

Initial Environmental Examination

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August 2023

Pakistan: National Disaster Risk Management Fund

Restoration & Rehabilitation of Flood Damaged Water Conservation Structures in
Irrigation Division Quetta

Prepared by National Disaster, Risk Management Fund, Planning, Development & Special Initiatives
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CURRENCY EQUIVALENTS

As of August, 2023
Pak Rs 1.00 = \$ 0.00349

Currency Unit 3 Pak Rupees (Pak Rs.)
US\$1.00 = Pak Rs. 286..7267

CONVERSIONS

1 meter = 3.28 feet
1 hectare = 2.47 acre
1 kanal = 0.125 acre

NOTE

In this report, "\$" refers to US dollar



**IRRIGATION DEPARTMENT
GOVERNMENT OF BALOCHISTAN**

**RESTORATION & REHABILITATION OF FLOOD DAMAGED WATER CONSERVATION
STRUCTURES IN IRRIGATION DIVISION QUETTA**



INITIAL ENVIRONMENTAL EXAMINATION REPORT

August 2023



Rehman Habib Consultants (Pvt.) Limited

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RESTORATION & REHABILITATION OF FLOOD DAMAGED WATER CONSERVATION STRUCTURES IN IRRIGATION DIVISION QUETTA PROJECT

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ACRONYMS

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
H ₂ S	Hydrogen Sulphide
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
NO _x	Oxides of Nitrogen
NTU	Nephelometric Turbidity Unit
PEPA	Pakistan Environmental Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PHE	Public Health Engineering Department
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
REA	Rapid Environmental Assessment
RHCs	Rural Health Centers
SOx	Oxides of Sulfur
SPS	Safeguard Policies
SC	Supervision Consultants
TA	Technical Assistance
TCI	Techno Consult International
TDS	Total dissolved solids
TSS	Total Suspended Solids
UNEP	United Nation Environment Program
VOCs	Volatile Organic Compounds
WHO	World Health Organization
WUA	Water User Association

EXECUTIVE SUMMARY

A. INTRODUCTION

1. This report presents the findings of an Initial Environmental Examination (IEE) study for the proposed project, which is the Restoration & Rehabilitation of Flood Damaged Water Conservation Structures in Irrigation Division, Quetta. 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 Executive Agency (EA).

2. The project is located in district Quetta, where the water level is rapidly falling due to excessive withdrawal from the ground aquifer. The streams flowing into Quetta valley from the surrounding hills have very steep slopes, causing their discharge to run too fast over the ground surface, resulting in less seepage into the ground. Additionally, the valley is under severe threat of flooding during heavy rains. The flash floods received from high-rise hills, namely Chiltan, Murdar, Talmtu and Zarghoon hills surrounding Quetta valley, cause devastation in almost the entire area of the project due to their high velocity and magnitude. To address these issues, the Balochistan Irrigation Department (BID) had already constructed water conservation structures and flood mitigation works in the valley. However, they suffered severe damage during the unprecedented rainfall in July to August, 2022 with most of the water conservation structures and flood mitigation works being damaged.

3. In the present activity, the BID intends to ensure the sustainable restoration/rehabilitation of water conservation structures and flood mitigation works.

4. Main components of the project include;

- a) Restoration of Water Conservation Structures (Small Dams, Check Dams, Delay Action Dams, Spillways, Outlet Works)
- b) Restoration of River Training / Flood mitigation structures

B. Project Categorization

5. According to ADB Safeguard Policy Statement 2009, (SPS) projects are to be categorized into three environmental categories; A, B or C. All the anticipated adverse environmental impacts of the project are mitigable, temporary, nature and localized. Also, there is no environmentally sensitive or archaeological site falling within project area of influence; therefore the project is classified as Category B as per ADB SPS.

6. The EIA / IEE regulations of 2000 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" of Schedule I and hence the environmental study is conducted and an IEE report is being prepared.

C. Policy Legal and Administrative Framework

7. This report represents in accordance to 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.

Occupational health & safety of the local population should also be addressed as well as the project workers as stated in SPS, 2009. As this project falls in the jurisdiction of Balochistan EPA (BEPA), therefore approval from the provincial EPA will be required.

D. DESCRIPTION OF PROJECT

8. This project will be implemented for restoration and rehabilitation of 11 dam 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 Table 1 below.

