, 23(6), 1609-1617.

Sr. No	Scientific Name	Common Name	Red List Category	Validation Status (Local survey)	Validation Status (Literature Review)
11.	<i>Neophron percnopterus</i>	Egyptian Vulture	EN	Not found	Reported at Gwadar Coast, Balochistan <sup>35</sup>
12.	<i>Aquila nipalensis</i>	Steppe Eagle	EN	Not found	Balochistan Province of Pakistan is mostly unsuitable for the steppe eagles, except for some fragments in the coastal areas (Gwadar, Lasbella) <sup>36</sup>
13.	<i>Falco cherrug</i>	Saker Falcon	EN	Not found	This is winter visitor from Tajikistan and Afghanistan, but now it has almost been extirpated from the Balochistan province due to heavy trapping. <sup>37</sup>
14.	<i>Leptoptilos dubius</i>	Greater Adjutant	EN	Not found	According to the IUCN Red List, Balochistan is not within the geographic range of these species.
15.	<i>Acinonyx jubatus</i>	Cheetah	VU	Not found	As IUCN Red list, it is extinct in Pakistan
16.	<i>Crocodylus palustris</i>	Mugger	VU	Not found	Reported in Hingol National Park, Balochistan <sup>38</sup>
17.	<i>Panthera pardus</i>	Leopard	VU	Not found	Its habitat in Baluchistan is (Toba Kakar, Mekran, Sulaiman Range) <sup>39</sup> but is found in very small number
18.	<i>Ursus thibetanus</i>	Asiatic Black Bear	VU	Not found	Reported in Sulaiman Mountains, Khuzdar District and Kharan District of Balochistan <sup>40</sup>
19.	<i>Wallago attu</i>		VU	Not found	Reported in Pat Feeder Canal, District Jaffarabad, Balochistan <sup>41</sup>
20.	<i>Aythya ferina</i>	Common Pochard	VU	Not found	Reported in Gwadar Peninsula, Balochistan <sup>42</sup>

35 Gabol, K., Ahmed, W., Rahim, A., Shams, Z. I., Ahmed, Z., & Batool, A. (2018). Status and diversity of coastal avian fauna in Gwadar peninsula, Balochistan. *Pakistan Journal of Marine Sciences*, 27(2), 121-131.

36 Ahmad, S., Khattak, R. H., Teng, L., Kaneez, K., & Liu, Z. (2022). Factors Affecting Habitat Selection of Endangered Steppe Eagle (*Aquila nipalensis*) in Pakistan: Implications for Raptors Conservation. *Diversity*, 14(12), 1135.

37 Ghalib, S. A., Khan, M. Z., Kanwal, R., Zehra, A., Siddiqui, S., Abbas, D., ... & Khan, A. R. (2019). Recent Observations on the Distribution and Status of Wildlife of Baluchistan. *Canadian Journal of Pure and Applied Sciences*, 13(2), 4813-4846.

38 Rehman, H. (2007). Baseline surveys of Reptilian Fauna of Hingol National Park, Balochistan. Report submitted to Forest & Wildlife Department, Balochistan, Quetta.

39 Hussain, A., Mahmood, T., Akrim, F., Andleeb, S., Fatima, H., Hamid, A., & Waseem, M. (2019). Depleting wild prey compels common leopard (*Panthera pardus*) to sustain on livestock. *Animal Biology*, 69(2), 213-230.

40 Sheikh, K. M.; Molur, S., eds. (2004). "Ursus thibetanus gedrosianus Blanford, 1877. Balochistan Black Bear". Status and Red List of Pakistan's Mammals. Based on the Conservation Assessment and Management Plan (PDF). Islamabad: IUCN Pakistan. p. 57.

41 Malik, Y., Ackakzai, W. M., Mustafa, S., Saddozai, S., & Akbar, A. (2023). Accumulation of heavy metals and detection of resistant-associated genes in *Pseudomonas aeruginosa* in an edible catfish (*Wallago attu*) from Pat Feeder Canal, Pakistan. *Iranian Journal of Fisheries Sciences*, 22(3), 602-614.

42 Gabol, K., Ahmed, W., Rahim, A., Shams, Z. I., Ahmed, Z., & Batool, A. (2018). Status and diversity of coastal avian fauna in Gwadar peninsula, Balochistan. *Pakistan Journal of Marine Sciences*, 27(2), 121-131.



Sr. No	Scientific Name	Common Name	Red List Category	Validation Status (Local survey)	Validation Status (Literature Review)
21.	<i>Columba eversmanni</i>	Yellow-eyed Pigeon	VU	Not found	Not reported in Balochistan Province. Reported in Punjab <sup>43</sup>
22.	<i>Sterna aurantia</i>	River Tern	VU	Not found	Not reported in Balochistan Province. Reported in Patisar Lake, Bahawalpur <sup>44</sup>
23.	<i>Clanga clanga</i>	Greater Spotted Eagle	VU	Not found	Not reported in Project area. It migrates from Russia, crossing Kazakhstan, Uzbekistan & Afghanistan enters Balochistan, but it settled in Punjab province and established a winter home range there <sup>45</sup> .
24.	<i>Aquila rapax</i>	Tawny Eagle	VU	Not found	Not reported in Project area. Reported In Mangla Dam, AJK <sup>46</sup>
25.	<i>Aquila heliaca</i>	Eastern Imperial	VU	Not found	Not reported in Project area. Reported in Chotiari Wetlands Complex, Sangahr, Sindh <sup>47</sup>
26.	<i>Saxicola macrorhynchus</i>	White-browed Bushchat	VU	Not found	Not reported in Project area. According to IUCN Red List, it is possibly extinct in Balochistan
27.	<i>Chlamydotis macqueenii</i>	Asian Houbara	VU		Reported in Chaghi and Kharan Districts of Balochistan <sup>48</sup>
28.	<i>Lissemys punctata</i>	Indian Flapshell Turtle	VU	Not found	According to IUCN Red List, geographically not present in Naseerabad Division
29.	<i>Schizothorax plagiostomus</i>	Snow Trout	VU	Not found	According to the IUCN Red List, Balochistan is not within the geographic range of these species.
30.	<i>Bagarius bagarius</i>		VU	Not found	It is indigenous fish species of Punjab and Sindh <sup>49</sup> , not reported in the project area

43 Shah, S. A. H., Ahmad, M. M., Sarwar, M. S., Ashraf, M., Saddique, S., Iqbal, Y., ... & Mahboob, H. A. (2023). Population Dynamics of Avian Diversity in the District Okara, Pakistan. *American Journal of Zoology*, 6(1), 9-19.

44 Tasleem, M. W., Rajpoot, S. R., Ashraf, I., Baqir, G., Irfan, M., & Kamran, M. Population Status and Habitat Requirement of Endangered Migratory Waterfowl of Patisar Lake, Bahawalpur, Pakistan.

45 Ram, M., Sahu, A., Tikadar, S., Gadhavi, D., Rather, T. A., Jhala, L., & Zala, Y. (2022). Home Ranges and Migration Routes of Four Threatened Raptors in Central Asia: Preliminary Results. *Birds*, 3(3), 293-305.

46 Khan, B., & Ali, Z. (2014). Assessment of birds' fauna, occurrence status, diversity indices and ecological threats at Mangla Dam, AJK from 2011 to 2014. *Journal of Animal and Plant Science*, 25(3), 397-403.

47 Rais, M., Khan, M. Z., Ghalib, S. A., Nawaz, R., Akbar, G., Islam, S. L., & Begum, A. (2013). Global conservation significance of Chotiari Wetlands Complex, Sangahr, Sindh, Pakistan. *J. of Animal and Plant Sc*, 23(6), 1609-1617.

48 Ghalib, S. A., Khan, M. Z., Kanwal, R., Zehra, A., Siddiqui, S., Abbas, D., ... & Khan, A. R. (2019). Recent Observations on the Distribution and Status of Wildlife of Baluchistan. *Canadian Journal of Pure and Applied Sciences*, 13(2), 4813-4846.

49 Rafique, M., & Khan, N. U. H. (2012). Distribution and status of significant freshwater fishes of Pakistan. *Rec. Zool. Surv. Pakistan*, 21, 90-95.