Table 1: Dams and damage nomenclature

Sr. No.	Structure Description/Sub Type	District	Location/ Coordinates	Name (Damage Nomenclature)
1	Spin Karez Dam Quetta	Quetta	30 ° 13'13.34" N 67 ° 08'20.03" E	Spillway damaged
2	Mandoki Check Dam Quetta	Quetta	30 ° 08'34.72" N 66 ° 43'57.85" E	Dam body breached
3	Small Dam Aghberg	Quetta	30 ° 11'30.52" N 67 ° 47'45.54" E	Spilway damaged
4	Ghundak Karez Check Dam	Quetta	30 ° 21'37.46" N 67 ° 08'11.05" E	Spilway collapsed, partial damages in dam body
5	Khalaka Check Dam Jalogeer Kuchlak	Quetta	30 ° 26'25.81" N 66 ° 55'14.26" E	Spilway damaged
6	Murghi Kotal Dam Kuchlak	Quetta	30 ° 19'04.39" N 66 ° 56'38.54" E	D/S Dam Body and Spilway Partial Damage
7	Shagai-I DAD	Quetta	30 ° 12'58.70" N 67 ° 04'20.66" E	Dam Body Settlement, Cracks, Excessive Seepage
8	Shagai-II DAD	Quetta	30 ° 12'44.60" N 67 ° 04'16.66" E	Dam Body Settlement, Cracks, Excessive Seepage
9	Habib Dara-II	Quetta	30 ° 11'35.32" N 67 ° 04'14.70" E	Breached
10	Barwery Delay Action Dam (Karkasha Dam)	Quetta	30°10'37.13" N 66°56'4.56" E	Partial Damage Spilway & Dam Body Cracks
11	Kach Delay Action Dam	Quetta	30°18'44.56" N 67°05'0.73" E	Dam Body Damaged

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

- a) Restoration of Water Conservation Structures (Small Dams, Check Dams, Delay Action Dams, Spillways, Outlet Works)
- b) Restoration of River Training / Flood Mitigation Structures

E. PROJECT ALTERNATIVES

10. No project option and the project for restoration and rehabilitation of Water Conservation Structures were compared. It was found that the "No project" option maintains the status quo, leaving the district Quetta 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 area is mountainous. The mountains are intersected by long narrow valleys consisting of flat alluvial plain with heavy pebbly slopes rising on either side. The general elevation of the district is about 1,200 to 3,500 meters above mean sea level, while the elevation of project area ranges from 1,600 to 1,700 meters.
- **Soil:** The central part of the Quetta valley is covered by a soil that ranges from sandy loam to silt loam. This type of soil is good for crop production. At the margin of the valley near foothills, the soil consists of sandy loam, mixed with pebbles and rock fragments and is suitable for vegetation.
- **Rivers and Streams:** There is no perennial river in the district. The Quetta Lora stream comes out near Sariab and traverses the western side of Quetta valley. Water of Quetta Lora is used for irrigation in villages like Khazi, Samungli and Nohsar. Hanna stream is one of the important sources of drinking and irrigation water in the district. It enters in Quetta valley near the Staff College and drains its northern parts. The Hanna stream is joined by the Sora Khula and Ghundak Rud Nalla above Sheikmanda village.
- **Ground Water¹:** The population of Quetta city has increased from 0.26 million in 1975 to 3.0 million in 2016, causing an increased burden on groundwater and now it is depleting at an alarming rate of 1.5–5.0 m/year in certain parts of the city. The Quetta valley comprises of two types of aquifers: the alluvial aquifer and the limestone aquifer. The issue of unmanaged groundwater depletion is present in many areas of Quetta city. The alluvial and limestone aquifers in the Quetta valley were depleted after two decades of heavy use from hundreds of illegal tube wells and agricultural wells.
- **Precipitation:** The average annual rainfall of Quetta is about 183.98 mm, while on average, the maximum monthly rainfall is 42.04 mm during the month of February and a minimum of 1.44 mm in July.
- **Ambient Air Quality:** Air quality in the project area is fairly clean as compared within Quetta city because project sites are situated in the outskirts of Quetta city, where there are minimal pollution sources. As a result, the air remains clean. The major source of air pollution are vehicular emissions on the road,

¹ Qureshi, A. L., Jamali, M. A., Hussain, S., Memon, F. A., Zaidi, A. Z., Zafar, S., & Ahmed, W. (2022). Subsurface depleting aquifers in the sedimentary terrain of Quetta Valley in Balochistan: a review. *Arabian Journal of Geosciences*, 15(21), 1648.

dust arising from wind and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or katcha access roads.

- **Ambient Noise:** The noise levels in the project area are lower than the permissible limits of NEQS and WHO as depicted by monitoring results. There are no potential sources of noise as the project sites are located at the outskirts of the city.
- **Flora:** The flora of district Quetta comprises Obusht Apurs or (Juniperous excelsa polycarpus), Wild Ash (Fraxinus Xanthoxyloides), Shinay or Wild pistachio (pistatio khinjjak), Surai (Rosa beggeriana), Anjir (Ficus johannis). Flora of sub-Project area also includes Almond. Apple, apricot, grapes, pomegranates, Chinar, Euclayptus, Ber (Zizyphus nummularia), Phulai (Acacia modesta), Makhi (Caragana ambigua), Tamarix sp. And Saccharam sp.
- **Fauna** of district Quetta includes Mammals: red fox(*Vulpes vulpes*),, Afghan fox(*Vulpes cana*), Asian jackal(*Canis aureus*), Striped hyena(*Hystrix indica*), Indian crested porcupine(*Hystrix indica*), Cape hare(*Lepus capensis*), Hedgehog(*Erinaceus europaeus*), Migratory Hedgehog (*Erinaceus algirus*), Beech or stone marten(*Martes foina*), Marbled pole cat(*Vormela peregusna*), Afghan pika(*Ochotona rufescens*), House mouse(*Mus musculus*), Long - tailed hamster(*Mesocricetus caudatus*), Grey hamster(*Cricetulus migratorius*), Persian jird(*Meriones persicus*) etc. Birds: Accentor (*Prunella spp*), Bulbul(*Pycnonotidae family*), Bunting(*Emberiza spp*), Chat(*Saxicola spp*), Chough(*Pyrrhocorax spp*), Chukar partridge(*Alectoris chukar*), Eagle(*Aquila spp*), Falcon(*Falco spp*), Lark(*Alaudidae family*), Magpie(*Pica spp*), Owl(Strigiformes order, various families and species), Shrike(Laniidae family), See partridge(*Alectoris graeca*), Vulture(Accipitridae family, various species) etc. Reptiles: Lizards (Agama, Monitor), Afghan Tortoise (Agrionemys horsfieldii), Saw-scale viper (Echis carinatus), Levantine viper (Macrovipera lebetina), etc.
- **Aquatic Ecology:** District Quetta is characterized by its arid climate and mountainous terrain, which limit the presence of natural aquatic ecosystems. There are no perennial rivers. Water sources are typically limited to seasonal hill torrents/streams that are fed by melting snow from the nearby mountains during the spring and summer months. These water bodies flow temporarily after rainfall or snowmelt, but they are not perennial in the sense of flowing year-round, resulting in a non-existent aquatic ecology.
- **Population Size and Growth:** The population of Quetta district according to census 2017 is 22,756,99, which was 773,936 in 1998 as compared to 381,570 in 1981, recording an increase of 99.16 percent over the last 17 years.
- **Castes & Tribes: Major** casts and tribes of the project area are Raisani, Mengal, Kakar, Bazai, Pirkani, Barech, Pashtoon, Muhammad Shahi, Syed, Khilji, Kiyazai and Muhammad Hassani.
- **Mother Tongue:** The predominant mother tongues of population of the district are Pashto and Bullochi, spoken by 57.54 percent of the total population followed by others at 17.46 percent and Punjabi at 16.01 percent.
- **Agriculture:** There are two cropping seasons in Quetta district, kharif and rabbi. The important rabbi crops are wheat, barley, cumin, vegetables and fodder. The crops grown during kharif are vegetables, potato, melon, fodder,

onion etc.

- **Source of Drinking Water:** In the project area, the major source of drinking water are springs, tube wells, and dam reservoirs.
- **Irrigation:** Tube well are also major source of irrigation in district Quetta in addition to surface water. Flood irrigation, Perennial irrigation schemes and Small delay action dams and flood protection work are irrigation schemes that have been initiated in Quetta district.
- **Health:** Specifically, the basic healthcare facilities in the project area are insufficient. Basic Health Units (BHU) are only present in the areas of Murghi Kotal Delay Action Dam and Kach Delay Action Dam. On the other hand, the population of Karkasa Dam and Berwery Dam have access to the T.B Hospital and Bolan Medical College Hospital.
- **Education:** There are 4 primary schools for boys, 5 primary schools for girls, 3. Middle schools for boys and 2 for girls present in the settlements close to the project area. Furthermore, a degree college is also located in the settlement of Murghi Kotal Delay Action Dam.
- **Livestock:** A minor but a sizeable proportion of the rural population is engaged in livestock rearing activities. In urban areas, dairy farms are maintained for commercial purpose.
- **Important/ Historical places of Quetta City:** Hazarganji Chiltan National park (7Km from Small Dam Aghberg), Karkhasa, Urak Valley (11.30 Km from Kach Delay Action Dam), Hanna Lake(5Km from Spin Karez Dam) and Askari Park(6.5 Km from Shagai-1 Delay Action Dam) are important historical and recreational places of the Quetta City.

G. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

H. Impact Assessment Methodology

11. The procedure for determining the level of risk associated with each potential impact has been described in Table 2 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. Impact Assessment Matrix is provided below

Table 2: Impact Assessment Matrix

Activity	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
Design Phase				
Seismicity	Likely	Major	Medium	Low
Flooding	Likely	Major	High	Low
Construction Phase				
Soil Contamination	Likely	Major	Medium	Low
Soil erosion/ silt run-off	Likely	Major	Medium	Low
Disposal of spoil	Likely	Major	Medium	Low
Use of local water resources	Likely	Moderate	Medium	Low
Contamination of water resources	Likely	Moderate	Medium	Low
Air Pollution	Certain	Moderate	Medium	Low
Noise	Likely	Major	Medium	Low

Vibration	Likely	Minor	Low	Low
Flora	Likely	Minor	Medium	Low
Fauna	Likely	Moderate	Medium	Low
Impact on local communities and work force	Likely	Major	Medium	Low
Contractor Mobilization: Campsite & Equipment Yard Establishment	Likely	Major	Medium	Low
Gender Issues	Likely	Moderate	Medium	Low
Safety Hazards for local people	Likely	Major	Medium	Low
Traffic disruption	Likely	Minor	Low	Low
Occupational Health and Safety	Certain	Moderate	Medium	Low
Impact of Construction Debris	Certain	Moderate	Medium	Low
Operation Phase				
Construction material left overs	Likely	Moderate	Medium	Low
Breaching of dam, spillway and Structures	Certain	Moderate	High	Medium
Periodic Cleaning and Maintenance of the System	Likely	Moderate	Medium	Low
Safety	Likely	Major	Medium	Low
Climate Change Aspects (Heat Waves etc.)	Likely	Major	Medium	Low