Sr. No	Scientific Name	Common Name	Red List Category	Validation Status (Local survey)	Validation Status (Literature Review)
31.	<i>Triplophysa brahui</i>		EN	Not found	Not Reported in Balochistan
32.	<i>Vormela peregusna</i>	Marbled Polecat	VU	Not found	Reported in Hazarganji-Chiltan National Park, Balochistan <sup>50</sup>
33.	<i>Gazella subgutturosa</i>	Goitered Gazelle	VU	Not found	Reported in Chagai Desert, Balochistan <sup>51</sup>
34.	<i>Ovis vignei</i>	Urial	VU	Not found	Reported in Dureji Game Management Area, Balochistan <sup>52</sup>
35.	<i>Platanista minor</i>	Indus River Dolphin	EN	Not found	Reported in around the mouth of the Indus Delta and in large sheltered bays in Balochistan <sup>53</sup>

<sup>50</sup> Afsar, Sheeba, and Sumaiya Bano. "Mapping the Endangered/Key Species of Hazarganji-Chiltan National Park through geo-spatial technology." *Int. J. Biol. Biotech* 10 (2013): 229-235

<sup>51</sup> Nawaz, Muhammad Ali, Muhammad Rafique, and Noor Kamal Khan. "Pattern of mammalian distribution in the Chagai Desert, Balochistan, Pakistan." *Pakistan J. Zool* 43, no. 5 (2011): 841-847.

<sup>52</sup> Frisina, MICHAEL R., G. A. Awan, and MICHAEL H. Woodford. "Status of Blanford's urial (*Ovis orientalis [vignei] blanfordi*) and Sindh ibex (*Capra aegagrus blythii*) on the Dureji game management area Balochistan, Pakistan." (2003).

<sup>53</sup> Gore, M. A., M. S. Kiani, E. Ahmad, B. Hussain, R. F. Ormond, J. Siddiqui, U. Waqas, and R. Culloch. "Occurrence of whales and dolphins in Pakistan with reference to fishers' knowledge and impacts." *J. Cetacean Res. Manage.* 12, no. 2 (2012): 235-247.



## Integrated Biodiversity Assessment Tool

### PROXIMITY REPORT

#### QILLAH ABDULLAH 1

Country: Pakistan

Location: [30.7, 66.7]

Date of analysis: 11 September 2023 (GMT)

Buffers applied: 1 km | 2 km | 3 km

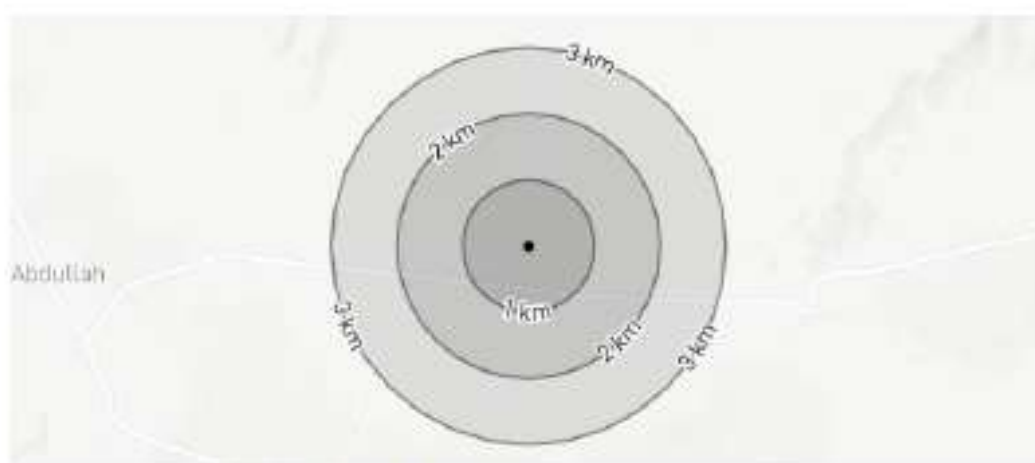
IUCN Red List Biomes: Marine, Freshwater, Terrestrial

Generated by: Shazia Shahid

Organisation: ADB

#### Overlaps with:

Protected Areas	0
Key Biodiversity Areas	0
IUCN Red List	17



Displaying project location and buffers: 1 km, 2 km, 3 km



## About this report

This report presents the results of [1400-48622] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 2 km, 3 km.

This report is one part of a package generated by iBAT on 11 September 2023 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read iBAT reports' document.

**WARNING:** iBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult iBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in iBAT reports in line with the [Sensitive Data Access Restrictions Policy for the IUCN Red List](#). This relates to sensitive Threatened species and KBAs triggered by sensitive species.

## Data used to generate this report

- UNEP-WCMC and IUCN, 2023. Protected Planet: The World Database on Protected Areas (WDPA) [On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: [www.protectedplanet.net](http://www.protectedplanet.net) - September 2023.
- BirdLife International (on behalf of the KBA Partnership), 2023. Key Biodiversity Areas - April 2023.
- IUCN, 2022. IUCN Red List of Threatened Species - December 2022.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). <https://www.iucnredlist.org>
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarren, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. *Nature* 586, 724–729 (2020). <https://doi.org/10.1038/s41586-020-2784-9>



### Recommended citation

IBAT Proximity Report. Generated under licence 1400-48622 from the Integrated Biodiversity Assessment Tool on 11 September 2023 (GMT). [www.ibat-alliance.org](http://www.ibat-alliance.org)

### How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

## Annexure 5: Emergency Response Plan for Breach of Dam

### 1. DAM EMERGENCY PLAN

The purpose of this Dam Emergency Plan (DEP) is to reduce the risk of human life loss and injury and minimize property damage during an unusual or emergency event at proposed project.

This DEP has been prepared with the intent of coping and responding to the disaster in case of dam failure or breaching.

### 2. BASIC DAM DESCRIPTION

This project will be implemented for restoration and rehabilitation of dams/bunds of District Killa Abdullah sites that have received severe damages during Recent High Intensity Rainfall in July and August 2022. Details of dams and damage Nomenclature are presented in below Table

Sr. No.	Structure Description/Sub Type	District	Location/ Coordinates	Name (Damage Nomenclature)
1	Pir Alizai & Majak Flood Protection Bund	Killa Abdullah	30°43'55.16"N 66°44'19.81"E	Protection Bund Damaged
2	Killa Abdullah Bazar Flood Protection Bund	Killa Abdullah	30°44'03.00"N 66°39'39.00"E	Protection Bund Washed out and Damaged at different RDs
3	Dobandai Flood Protection Bund	Killa Abdullah	31°13'58.74"N 66°51'18.20"E	Protection Bund Washed out and Damaged at different RDs
4	Essargai Delay Action Dam Dobandai	Killa Abdullah	31°02'52.29"N 66°47'02.80"E	Spillway damaged, raising of dam body
5	Gulistan Karez Area Flood Protection Bund	Killa Abdullah	30°36'30.53"N 66°34'00.58"E	Protection Bund Washed out and Damaged at different RDs
6	Segai Area Flood Protection Bund	Killa Abdullah	30°34'59.40"N 66°34'57.13"E	Protection Bund Washed out and Damaged at different RDs

The Scope of work for this project includes following design of interventions related to all components of this subproject.

1. Restoration and rehabilitation of Water conservation structures (Small delay action dams, Flood Protection Bunds)
2. Restoration and strengthening of Flood Embankment of canal and drain respectively.

### 2. Disaster Risk Management

Disasters can be divided into four major phases:

1. Non-Disaster Phase
2. Pre-Disaster Phase
3. During-Disaster Phase
4. Post-disaster phase

### PRE-DISASTER PHASE

1. Use Guidance notes provide as **Annexure A** of this document, to quality of emergency.



2. In the event of any emergency / disaster, inform the relevant following departments:

Level	Agency	Contact Person Details (to be updated)
National Level	National Disaster Management Authority (NDMA)	Prime Minister's Office, 2nd Floor Sector G-5-1, Constitution Avenue, Islamabad Post Code 44000
Provincial Level	Administration, Infrastructure & Coordination Department (AI&C)	Secretary 091-9214013 Director Irrigation 091-9212149
	Provincial Disaster Management Authority (PDMA)	Emergency Help line: 081-111-400-400 Assistant Director Admin Phone: (92-42) 99203302, 36375526
District Level	Provincial Disaster Management Authority (PDMA)	Deputy Commissioner (DC) Killa Abdullah
	Administration such as Assistant Commissioner (AC)	AC Killa Abdullah
Dam Level	Dam Operator	Sub Divisional Officer Irrigation

3. Provincial Disaster Management Authority and its field office in Killa Abdullah District Administration of the Killa Abdullah District, to prepare Evacuation Plan for events such as Dam failure including evacuation area and route. They should have an idea of the population that will need to be evacuated.
4. Provincial Disaster Management Authority (PDMA) and District Administration should also initiate capacity building and train local community for such events.

## DISASTER PHASE

The following are the basic emergency planning and response roles and responsibilities for the key agencies involved when an emergency occurs.

1. Merged Areas Secretariat to undertake appropriate remedial actions as given in **Annexure B** of this document.
2. Issue immediate evacuation warnings to people in the vicinity of the dam likely to be affected,
3. Merged Areas Secretariat to provide updates of the situation to the press and local emergency authority to assist them in making timely and accurate decisions regarding warnings and evacuations.
4. Provincial Disaster Management Authority support and coordinate the overall emergency response activities within its geographical or functional jurisdiction.

## POST DISASTER PHASE

1. Killa Abdullah District administration to undertake DEP exercises as appropriate.
2. Provincial Disaster Management Authority to provide leadership to assure the DEP is reviewed and updated annually and copies of the revised DEP are distributed to all who received copies of the original DEP including the records for the local emergency authorities.
3. Provincial Disaster Management Authority will decide when to terminate the emergency.

## Appendix A: Guidance for Determining the Emergency

Event	Situation
Seepage	New seepage areas in or near the dam
	New seepage areas with cloudy discharge or increasing flow rate
	Seepage with discharge greater than 10 gallons per minute
Sinkholes	Observation of new sinkhole in reservoir area
	Rapidly enlarging sinkhole
Instruments	Instrumentation readings beyond predetermined values
Earthquake	Measurable earthquake felt or reported on or within 50 kilometers of the dam      Earthquake resulting in uncontrolled release of water
	Earthquake resulting in visible damage to the dam or appurtenances
	Earthquake resulting in uncontrolled release of water from the dam
Security threat	Verified bomb threat that, if carried out, could result in damage to the dam      Damage to dam or appurtenances with no impacts to the functioning of the dam      1
	Detonated bomb that has resulted in damage to the dam or appurtenances
Sabotage/ vandalism	Damage to dam or appurtenance with no impacts to dam function
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam
	Damage to dam or appurtenances that has resulted in seepage flow
	Damage to dam or appurtenances that has resulted in uncontrolled water release

## Appendix B: Emergency Remedial Actions

The following emergency remedial actions should be considered and immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam.

Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions.

Close monitoring of the dam must be maintained to confirm the success of any remedial action taken at the dam.

### Seepage and sinkholes

1. Open the low-level outlet gate to lower the reservoir level as rapidly as possible to a level that stops or decreases the seepage to a non-erosive velocity. If the gate is damaged or blocked, pumping or siphoning may be required. Continue lowering the water level until the seepage stops.
2. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.
3. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

### Earthquake

Although risk related with the seismic activities has been taken into account while designing the structure and type of dam, yet there is risk in the case of unexpected earthquake of high magnitude. In case of earth quake;

1. Immediately conduct a general overall visual inspection of the dam.
2. Perform a field survey to determine if there has been any settlement and movement of the dam / spillway, and low-level outlet works.
3. Drain the reservoir, if required.

Adverse or unusual conditions that can cause the failure of a dam are typically related to aging or design and construction oversights. Extreme weather events that exceed the original designed conditions can cause significant flow through the spillway or overtopping of the embankment. However, accidental or intentional damage to the dam may also result in emergency conditions. The conditions have been grouped to identify the most likely emergency-level condition. The groupings are provided as guidance only. Not all emergency conditions may be listed, and the dam operator is urged to use conservative judgment in determining whether a specific condition should be defined as an emergency situation at the dam.

**Urgent; dam failure appears imminent or is in progress Seepage and Sinkholes**  
**Potential dam failure situation; rapidly developing:**

1. Cloudy seepage or soil deposits are observed at seepage exit points or from internal drain outlet pipes.
2. New or increased areas of wet or muddy soils are present on the downstream slope, abutment, and/or foundation of the dam, and there is an easily detectable and unusual increase in volume of downstream seepage.
3. Significant new or enlarging sinkhole(s) near the dam or settlement of the dam is observed.
4. Reservoir level is falling without apparent cause.
5. The following known dam defects are or will soon be inundated by a rise in the reservoir:
  - Sinkhole(s) located on the upstream slope, crest, abutment, and/or foundation of the dam; or
  - Transverse cracks extending through the dam, abutments, or foundation.

**Urgent; dam failure appears imminent or is in progress:**

1. Rapidly increasing cloudy seepage or soil deposits at seepage exit points to the extent that failure appears imminent or is in progress.
2. Rapid increase in volume of downstream seepage to the extent that failure appears imminent or is in progress.
3. Water flowing out of holes in the downstream slope, abutment, and/or foundation of the dam to the extent that failure appears imminent or is in progress.
4. Whirlpools or other evidence exists indicating that the reservoir is draining rapidly through the dam or foundation.
5. Rapidly enlarging sinkhole(s) are forming on the dam or abutments to the extent that failure appears imminent or is in progress.
6. Rapidly increasing flow through crack(s) eroding materials to the extent that failure appears imminent or is in progress.

**Potential dam failure situation; rapidly developing:**

1. Settlement of the crest, slopes, abutments and/or foundation of the dam that may eventually result in breaching of the dam.
2. Significant increase in length, width, or offset of cracks in the crest, slopes, abutments, and/or foundation of the dam that may eventually result in breaching of the dam.

**Urgent; dam failure appears imminent or is in progress:**

1. Sudden or rapidly proceeding slides, settlement, or cracking of the crest, slopes, abutments, and/or foundation, and breaching of the dam appears imminent or is in progress.

## Annexure 6: Departmental Land Acquisition Certificate

### RESTORATION & REHABILITATION OF FLOOD DAMAGED WATER CONSERVATION STRUCTURES IN IRRIGATION DIVISION QUETTA

#### LAND ACQUISITION CERTIFICATE

This is to certify that the proposed schemes in Balochistan Province have no requirement for any type land acquisition including the Voluntary Land Donation as the existing Right of Way will be used for restoration and rehabilitation of flood protection and water conservation structures.

At present no community (s) was found occupying the existing structures for both permanent and temporary shelter and relief from the floods and there has been no community asset found to be relocated.

Communities along the proposed schemes are vulnerable and at threat from the future unexpected climatic events of floods and in dire need of the proposed works. At the same time community's willingness has been acquired through meetings during damages assessment survey after floods of 2022 and their main concern is to restore the damages as early as possible to make them resilient.

Proposed works will be carried out on the Irrigation Department (Govt of Balochistan) land and will utilize the department owned Right of Way on all proposed sites. List of the proposed flood mitigation and water conservation sites is annexed with GPS locations.

Moreover, Irrigation Department of Balochistan will comply with NDRMF's Environment & Social Management System and schemes will be assessed for site specific safeguards impacts and mitigation measures and management plan will be addressed in the Initial Environmental Examination study after the Grant Implementation Agreement prior to commencement of works on the ground.

DA

List of Schemes Annex-A



Executive Engineer  
Irrigation Division Quetta  
081-9201117



Superintending Engineer  
Irrigation Circle Quetta  
081-9201117



Chief Engineer (Quetta)  
Irrigation Balochistan  
Ph # 081-9211605



Secretary  
Irrigation Department  
Government of Balochistan  
Ph # 081-9201074

## **Annexure 7: Occupational Health and Safety Plan**

### **General**

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank/IFC EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

### **a. Screening and regular unannounced checking of workers**

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

### **b. Minimizing hazards and risks at the workplace.**

To ensure safety at all work sites, the following will be carried out:

- i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.
- ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.
- iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.
- iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.
- v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.



- vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;
- vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontals.
- viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.
- ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.
- x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.
- xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

### **c. Provision of Personal Protective Equipment**

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

- i. High visibility clothing for all personnel during road works must be mandatory.
- ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.
- iii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.
- iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
- v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.
- vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.
- vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.
- viii. Safety nets shall be provided when work places are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

**Table 6.1 PPE Requirement List**

Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

#### **d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers**

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

- i. Provision of dispensaries by the individual EPC contractor.
- ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.
- iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.
- iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

#### **e. Record Maintenance and Remedial action**

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

#### **f. Compensation for Injuries and Death**

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

#### **g. Awareness Programs**

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

- i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.
- ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

#### **h. Nomination of a Health and Safety Focal Person**

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

- i. Function as the focal person/representative for all health and safety matters at the workplace;
- ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;
- iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;
- iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;
- v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

## Annexure 8: Emergency Response Plan

### PURPOSE

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

- (i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.
- (ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

### EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

- (i) Construction Accident
- (ii) Road & Traffic Accident
- (iii) Hazardous material spills
- (iv) Structure collapse or failure
- (v) Trauma or serious illness
- (vi) Sabotage
- (vii) Fire
- (viii) Environmental Pollution
- (ix) Loss of person
- (x) Community Accident

### RESPONSIBILITIES

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table 7.1** below.