12. Some of the main impacts during different stages of the project are described below.

- Land acquisition:** The proposed works will be carried out on the BID land and will utilize the department owned Right of Way (RoW) on all proposed sites. Therefore, there is no requirement for any type land acquisition including the Voluntary Land Donation (VLD) for this Project.
Mitigation Measures: No mitigation measures are required
- Flooding:** 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 high magnitude flash floods of 2022, future flooding can breach the dam body and damage spillways and other infrastructure. This impact will have 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. 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.
- Seismic Hazard:** Absence of any design provision (e.g. seismic consideration) may lead to design failure thus resulting in system collapse. The impact significance has therefore been categorized as 'High'.
Mitigation Measures: 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.
- Disposal of Soil Material:** Spoils(1940.84 m³)will be generated from the excavation activities of the project. Disposal of spoil / surplus material may cause negative environmental impacts and this impact is of medium significance, 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 river/waterways, and (iv) aesthetic impacts. This impact would be of moderate significance.

Mitigation Measures: The spoil material from the excavation will be dumped at designated places and ample barren land is available in the vicinity that could be used for this purposes after following necessary procedures/obtaining NOCs etc. The Contractor will also ensure that no spoil material is disposed into river/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. Approximately 1940.84 m³ material will be excavated, most of which will be reused after approval of quality control engineer. The remaining volume of spoil i.e. approximately 200 m³ will be dumped safely and leveled to avoid any harm to aesthetic sense. Contractor will prepare and approved a spoil management plan prior starting any spoil disposal in the area.

- **Noise Pollution:** Sources of noise during construction will be generators, concrete batching plants etc. Increased noise and vibration levels during construction activities can be a source of nuisance for locals and a source of disturbance to wildlife.

Mitigation Measures: Contractor will ensure all construction equipment employed during the project operations will be maintained, operated, and equipped in a manner that aligns with the Noise Environment Quality Standards (NEQS) established by regulatory bodies. This includes making certain that the noise emissions from the equipment remain within the permissible limits defined by the NEQS. Construction workers will be provided with earplugs to minimize noise impact.

- **Ambient Air Quality:** i) Air quality may decrease as a result of the project interventions. Construction machinery, diesel generators and project vehicles will release exhaust emissions containing carbon monoxide (CO), sulfur dioxide (SO₂), oxides of nitrogen (NO_x), and particulate matter (PM). These emissions can deteriorate the ambient air quality of the project site and along the road leading to it. Furthermore, fuel combustion will also release smoke emissions. ii) Concentrations of airborne particulate matter will result from the earthwork, lining of channels and excavation activities. Generation of dust from these activities is likely to be significant in strong winds.

Mitigation Measures: i) Contractor's contractual obligation to ensure that all equipment, generator and vehicles used during the project are properly tuned and maintained in good working condition, in order to minimize the exhaust emissions. Air quality should be monitored on regular basis at nearby sensitive receptors. Select batching plant location away from the living area or construct zero emission plant. ii) Regular sprinkling of water at the exposed areas (excavation sites, service roads and dirt tracks etc.) should be carried out many times a day rendering the impact minimal. Hauling trucks containing construction materials shall be covered with tarpaulin and will be required to run at pre-determined speed in order to minimize dust generation.

- **Waste Generation:** It is expected that the waste to be generated will consist primarily of construction related waste (ninety five percent) consisting of demolition material (concrete, masonry and steel), debris from construction sites (excess aggregate, sand etc.) and excavated material unsuitable for earth fill will be generated during construction. The remaining source of waste (five percent) will be due to the labor camps which are expected to generate some food waste along with domestic waste resulting from regular housekeeping measures.

Mitigation Measures: Ensure that all the waste generated from different locations must be disposed of according to the Waste Management Plan to be prepared by contractor as part of Site Specific Environmental Management Plan (SSEMP). Minimize hazardous waste generation by implementing stringent waste segregation to prevent mixing of non-hazardous and hazardous waste to be managed through providing clear guidelines to workers on how to segregate waste at the source, implementing a color-coding system for waste bins or containers, where different colors represent different types of waste – hazardous and non-hazardous Training sessions will be conducted to educate workers about the importance of waste segregation and the specific procedures to follow.

- **Fauna: Mammals and Reptiles:** During 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 that may be affected 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. Construction activities could lead to avoidance of these areas by mammals and reptiles, potentially causing harm to some reptiles during digging. Movement of wildlife will be limited, and accidental vehicle strikes pose a moderate risk, making this impact of medium significance.

Mitigation Measures: 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.

- **Birds-Avian Fauna:** The presence of migratory and sedentary birds is considered likely throughout the area surrounding the project footprint. However, there are no landing zones used by migratory birds in the immediate project area. The key avifauna species in the project area that may be affected are Chukar partridge (*Alectoris chukar*), See-See Partridge (*Ammoperdix griseogularis*), Chough (*Pyrrhocorax spp.*). 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. 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. Overall impact will be of medium significance.

Mitigation Measure: 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.

- **Flora:** No tree cutting is involved as this is restoration/ and rehabilitation project that will be implemented within existing RoW. However, the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfil the camps requirements). The cutting of trees & vegetation will cause degradation of local environment.

Mitigation Measures: 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. Contractor will prepare tree plantation plan, if tree cutting will involve.

- **Traffic:** During construction period, there will be increased traffic within the project area as well as on the link roads and other approach routes of the project area. Traffic movement will interrupt the local vehicular and pedestrian traffic disrupting travel to nearby villages during day time. Due to increased use of trucks and other vehicles on the roads in the project area elderly people, women and children will be more exposed to dangerous situations, which may lead to traffic accidents and unrest.

Mitigation Measures: A traffic management plan to be prepared and implemented by the contractor, inter alia, has been proposed as a mitigation measure. Construction traffic hindrance should be avoided by providing proper diversion and signage. Should the damage take place to road, the contractor must be bound to carry out repair work immediately.

- **Occupational Health and Safety:** The construction activities will involve operations which pose risks to the health and safety of the contractor's staff as well as the surrounding communities.

Mitigation Measures: The contractor will prepare Site-specific EMP (SSEMP) and Site Specific Health and Safety Management Plan (SSHSM) and a Standard Operational Procedure (SOP) to manage COVID-19 risks.

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.

Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.

Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of it.

- **Use of local water resources:** There will be a requirement for water not only for construction purposes but also for meeting the consumptive and non-consumptive needs of the campsites, workshop, washing yard, etc. However, keeping in view the limited nature of the proposed works and the setting of the project area with limited scattered settlements, no burden is expected to be placed on the existing water resources in the area, particularly since the construction works will be short term in nature. Furthermore, all required measures will be in place to ensure no wastage of water resources takes place, either during the construction works and/or at the labor camp site(s).

Mitigation Measures: 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.

- **Safety of General Public:** Occurrence of accidents/incidents during the construction activities, particularly from excavation activities is a common phenomenon. Safety of general public residing close to excavation work will particularly be at stake. The local people, particularly the children and women, may get injuries or even fatalities. Contractor staff while working at heavy machinery may get injuries.

Mitigation Measures: Safety hazards are controllable with efficient management, staff training, machinery maintenance and other preventive measures. The construction contractor will ensure proper management and utilization of the machinery to minimize the hazards during construction. Safety equipment will be provided to the labors for accident prevention.

- **Impacts on Local Communities/Workforce:** During the construction phase, general mobility of the local residents and their livestock in and around the project area is likely to be hindered. The presence of outside construction workers inevitably causes some degree of social disruption and even active disputes with the local community as a result of social/cultural differences. Usage of community's common resources like potable water, fuel wood etc. by contractor workforce may create conflicts between the community and the contractor.

Mitigation Measures: The contractor will ensure that the mobility of the local communities, particularly women and children, and their livestock is not hindered by the construction activities. The contractor will provide alternate and safe track for community at quite a distance away from the construction areas. Contractor will ensure that women are informed through traditional means of communication of the presence of foreigners (if any) in their area. Contractor will ensure that conflicts with village leaders and local communities are avoided and he is required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly.

- **Aesthetic/scenic quality:** The construction activities could affect the aesthetic /scenic value of the area. Construction activities might generate dust, debris, and temporary disturbances that can affect the cleanliness and visual appeal of the surroundings. The presence of construction equipment, vehicles, and

structures might detract from the scenic beauty that locals and visitors are accustomed to.

Mitigation Measures: Implement regular water spraying on construction sites to control dust emissions from excavation and earth-moving activities. Cover construction materials and piles of debris with tarps or appropriate covers to prevent wind from carrying dust particles. Install aesthetically pleasing temporary fencing or barricades around construction sites to visually separate them from public areas. Regularly clean and maintain construction equipment and infrastructure to minimize visual wear and tear.

- **Breaching of Dam, damage to spillway and other structures** during the operation phase will threaten system sustainability. The BID will monitor the system regularly and liaise with the communities to identify potential weaknesses in the system that could cause breaches. Currently, downstream users are encountering significant challenges pertaining to water availability. Consequently, they have expressed unwavering endorsement for this project during the consultation phase. The execution of this project will guarantee an augmentation in water availability for downstream users. This necessity arises due to the considerable damage sustained by dams in the aftermath of the 2022 floods, which has consequently impaired their functionality. A similar situation is observed in relation to Environmental Flow (EFlow).

I. ENVIRONMENTAL MANAGEMENT PLAN

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

14. EMP also provides its implementation mechanism during construction and operational Phases

- **Implementation during Construction Phase:** The executing agency for this Project is BID, having core implementation responsibility. The BID 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. Contractor's HSE department is highly recommended to be on-board prior to mobilization.
- **Implementation during O&M:** The key players involved during operation of the proposed project are EA (BID), District Environmental Officers of Quetta/ BID will randomly check the project operation in context of EMP and report to District Environment Officers annually.