**Table 7.1 Emergency Response Team**

Action Group	Responsibility
Emergency Coordinator	<p>Overall control of personnel and resources.</p> <p>The Emergency Coordinator will support and advise the Site Safety Supervision as necessary.</p> <p>Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.</p>
Site Safety Supervision (Emergency Commander)	<p>Overall responsibility for activating emergency plan and for terminating emergency actions.</p> <p>Be alternative of emergency response chairpersons.</p> <p>Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth.</p> <p>Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger.</p> <p>Notify outside authorities if assistance is required.</p> <p>Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation.</p> <p>Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency.</p> <p>Establish and appoint all emergency organization structure and team.</p> <p>Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency.</p> <p>Ensure resources available to purchase needed emergency response equipment and supplies.</p> <p>Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan.</p> <p>Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency.</p> <p>The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.</p>
Security Team	<p>Ensure that the exit route is regularly tested and maintained in good working order.</p> <p>Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel.</p> <p>Assist with strong/activation of services during an emergency.</p> <p>Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.</p>
	Protect the injured from further danger and weather.

Action Group	Responsibility
Rescue & Medical Team	Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital. Remain familiar with the rescue activities and rescue apparatus. Assist outside medical services personnel when they arrive
General Administration Team	Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team. Coordinate emergency plan with the government authorities, local community.
Environment Team	In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	Call up of personnel into the safe location for protective life and property. Take immediate and appropriate action while Emergency Response Team is being mobilized. Keep in touch with the Emergency Commander Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary. Provide and maintain emergency equipment of their responsible areas.
Other Staff and Employees	All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team. Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.

## PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.



Figure 7.2. Emergency Procedure for Fire

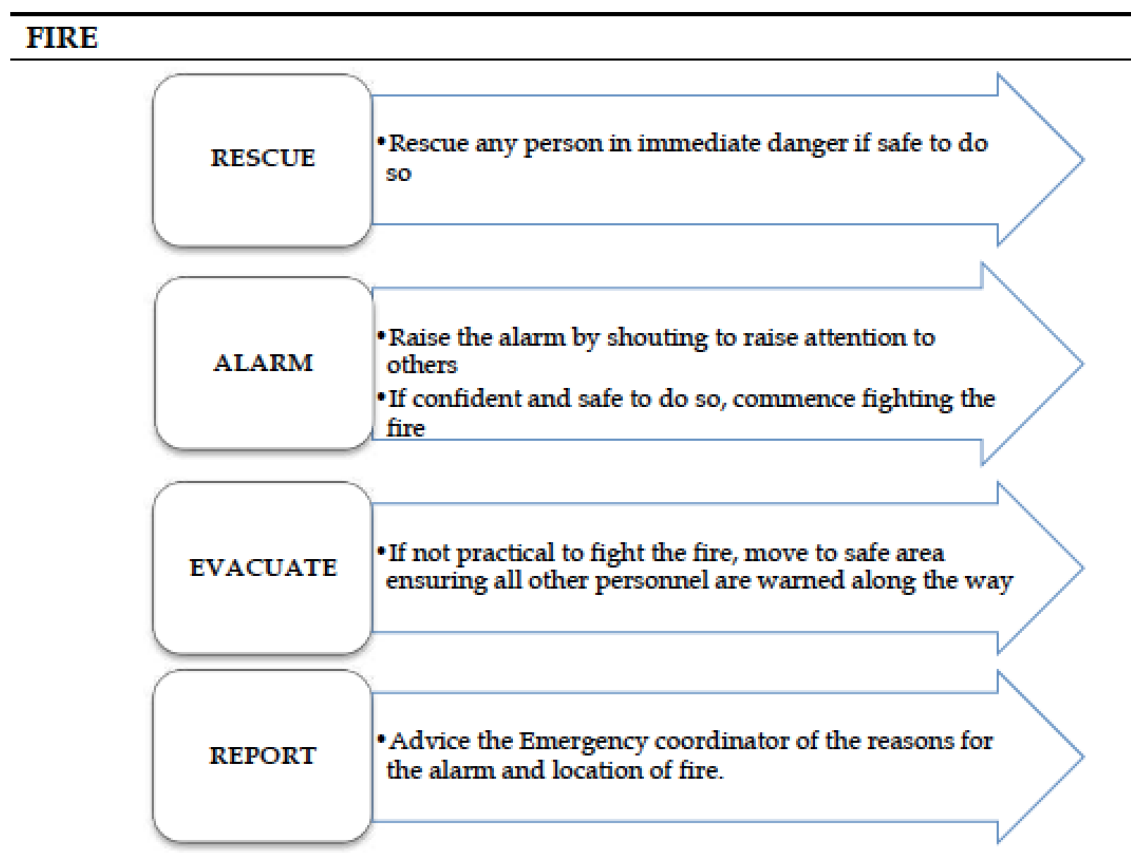


Figure 7.3 Emergency Procedure for Serious

**ACCIDENT**

In the event of injuries of persons, the first person on the scene should take the following action:

If a hazard exists consider your own safety then if possible remove the hazard or the injured person.

Assess the patient by checking for Airway, Breathing, Pulse and obvious

Report directly to First Aid or Security Centers, when raising the alarm you must clearly give the following information;

- Your name and the detail of accident
- The location of the injured person(s)
- The number of persons injured
- The extent of the injuries, if known
- What known hazards are in the area

Make the injured person as comfortable as possible

Treat the obvious injuries

Reassure the injured person

## **COMMUNICATION WITH AUTHORITIES / PRESS AT SITE**

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoiding politely, at all costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

### **First Aid Persons**

- Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,
- Provide treatment to the victim(s) to the best of his/her ability.
- Ensure the safety of victims by ceasing any work activity in the area.
- Protect the injured from further danger and weather.
- Assist medical services personnel when they arrive.

### **General Administration Team**

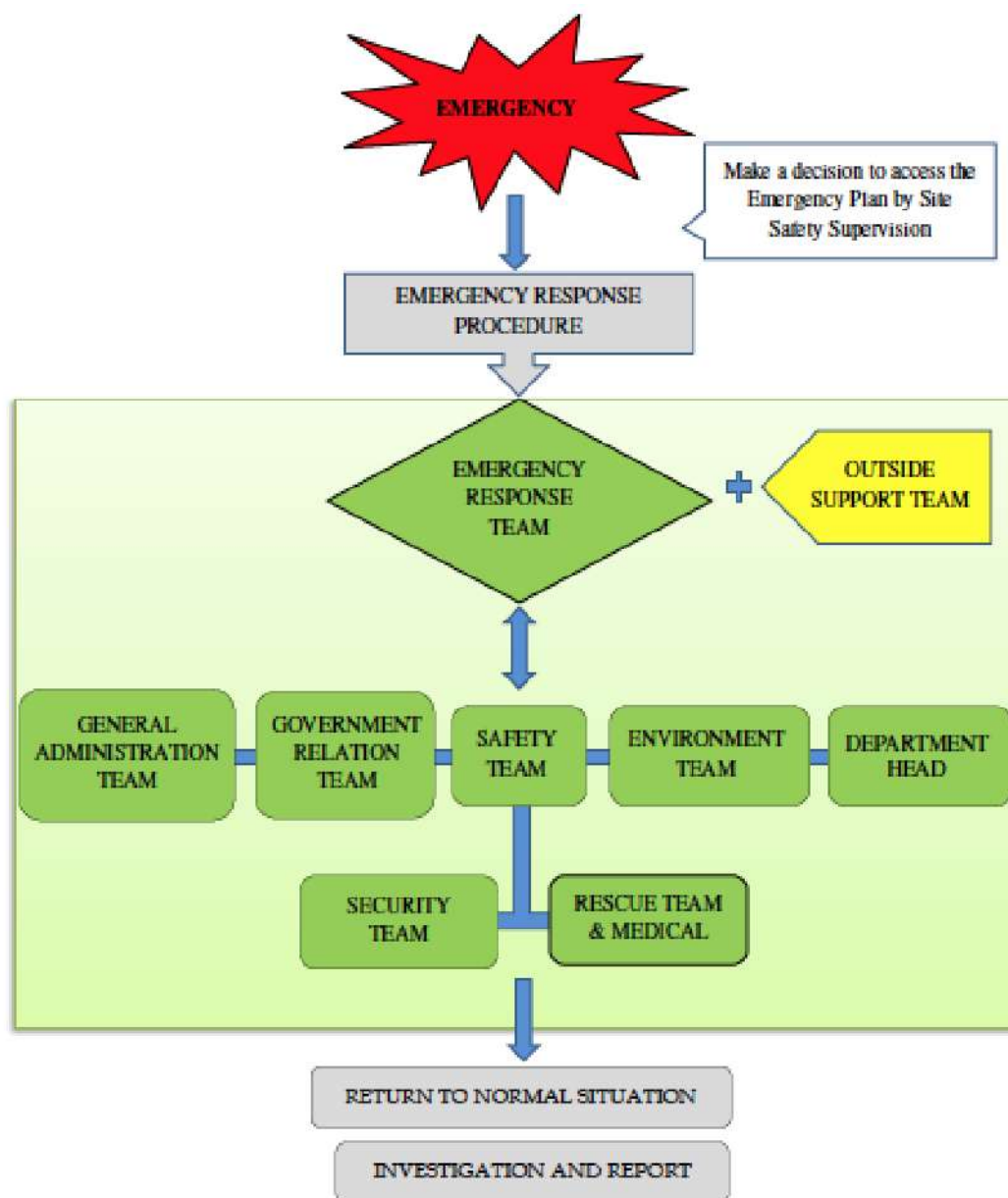
- Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

### **Security Team**

- If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.
- Prevent access to the site of unauthorized personnel (press, etc.).