15. The EMP is prepared taking into account environmental consequences of the proposed action. Mitigation measures are suggested in the Environmental Mitigation Plan at different stages of activities with performance indicators to mitigate the potential impacts. Environmental Monitoring Plan has also been prepared as a part of EMP which details about monitoring mechanism of a specific receptor /item, its frequency and parameters to be considered. The designer has carefully considered all recommendations related to the design. Though construction impacts are not severe, proper mitigation measures are

needed. A suitable training program is proposed to train the Contractor(s) staff who will be involved in the construction phase and the professional staff from the proponent involved at the operational phase of the project. All required permits shall be obtained from the concerned departments before starting the related activity. Grievances should be addressed promptly, as suggested in the EMP.

EMP Budget

16. The EMP budget for construction and operations period of Project is 7.5 Million PKR.

J. CONCLUSION

17. 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 document. Contractor will be bound to completely implement relevant mitigation measures set out in the EMP. Also, the cost related to these mitigation measures has to be borne by the Contractor. Contractor shall prepare detailed Burrow, Quarrying and Disposal Plan, site specific HSE Plan as mentioned in EMP.

18. 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.

19. 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.

20. Environmental impacts during the construction phase are related to the establishment of campsite which are temporary and can be minimized with better management. Construction of worker camps will not necessarily be based on the scale of the works needed. If for some unforeseen reason a larger workforce is needed, the construction camp will not be located in settlement areas or near sensitive water resources and will be provided with lavatories. Local employment will be preferred to avoid cultural conflicts.

21. The restoration and rehabilitation of the Check dam subproject will bring various benefits. Firstly, it will involve the restoration and strengthening of dams, ensuring their long-term functionality and resilience. Additionally, measures will be taken to stabilize slopes, minimizing the risks of landslides and erosion. The improved condition of the dams will extend their operational life, enabling continued benefits such as water storage and flood control. The sub-project will also contribute significantly to groundwater recharge. It aims to protect the local population from the havoc caused by floods, as well as safeguard physical infrastructure, reducing the need for costly repairs and disruptions. Furthermore, the implementation of the sub-project will lead to a reduction in flood peaks and damages downstream, mitigating the adverse effects of flooding on surrounding populations. Moreover, it will provide opportunities for livelihood and promote production activities, fostering economic growth and development in the area.

22. Some activities under this project have been identified to cause low to moderate environmental negative impacts determined through impact assessment methodology and their mitigation measures have been prescribed. Proper and timely execution of these measures will reverse most of the negative impacts in the long term, however, there will be some residual impacts of the project. Overall, the project is expected to cause moderate to high positive impacts on the physical and socio-economic environments and should therefore be approved for implementation.

1. INTRODUCTION

1.1 PROJECT BACKGROUND

23. Historically, Balochistan has been a water-scarce province in Pakistan. Due to the overexploitation of groundwater sources, the water table in the Quetta district is declining at an alarming rate of 10-20 feet per annum. This decrease in groundwater resources poses a potential threat to the district's economy. Therefore, there is an urgent need to maintain a balance between recharge and extraction. To achieve the target for water resource development in Balochistan province, it is imperative to devise ways and means to recharge the groundwater aquifer.

24. Quetta valley is under severe threat of flooding during heavy rains. Flash floods received from hill torrents, namely Chiltan, Murdar, Talmtu, and Zarghoon hills surrounding Quetta valley, cause devastation in almost the entire area due to their high velocity and magnitude. To cope with these issues, the Balochistan Irrigation Department (BID) has already constructed water conservation structures and flood mitigation works in the valley. Especially the recent high-intensity rainfall in July and August 2022 broke all previous records, and the high-magnitude flash floods proved to be catastrophic, causing irreparable loss to precious human lives and public and private infrastructure. Most of these water conservation structures and flood mitigation works were damaged.

25. The most important income-generating activity in district Quetta is agricultural development, which relies entirely on irrigation. The project will improve the livelihoods of residents through income-generating activities. Additionally, the proposed project will significantly contribute to recharging the existing tube wells in the vicinity.

Furthermore, in the project areas, increased pumping of groundwater for irrigation, domestic, and other purposes have placed an enormous burden on groundwater resources. The majority of the water demand in the area is met by groundwater. The current exploitation of groundwater far exceeds the natural recharge into the groundwater aquifer, creating an alarming situation as groundwater is rapidly depleted. To address this problem, the restoration of damaged storage/delay action/check dams has been conceived as an effective tool to enhance recharge into the groundwater. The Government of Balochistan, under the BID, Quetta division, intends to execute the restoration & rehabilitation of Flood Damaged Water Conservation structures.

26. This document presents the findings of the Initial Environmental Assessment (IEE) study of the Restoration & Rehabilitation of Flood Damaged Water Conservation Structures in Irrigation Division Quetta.

1.2 NATURE SIZE AND LOCATION OF THE PROJECT

27. The project involves the restoration and rehabilitation of the 11 damaged dams around Quetta city under BID, Quetta division to store the water for irrigation and to recharge the aquifer of the area. The project is located around the remote areas of Quetta city. Eleven dams are included in the proposed project and are in the vicinity of Quetta city.

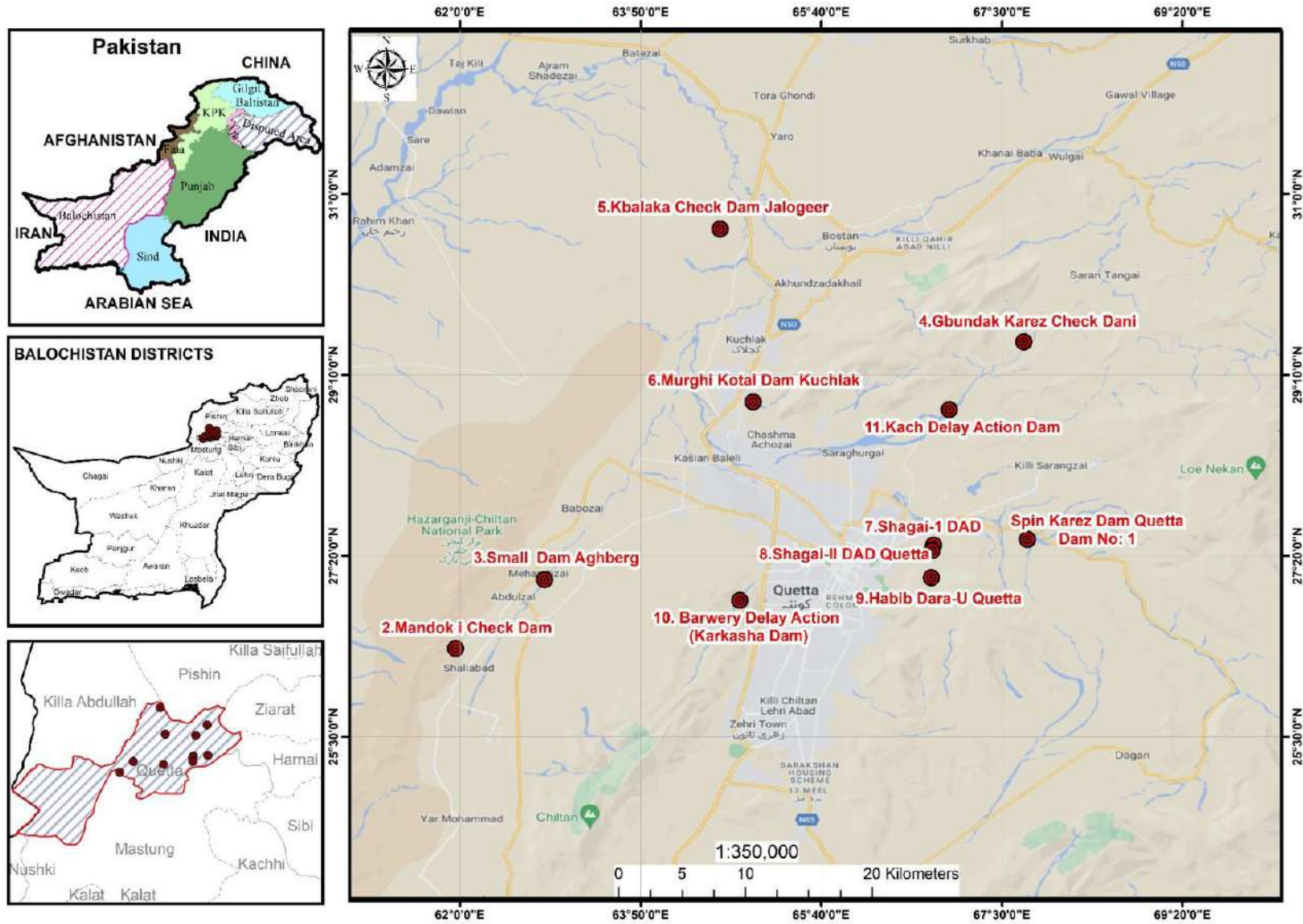


Figure 1-1 : Project Location

1.3 ENVIRONMENTAL ASSESSMENT

28. The apex Pakistani law governing the subject of environment is the Pakistan Environmental Protection Act – 1997 (PEPA-97). Under Section 12 of the Act, it is mandatory for the proponents of the projects¹ to execute the IEE and / or EIA (where warranted), and get the approval from federal agency (i.e. Pak-EPA). This function has been delegated under Section 26 to provincial EPAs.

29. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the restoration and rehabilitation of Flood Damaged Water Conservation Structures in Irrigation Division Quetta is the “Balochistan Environmental Protection Act 2012”. This act also provides for IEE or EIA (as the case maybe) for projects under its clause 15.

30. The EIA / IEE regulations of 2000 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 is conducted and an IEE report is being prepared.