### **Emergency Coordinator**

- The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.
- The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation
- The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.



Note: Name of contact person and call number from Owner/ Contractor to be determined.

Details of the actual job being done at the time:

Details of Accident / Incident / What actually happened?

**Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark C)**

UNSAFE CONDITIONS		UNSAFE ACTS	
1	<input type="checkbox"/> Inadequately Guarded	1	<input type="checkbox"/> Operating Without Authority / Training
2	<input type="checkbox"/> Unguarded	2	<input type="checkbox"/> Operating at Unsafe Speed
3	<input type="checkbox"/> Defective Tools, Equipment, or Substance	3	<input type="checkbox"/> Marking SHE Device Inoperative
4	<input type="checkbox"/> Unsafe Design or Construction	4	<input type="checkbox"/> Using Unsafe Equipment or Equipment Unsafely
5	<input type="checkbox"/> Hazardous Arrangement	5	<input type="checkbox"/> Unsafe Loading, Placing, Mixing
6	<input type="checkbox"/> Unsafe Illumination	6	<input type="checkbox"/> Taking Unsafe Position
7	<input type="checkbox"/> Unsafe Ventilation	7	<input type="checkbox"/> Working on Moving or Dangerous Equipment
8	<input type="checkbox"/> Unsafe Clothing	8	<input type="checkbox"/> Distraction, Teasing, Horse Play
9	<input type="checkbox"/> Insufficient Instruction	9	<input type="checkbox"/> Failure to use Personal Protective Devices
10	<input type="checkbox"/> Lack of system of work	10	<input type="checkbox"/> Lack of effective instruction or supervision
Why was the unsafe act committed? _____		Why did the unsafe condition exist? _____	

**Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)**

UNSAFE ACT	UNSAFE CONDITION	If Supervisor can't handle, then recommend to
<input type="checkbox"/> Stop the Behaviour	<input type="checkbox"/> Remove	<input type="checkbox"/> Site Engineer, or
<input type="checkbox"/> Study the job	<input type="checkbox"/> Guard	<input type="checkbox"/> Site Manager, or
<input type="checkbox"/> Instruct (tell-show-try-check)	<input type="checkbox"/> Warn	<input type="checkbox"/> Project Manager, or
<input type="checkbox"/> Follow Up	<input type="checkbox"/> Supervisory Training	<input type="checkbox"/> Safety Committee
<input type="checkbox"/> Enforce		

Detail below any immediate remedial actions that have been taken:

Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:

Responsible

Completion  
Date

## **Annexure 9: Archaeological ‘Chance Find’ procedure**

### **Background**

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this ‘Archaeological Chance Find Procedure’ are to promote preservation of archaeological data while minimizing disruption of construction scheduling/ It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

### **Potential Impacts to Archaeological Sites**

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

### **Archaeological ‘Chance Find’ Procedure**

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following ‘chance-find’ principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

- (i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.
- (ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.
- (iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.
- (iv) Work will not re-commence in this location until agreement has been reached between DoA and proponent as to any required mitigation measures, which may include excavation and recovery of the item.
- (v) A precautionary approach will be adopted in the application of these procedures.

### **Detailed Procedural Steps**

If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the



sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part as for a public purpose.

## **Annexure 10: Dust Management Plan**

### **General**

The purpose of this plan is to describe the measures that the project shall take to ensure that the risk of emissions from dust generated by site operations during construction are minimized and that best practice measures are implemented.

Dust emissions from construction can cause ill health effects to Contractor staff along with nuisance and annoyance to members of the local community. Dust will be controlled through:

- Elimination
- Reduction/Minimisation
- Control

This dust management plan shall be implemented based on the measures already provided in the Environmental Management Plan (EMP) relating to controlling dust emissions.

### **Methodology**

The following methodology will be undertaken for each project section:

### Step 1 – Identify the dust generating activities

Construction activities that are likely to produce dust will be identified. The activities that will be taken into account are:

- Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant
- Roads, surfaces and public highways
- Static and mobile combustion plant emissions
- Tarmac laying, bitumen surfacing and coating
- Materials Handling, Storage, Spillage and Disposal
- Storage of material
- Stockpiles
- Spillages
- Storage of Waste
- Site Preparation and Restoration after Completion
- Earthworks, excavation and digging
- Storage of spoil and topsoil
- Demolition
- Construction and Fabrication Processes

### Step 2 – Identify Sensitive Receptors

Sensitive receptors have already been identified. The nature and location of the sensitive receptors will be taken into account when implementing control measures.

### Step 3 – Implement Best Practice Measures to Control

Based on the nature of the activity producing the dust, the likelihood of dust being produced and the possible consequence of dust based on the sensitive receptors, the most effective control measure will be identified and implemented.

### Step 4 – Monitor effectiveness of control

Construction Supervision Staff (CSC) will have the responsibility to ensure that dust control measures are being implemented and are effective.

### Step 5 – Record and report result of monitoring

All inspections, audits and results of monitoring will be recorded and kept as part of the site filing system.

## Method Statements and Risk Assessments

- The Contractor's Risk Assessments and Method Statements will be required to be approved by the CSC prior to commencing work and will be required to contain environmental aspects of the task, including dust control measures where required.
- Where dust has been identified within the risk assessment as a significant issue, the method statement will be required to cover the following:

- Methods and materials that will be used to ensure that dust generation is minimized.
- The use of pre-fabricated materials where possible.
- Optimum site layout:
- Dust generating activities to be conducted away from sensitive receptors
- Supply of water for damping down.
- Good housekeeping and management
- All employees will be briefed on the Risk Assessment and Method Statement before starting work.

## Training

All Contractor staff will be required to attend training seminars as already mentioned in the EMP document. A site-specific induction will also be required before being allowed to work on site. These will include site-specific sensitive receptors and details regarding dust control measures to be taken.

Toolbox talks on air pollution and minimizing dust emissions will be provided on a regular basis to Contractor staff.

## Identification of Dust Generating Sources and Control Methods Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Dust Source	Dust Control Methods
Major haul roads and traffic routes	Haul roads will be dampened down via a mobile bowser, as required.
Public Roads	Road sweeper will be used to clean public roads as required.
Site traffic management	Site traffic will be restricted to constructed access roads as far as possible. Site speed limit will be set at 10 mph as this will minimize the production of dust.
Road Cleaning	A mechanical road sweeper will be readily available and used.
Handling, Storage, Stockpiling and Spillage of Dusty materials	
Material handling operations	The number of times a material will have to be handled will be kept to a minimum to prevent double handling and ensure dusty materials are not handled unnecessarily.
Transport of fine dusty materials and aggregates.	Closed tankers will be used or sheeted vehicles.

Dust Source	Dust Control Methods
Vehicle loading/unloading materials on to vehicles and conveyors.	Dusty materials will be dampened down Drop heights will be kept to a minimum and enclosed where possible.
<b>Storage of Materials</b>	
Bulk cement, bentonite etc.	Bentonite will be delivered in tankers and stored in dedicated enclosed areas. Bulk cement will be transported through tractor trollies or trailers.
Fine dry materials	These will be protected from the weather and by storing in appropriate containers and indoors, where necessary.
Storage location	Material will be stored in dedicated lay-down areas.
<b>Storage of Stockpiles</b>	
Stockpile location	Stockpiles will be placed so as to minimize double handling and facilitate the site restoration.
Building stockpiles	Stockpiles, tips and mounds will not be stored at an angle greater than an angle of repose of the material.
Small and temporary stockpiles	Where possible, stockpiles will be placed under sheeting. Dusty material will be damped down. Wind barriers (protective fences) of a similar height to the stockpiles will be erected, if required.
Large and long term stockpiles	Long-term stockpiles will be vegetated and stabilized as soon as possible. Stock piles will be dampened down until stabilized, where necessary. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
<b>Waste Material from Construction</b>	
Disposal method	A dedicated lay-down area will be available for waste. Waste will not be allowed to build up and will be disposed off at the designated locations as per EMP.
<b>Site Preparation and Restoration</b>	
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
<b>Construction and Fabrication Process</b>	
Crushing of material for reuse, transportation and disposal	Authorization will be obtained from PMU and ADB before using any mobile plant on site for activities such as crushing and screening. Any crushing or screening activities will be located away from sensitive receptors.
Cutting, grinding, drilling, sawing, trimming, planning, sanding	These activities will be avoided wherever possible. Equipment and techniques that minimize dust will be implemented. Water will be used to minimize dust.
Cutting roadways, pavements, blocks	Water sprinkling to be used.
Angle grinders and disk cutters	Best practice measures will be used such as dust extraction

## Monitoring Arrangements

Monitoring will be conducted at sensitive receptor locations in the project area as provided in the EMP. Furthermore, at locations where PM levels are exceeding applicable guidelines, additional stringent measures will be implemented at the respective location(s) in the project area to ensure dust levels are controlled as far as possible.

## Annexure 11: Site Specific EMP (SSEMP) Guide & Template for Guidance to Contractor

### Guide for Development of SSEMP

- Step 1: Define Boundaries
- Step 2: Identify Sensitive Receptors
- Step 3: Specify construction activities
- Step 4: Conduct Risk Assessment
- Step 5: Assign Environment Management measures
- Step 6: Prepare Site Plans
- Step 7: Prepare Environment Work Plans (if required)
- Step 8: Monitoring

**Step 1:** The project area needs to be clearly defined.

**Step 2:** The mapping of sensitive receptors has already been conducted and needs to be presented clearly in a map.

**Step 3:** The tentative construction activities to be conducted are as follows:

- Site Surveying and Vegetation (Trees and plants) Clearance
- Establishment of Work Camp, Batching and Asphalt plant and access roads
- Dismantling of Asphalt and existing structures including Utilities
- Preparation of ground for Asphaltting
- Asphaltting
- Landscaping

**Step 4:** The Risk Assessment matrix template is provided in the table below.

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

**Risk = Likelihood × Consequence**

### Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventative measures are not applied	3
Unlikely	May occur once or twice during the activity if preventative measures are not applied	2
Rare	Unlikely to occur during the project	1

### Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding community e.g. extreme loss of soil and water resources and quality from stormwater runoff extreme pollution of soil and water resources including major contamination from hazardous materials widespread effects on ecosystems with deaths of fauna/flora widespread community impacts resulting in illness, injury or inconvenience loss or destruction of archaeological or historical	5



	sites Occurrence will almost certainly result in the work being halted and a significant fine.	
Major	The action will cause major adverse damage on the environment or surrounding communities' e.g. major loss of soil and water resources and quality from stormwater runoff major pollution of soil and water resources including contamination from hazardous materials significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna significant annoyance or nuisance to communities major damage to or movement required to archaeological or historical sites Occurrence may result in work being halted and a fine	3
Moderate	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	2
Minor	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	1

### Risk Score Table

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
	Certain	25	15	10	5
	Likely	15	9	6	3
	Unlikely	10	6	4	2
	Rare	5	3	2	1

**Risk: Significant: 15-25**

**Medium: 6-10**

**Low 1-5**

Any Medium to Significant risk requires an environmental management measure to manage the potential environmental risk. Judgement will be required concerning the application of an environmental management measure to mitigate low risk situations.

The higher the risk the more intensive the required mitigation measure will need to be; e.g. where site sedimentation is deemed to be low risk, then silt fences may be needed but as the risk increases, then sediment traps may be required. The selection of the appropriate

mitigation measure will require judgement based on the level of risk and the specific site parameters.

**Step 5:** The Environmental Management measures are to be extracted from the IEE study for the project and should be added in the last column of the table below.

No.	Construction Activity	Hazards to Consider	Likelihood that the site or sensitive receptors will be affected?	Consequence of the site or sensitive receptors being affected?	Risk Score (consequence x likelihood)	Environmental Management Measures
i	Site Surveying & vegetation clearance	Damage to vegetation beyond project footprint				These can be taken from the EMP provided in the IEE report (If Risk Score is 6 or more)
		Erosion of exposed areas and sediment				
		Loss of topsoil				
		Dust generation				
		Noise				
ii	Establishment of Work Camp, Batching plant etc.	Soil deposited onto roads from tires				
		Stock Pile erosion				
		Noise & Vibration				
		Traffic congestion				
		Fuel spills				
iii	Dismantling of Asphalt and existing structures including Utilities	Noise and vibration				
		Dust generation				

		Community safety				
		Worker safety				
		Traffic Congestion				
iv	Preparation of Sub-Base	Noise and vibration				
		Dust generation				
		Traffic Congestion				
vi	Landscaping	Dust generation				
		Sediment runoff				
		Failure of vegetation to take root				

**Step 6:** The Site plans are a critical part of the SEMP and will need to be prepared, otherwise the ADB will consider the document as incomplete.

The site plan will need to provide the following:

- Indication of North and scale
- Existing and planned supporting infrastructure (e.g. access roads, water supplies and electricity supplies)
- Location of planned work
- Contours
- Drainage systems
- Locations of sensitive receptors

**Step 7 (if required)<sup>54</sup>:** The completed SEMP provides details of all the environmental management requirements for all stages of the construction process. For individual work teams who are responsible for only a small part of the overall construction works it can be confusing as to what is required for their particular work component. For example, the work team responsible for stripping soil for the construction areas are not going to be interested in the requirements for pouring concrete for footings and foundations. However, it is essential that the soil stripping team knows exactly what to clear and what to leave, as well as where to put stockpiles of soil for later use.

In situations where different work activities are required at different times or at different locations, environmental work plans can be prepared. These are similar to the work method statements that are often produced for major construction projects.

**Step 8:** A detailed monitoring plan will be provided along with frequency and responsibilities to ensure all key environmental parameters are monitored to ensure compliance with both national and ADB requirements.

#### Template for SEMP

- Introduction
- Project Overview
- Scope of SEMP
- Objectives of SEMP
- Map of Sensitive Receptors
- Construction Activities
- Risk Assessment
- Risk Assessment Matrix & Mitigation Measures
- Site Plan(s)
- Environmental Monitoring Plan
- Instrumental Monitoring of Environmental Parameters by Contractor as per EMP
- In-house monitoring
- Third Party environmental monitoring
- Visual monitoring of Environmental Parameters by Contractor as per EMP
- Responsibilities
- Organizational Responsibilities and Communication
- Responsibility of EA
- Responsibility of Construction Supervision Consultant (CSC)
- Responsibility of Contractor
- Responsibility of EPA

<sup>54</sup> ADB, Safeguards Unit for Central & West Asia Department, *Environmental Management for Construction Handbook*.

## Annexure 12: Accident and Incident Investigation Procedure

<b>INCIDENT / NEAR MISS REPORT</b>	<b>QUALITY RECORDS / FORMS</b>
Doc. Level:	Doc. Version: 1
Doc. No	

<b>HS.T.02</b>	<b>INCIDENT / NEAR MISS REPORT</b>
Title of Project:	
Location:	Date:

<b>Objective(s)</b>
To implement immediate and effective process in order to provide immediate treatment against any fatality, Injuries, Casualty.

**SECTION A: TO BE COMPLETED BY PERSON INVOLVED (OR BY SUPERVISOR OR HEALTH AND SAFETY REPRESENTATIVE IF WORKER IS INCAPACITATED) AND BY THEIR SUPERVISOR**

Details of the person involved in the incident/near miss

Employee #: ..... Site Address: ..... Work phone: .....

Name: ..... Father Name: .....

Position: ..... Date of birth: ..... ☐ Male ☐ Female

Please select one: ☐ Member ☐ Client Member ☐ Sub Contractor ☐ Visitor/Other

Details of the: ☐ Incident ☐ Near miss ☐ Medical

Date: ..... Time: ..... A.M /P.M

City: ..... Location: .....

Was the incident/near miss reported to your supervisor, immediately: ☐ Yes ☐ No

Part of the body injured

<b>Head</b> <input type="checkbox"/> neck <input type="checkbox"/> hip <input type="checkbox"/> nose <input type="checkbox"/> mouth <input type="checkbox"/> teeth <input type="checkbox"/> face <input type="checkbox"/> skull	<b>Trunk</b> <input type="checkbox"/> heart <input type="checkbox"/> lungs <input type="checkbox"/> chest <input type="checkbox"/> stomach <input type="checkbox"/> groin <input type="checkbox"/> back <input type="checkbox"/> multiple	<b>Internal</b> <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> systemic	<b>Arm</b> <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> shoulder <input type="checkbox"/> upper arm <input type="checkbox"/> elbow <input type="checkbox"/> forearm <input type="checkbox"/> wrist	<b>Hand</b> <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> thumb <input type="checkbox"/> fingers <input type="checkbox"/> palm	<b>Leg</b> <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> knee <input type="checkbox"/> lower leg <input type="checkbox"/> ankle <input type="checkbox"/> thigh <input type="checkbox"/> upper leg	<b>Foot eye</b> <input type="checkbox"/> ear <input type="checkbox"/> great toe <input type="checkbox"/> other toes  <input type="checkbox"/> psychosocial
--	--	---	--	---	--	---

Nature of injury

<input type="checkbox"/> abrasion <input type="checkbox"/> bruise <input type="checkbox"/> fracture <input type="checkbox"/> concussion	<input type="checkbox"/> puncture <input type="checkbox"/> laceration <input type="checkbox"/> amputation <input type="checkbox"/> bite	<input type="checkbox"/> heart attack <input type="checkbox"/> hearing loss <input type="checkbox"/> foreign body <input type="checkbox"/> minor cuts	<input type="checkbox"/> sprain <input type="checkbox"/> strain <input type="checkbox"/> hernia	<input type="checkbox"/> burn <input type="checkbox"/> scald <input type="checkbox"/> rash <input type="checkbox"/> allergy	<input type="checkbox"/> traumatic shock <input type="checkbox"/> electric shock <input type="checkbox"/> psychosocial <input type="checkbox"/> chemical
--	--	--	---	--	---

☐ aggravation of previous injury or medical condition (please describe): .....

Type of incident which caused injury

<input type="checkbox"/> striking against <input type="checkbox"/> struck by <input type="checkbox"/> caught in/on <input type="checkbox"/> stepping on <input type="checkbox"/> other (please describe): .....	<input type="checkbox"/> stumbling <input type="checkbox"/> slipping <input type="checkbox"/> tripping <input type="checkbox"/> falling	<input type="checkbox"/> lifting <input type="checkbox"/> bending <input type="checkbox"/> twisting <input type="checkbox"/> stress	<input type="checkbox"/> pushing <input type="checkbox"/> pulling <input type="checkbox"/> jumping <input type="checkbox"/> vehicle	<input type="checkbox"/> ingestion <input type="checkbox"/> absorption <input type="checkbox"/> inhalation <input type="checkbox"/> needlestick
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## Annexure 13: Traffic Management Plan

### Need for Plan

The construction of the Landfill will take over 24 months and in this period, huge vehicular movement carrying large amount of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

### The plan

The Objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

- The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such as tipping areas and wash-out areas. It is intended to compliment and work alongside relevant ESMMP. The TMP will be classed as “live” and therefore be subjected to updates as required.
- Contractor, at the time of the execution of the project will prepare a comprehensive TMP in coordination with local traffic police department, PMU, emergency services and local administrative department. The PMU and CSC will review and approve contractors TMP. The contractor’s TMP shall include following mitigation measures during its preparation:
- Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project construction.
- Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.
- Spoil dumpsites located close to Project site to minimize journey distance and limit movements to site access roads.
- Concrete mixing plant located at Project site limiting traffic movements associated with concrete delivery to site access roads
- Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site
- Provision of bus/minibus services for personnel living in nearby settlements
- Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.
- Schedule deliveries and road movements to avoid peak periods
- Road maintenance fund to leave a useful asset for communities after the construction phase.
- Driver training for HGV drivers and refresher course every six months for Project drivers
- Speed restrictions for project traffic travelling through communities (to be agreed with Traffic Management Authority)
- Run a safety campaign to improve the people’s knowledge of the traffic hazard on their roads, public information and other activities to address the issues.
- Run a pedestrian awareness programme

- Temporary signage
- The traffic management plan is provided below.
- Other Recommendations

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the project site would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

- Public Access Routes
- The use of public road for site access may be restricted in terms of:
- Vehicle size, width and type of load
- Time limits
- Parking
- Pedestrian conflicts
- Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

### **Site Workers Traffic**

Site personnel should not be permitted to park vehicles near the site boundary; this will lead to disruption in material deliveries. Designated parking area with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

### **Site Rules**

- Access to and from the site must be only via the specified entrance.
- On leaving the site, vehicles must be directed to follow the directions given.
- Drivers must adhere to the site speed limits.
- All material deliveries to site must keep allocated time limits.
- No material or rubbish should be left in the loading-unloading area.
- Develop a map for alternate routes showing material delivery services.
- Assign designated personnel on site to receive deliveries and to direct the vehicles.
- Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.
- Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the project.

### **Contractor's Obligation**

The traffic management plan of the Contractor should be safe enough and widening of access roads and construction of the detours must be completed before start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. While widening the access roads, the safe movement of the vehicles, people, animals and wildlife must be ensured. It will be sole responsibility of

Contractor. The roads widening should be designed on the basis of the traffic survey, summarized and estimated site traffic. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, PMU, emergency services and Traffic Police, and also publish weekly programme in local newspapers.

## Annexure 14: Solid Waste Management Framework

### INTRODUCTION

Construction contractors may use this framework as guiding document for preparation of site specific solid waste management plan. The purpose of this Framework Solid Waste Management Plan is to ensure that wastes arising from the proposed construction works are managed, reused, recovered or disposed of by a method that ensures the provisions of the BEPA rules and ADB SPS, 2009. It also ensures that the optimum levels of waste reduction, re-use and recycling are achieved.

Waste management priorities for project are based following waste management hierarchy.

- Prevent material wastage
- Minimise the quantity of waste
- Reuse of site materials
- Recycling of waste
- Energy recovery
- Disposal
- 

### WASTE MANAGEMENT AT Balochistan Project sites

#### National Level

Waste management of the project will be carried as per national rules including:

- Solid Waste Management Policy, 2000
- Requirements of Balochistan Environmental Protection Act
- Draft Guidelines on Solid Waste Management, 2005.
- Section 11 of PEPA, 1997 prohibits discharge of waste in amount that violates the NEQS.
- Draft Hazardous Substances rule of 1999
- Section 132 of Cantonment Act, 1942
- Provision Contains in the Local Government Ordinance, 2001

#### Regional Level

- Asian Development Bank (ADB) SPS, 2009
- IFC guidelines for Solid Waste Management
- Best practices of waste management on construction sites

### Details of the wastes to be produced

During construction/civil works, potential sources of waste will include spoils generated during excavation, concrete and construction waste, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills. It is the responsibility of all personnel on site including Contractors, Sub-Contractors and their Employees to ensure compliance with this Waste Management Plan.

### Main Waste Categories

Contractors are required to develop inventory of main waste categories that will be generated during construction phase of the project. Anticipated main waste categories include construction debris, concrete waste, scrap wood, bricks, concrete, asphalt, plumbing fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents.

### Anticipated Hazardous Waste Arising

Fuels stored on site that will be used during the construction phase are classed as hazardous. There will be fuel stored on site for machinery and construction vehicles. All fuel tanks and draw off points will be banded. If the fuel is correctly contained and banded, it is not expected that there will be any fuel wastage at the site. Other sources of hazardous waste include used paints, used oil/lubricants, electrical waste and chemicals. Project contractors are required to develop SOPs for handling, storage and disposal of hazardous waste arising from the project.

## **ESTIMATED WASTE GENERATION**

### **Construction Waste Generation**

Project contractors are required to develop and maintain waste inventory clearly showing the type, amount and location of waste generated from different activities at the site. Waste record keeping is key to successful implementation of waste management plan.

### **Proposed Waste Management Options**

Waste will be segregated on site. Contractor will ensure that sufficient number of waste drums are placed at site with appropriate color coding. All recyclable waste will be handed over to recycling contractor. The appointed waste contractor will collect and transfer the recyclable wastes as receptacles are filled. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility. Project contractors will identify both recycling and non-recycling contractor working in the project area. Contractors through bidding documents will be bound to hire such waste contractors for efficient waste management at project sites.

A successful Waste Management Plan is largely dependent on how readily it can be changed in to normal site operations by the person responsible. It is recognized that the plan should not be obstructive to site operations and the construction program by placing the responsibility of construction waste management with the Manager, all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible. An Environmental Representative from each Works Sub-Contractor will also be nominated responsible for all waste management in their own operations. In this way, it is possible to identify where the greatest material wastage occurs, with a view to implementing better management.

The site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan. The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in this framework for solid waste management are performed on an on-going basis.

### **Tracking and documentation procedures for off-site waste**

The site construction Manager will maintain a copy of all waste collection permits. If waste (soil & stone) is being accepted on-site, a waste docket must be issued to the collector. If the waste is being transported to another site, a copy of the waste permit for that site must be provided to the manager. Record of waste collection docket, a receipt from the final destination of the material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

### **Disposal Waste**

Contractors are required to develop SOP for disposal of recyclable, non-recyclable and hazardous waste generated at site. Food waste will be disposed at food waste pit which will be fenced. Recycling waste will be handed over to recycling waste contractor. Hazardous waste will be disposed through incineration facility available in close proximity of the project

area. Workers on the site will be encouraged to recycle as much municipal waste as possible i.e. cardboard, plastic, metals and glass. Prior to removal, the municipal waste will be examined to determine if recyclable materials have been placed in other containers. If this is the case, effort will be made to determine the cause of the waste not being segregated correctly.

### **ESTIMATED COST OF WASTE MANAGEMENT**

Contractors are required to estimate and budget cost for waste management through BOQ items. Such waste management cost should include cost of waste drums, cost of waste handling crew, cost of waste transportation, cost of EPA approved waste contractor services and associated incineration costs if any. By reusing materials on site, there will be reduction in transport and disposal costs for a waste contractor taking the material away.

### **TRAINING PROVISIONS FOR WASTE MANAGER AND SITE CREW**

A waste manager will be appointed or designated by construction contractors to ensure commitment, operational efficiency and accountability during the project execution.

#### **Site Manager Training and Responsibility**

The waste manager will be given responsibility and authority to select a waste team if required i.e. members of the site crew that will aid him in the organization, operation and recording the waste management system implemented on-site. The waste manager will have overall responsibility to oversee record and provide feedback to the CSC on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors where necessary and to co-ordinate with suppliers, service providers and sub-contractors to prioritize waste prevention and salvage. The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on-site. He will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and know how to implement this Framework for Solid Waste Management.

#### **Site Crew Waste Management Training**

Training of the site crew is the responsibility of the waste manager and as such, a waste training program should be organized. A basic awareness course will be held for all crew to outline the construction waste management plan and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g. general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

### **RECORD KEEPING**

Records will be kept for each waste material which leaves the site, either for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site. The waste manager or delegate will record the following:

- Waste taken off-site for reuse
- Waste taken off-site for recovery
- Waste taken off-site for recycling
- Waste taken off-site for disposal
- Waste (soil & stone) accepted on-site for recovery

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material



type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

### **OUTLINE WASTE AUDIT PROCEDURE**

Contractors are required to develop SOP for waste auditing at the construction sites. Such SOP should reflect frequency and types of waste audits, audit criteria and way forward to close non-compliances.

#### **Responsibility for Waste Audit**

The appointed waste manager will be responsible for conducting a waste audit at the site during project execution.

#### **Review of Records and Identification of Corrective Actions**

A review of all the records for the waste generated and transported off-site, as well as waste accepted, should be undertaken. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed. Upon completion of the construction phase a final report will be prepared summarizing the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

### **CONSULTATION WITH RELEVANT BODIES**

#### **Local Authority**

Project contractors are required to maintain close coordination with focal government departments/agencies to ensure that all available waste reduction, re-use and recycling opportunities are identified and utilized.

## Annexure 15: WHO advice on Use of Masks for the COVID-19 Virus

Advice on the use of masks in the context of COVID-19: interim guidance

masks away from those in health care who need them most, especially when masks are in short supply.

### Persons with symptoms should:

- wear a medical mask, self-isolate, and seek medical advice as soon as they start to feel unwell. Symptoms can include fever, fatigue, cough, sore throat, and difficulty breathing. It is important to note that early symptoms for some people infected with COVID-19 may be very mild;
- follow instructions on how to put on, take off, and dispose of medical masks;
- follow all additional preventive measures, in particular, hand hygiene and maintaining physical distance from other persons.

### All persons should:

- avoid groups of people and enclosed, crowded spaces;
- maintain physical distance of at least 1 m from other persons, in particular from those with respiratory symptoms (e.g., coughing, sneezing);
- perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- cover their nose and mouth with a bent elbow or paper tissue when coughing or sneezing, dispose of the tissue immediately after use, and perform hand hygiene;
- refrain from touching their mouth, nose, and eyes.

In some countries masks are worn in accordance with local customs or in accordance with advice by national authorities in the context of COVID-19. In these situations, best practices should be followed about how to wear, remove, and dispose of them, and for hand hygiene after removal.

### Advice to decision makers on the use of masks for healthy people in community settings

As described above, the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks. WHO offers the following advice to decision makers so they apply a risk-based approach.

Decision makers should consider the following:

1. **Purpose** of mask use: the rationale and reason for mask use should be clear—whether it is to be used for source control (used by infected persons) or prevention of COVID-19 (used by healthy persons)
2. Risk of **exposure** to the COVID-19 virus in the local context:
  - The population: current epidemiology about how widely the virus is circulating (e.g., clusters of cases versus community transmission), as well as local surveillance and testing capacity (e.g., contact tracing and follow up, ability to carry out testing).
  - The individual: working in close contact with public (e.g., community health worker, cashier)
3. **Vulnerability** of the person/population to develop severe disease or be at higher risk of death, e.g. people with comorbidities, such as cardiovascular disease or diabetes mellitus, and older people

4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility**: availability and costs of the mask, and tolerability by individuals
6. **Type** of mask: medical mask versus nonmedical mask (see below)

In addition to these factors, potential advantages of the use of mask by healthy people in the community setting include reducing potential exposure risk from infected person during the “pre-symptomatic” period and stigmatization of individuals wearing mask for source control.

However, the following potential risks should be carefully taken into account in any decision-making process:

- self-contamination that can occur by touching and reusing contaminated mask
- depending on type of mask used, potential breathing difficulties
- false sense of security, leading to potentially less adherence to other preventive measures such as physical distancing and hand hygiene
- diversion of mask supplies and consequent shortage of mask for health care workers
- diversion of resources from effective public health measures, such as hand hygiene

Whatever approach is taken, it is important to develop a strong communication strategy to explain to the population the circumstances, criteria, and reasons for decisions. The population should receive clear instructions on what masks to wear, when and how (see mask management section), and on the importance of continuing to strictly follow all other IPC measures (e.g., hand hygiene, physical distancing, and others).

### Type of Mask

**WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.**

The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is no current evidence to make a recommendation for or against their use in this setting.

WHO is collaborating with research and development partners to better understand the effectiveness and efficiency of nonmedical masks. WHO is also strongly encouraging countries that issue recommendations for the use of masks in healthy people in the community to conduct research on this critical topic. WHO will update its guidance when new evidence becomes available.



In the interim, decision makers may be moving ahead with advising the use of nonmedical masks. Where this is the case, the following features related to nonmedical masks should be taken into consideration:

- Numbers of layers of fabric/tissue
- Breathability of material used
- Water repellence/hydrophobic qualities
- Shape of mask
- Fit of mask

## Home care

For COVID-19 patients with mild illness, hospitalization may not be required. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to follow local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness.<sup>7</sup>

Home care may also be considered when inpatient care is unavailable or unsafe (e.g. capacity is limited, and resources are unable to meet the demand for health care services). Specific IPC guidance for home care should be followed.<sup>3</sup>

### Persons with suspected COVID-19 or mild symptoms should:

- Self-isolate if isolation in a medical facility is not indicated or not possible
- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 m from other people;
- Wear a medical mask as much as possible; the mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e. cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene.)
- Avoid contaminating surfaces with saliva, phlegm, or respiratory secretions.
- Improve airflow and ventilation in their living space by opening windows and doors as much as possible.

### Caregivers or those sharing living space with persons suspected of COVID-19 or with mild symptoms should:

- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 meter from the affected person when possible;
- Wear a medical mask when in the same room as the affected person;
- Dispose of any material contaminated with respiratory secretions (disposable tissues) immediately after use and then perform hand hygiene.
- Improve airflow and ventilation in the living space by opening windows as much as possible.

## Health care settings

WHO provides guidance for the use of PPE, including masks, by health care workers in the guidance document: Rational use of PPE in the context of COVID-19.<sup>24</sup> Here we provide advice for people visiting a health care setting:

### Symptomatic people visiting a health care setting should:

- Wear a medical mask while waiting in triage or other areas and during transportation within the facility;
- Not wear a medical mask when isolated in a single room, but cover their mouth and nose when coughing or sneezing with disposable paper tissues. Tissues must be disposed of appropriately, and hand hygiene should be performed immediately afterwards.

### Health care workers should:

- Wear a medical mask when entering a room where patients with suspected or confirmed COVID-19 are admitted.
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health-certified N95, European Union standard FFP2, or equivalent, when performing or working in settings where aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy are performed.
- Full infection prevention and control guidance for health care workers is provided [here](#).

One study that evaluated the use of cloth masks in a health care facility found that health care workers using cotton cloth masks were at increased risk of infection compared with those who wore medical masks.<sup>25</sup> Therefore, cotton cloth masks are not considered appropriate for health care workers. As for other PPE items, if production of cloth masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the proposed PPE according to specific minimum standards and technical specifications.

## Mask management

For any type of mask, appropriate use and disposal are essential to ensure that they are effective and to avoid any increase in transmission.

The following information on the correct use of masks is derived from practices in health care settings:

- Place the mask carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the mask.
- Avoid touching the mask while wearing it.
- Remove the mask using the appropriate technique: do not touch the front of the mask but untie it from behind.
- After removal or whenever a used mask is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace masks as soon as they become damp with a new clean, dry mask.
- Do not re-use single-use masks.
- Discard single-use masks after each use and dispose of them immediately upon removal.



WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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