31. For ADB’s SPS, all loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) and requires the completion of the environmental categorization form. REA was filled by consultants and shared with the NDRMF management which reviewed and confirmed the project category and the REA document is attached as Annexure-I. Also, a Due Diligence Report (DDR) for the proposed sub-projects was prepared by NDRMF and shared with ADB for review and endorsement of the project category.

32. Accordingly, as proposed project is classified as ‘Category B’ if it is unlikely to cause significant adverse environmental and social impacts. A project is classified as ‘Category B’ if its potential adverse environmental impacts on human populations or environmentally important areas, (e.g., wetlands, forests, grasslands, and other natural habitats) are less adverse, site-specific, and reversible with the exception of a few.

33. According to ADB, an IEE is required for ‘Category B’ projects to determine the likelihood of significant environmental impacts. In such a case, an EIA study of the project is warranted. If an EIA is not needed, the IEE is regarded as the final environmental assessment report. Public consultation is a mandatory task to be undertaken during the IEE process.

34. Based on the above requirements of national and provincial regulations, as well as the ADB policy, an Initial Environmental Examination of the proposed interventions is being carried out.

35. The overall objective of IEE study is to elucidate the anticipated aspects of the proposed project and their impacts on the surrounding environment in order to propose necessary mitigation measures to prevent/minimize adverse impacts. To achieve this objective, an assessment of the existing environmental status of the project site is a prerequisite and, therefore, included in this study by collecting and reviewing the baseline data of various environmental attributes.

36. The IEE report will be prepared to ensure adequate environmental and social management during the lifecycle of the project for the previously mentioned interventions of the restoration and rehabilitation of Flood Damaged Water Conservation Structures in Irrigation Division Quetta Project.

37. It intends to provide mechanisms for ensuring that potential environmental and social impacts of the current program are identified, assessed and mitigated as appropriate, through an environmental and social screening process.

38. The IEE report is also required to, comply with the Pakistan / Balochistan Environmental and social requirements, as outlined in the prevailing IEE / EIA Guidelines. The IEE will also comply with the ADB Safeguard Policies SPS – 2009 or 2012 for environmental management of projects.

1.4 OBJECTIVES OF IEE REPORT

39. More specific objectives of this IEE report include following:

- (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 project proponents 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

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

1.6 PURPOSE OF IEE REPORT

41. The purpose of this EIA 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 concerned EPA.

1.7 STUDY TEAM

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

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

1.8 METHODOLOGY

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

a) Orientation

44. 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

45. 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

46. 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

47. 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

48. 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

49. 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

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

f) Socio-Cultural Environment

51. 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 plant. 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

52. 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

53. The Adequate mitigation measures and implementation framework were proposed so that the proponent could 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 EIA study.

Section 2 “**Policy, Legal and Administrative Framework**” comprises policy guidelines, statutory obligations and roles of institutions concerning EIA 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 road project.

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 the this IEE Report and recommendations for the proposed project.

2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 GENERAL

54. This chapter elucidates 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

55. The Government of Pakistan realized the importance of environmental preservation way back in the early 1980's. Until the 1980's development policies were formulated irrespective of environmental considerations. A variety of environment-related acts and ordinances existed, but the Pakistan Environmental Protection Ordinance 1983 (PEPO) was the first effort to deal with environmental concerns systematically. The ordinance created a legal basis for comprehensive environmental policy making, the establishment and enforcement of standards, environmental impact assessments and the inclusion of environmental considerations in development policies. In 1984, the promulgation of this ordinance was followed by the establishment of the Pak-EPA, the primary government institution dealing with environmental issues. The PEPO 1983 was replaced with a new Act of Parliament in 1997 i.e. PEPA Act 1997.

56. The UN International Summit on Environment was held in 1992 in Rio de Janeiro, to highlight the importance of environment protection and to promote sustainable development. Pakistan also became a signatory of this summit, after which the Government of Pakistan developed a National Conservation Strategy (NCS), approved in March 1992. It was decided that all reports regarding strategies, policies and program for sustainable development will be drawn up on the basis of the NCS. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP).

57. 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.

58. Pakistan EPA review of IEE and EIA Regulations, 2000 and Pakistan Environmental Assessment Procedures were published, to provide necessary guidelines for preparation, submission and review of IEE and EIA.

2.3 NATIONAL ENVIRONMENTAL POLICY

59. 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.

60. 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

61. 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.

62. As per Draft Balochistan Comprehensive Development Strategy 2013 -2020 the water sector development will be as under:

63. "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 Sailaba and creating water storages on all strategic locations in the river basins and handling the Sailaba 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

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

2.5.1 National Regulations

65. 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

66. 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

67. 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.

68. 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, 2000.
- National Environmental Quality Standards (Certification of Environmental Laboratories) Regulations, 2000.

2.5.3 Balochistan Environmental Protection Act, 2012

69. After the 18th Constitutional amendments 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.

70. 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.

71. In terms of requirements of EIA / IEE, the provincial Act contains, in its section 15, similar provisions as given in the PEPA section 12. The PEPA has entrusted the authority of review and to approve environmental assessments to the provincial EPA. The proposed project falls under the jurisdiction of the Balochistan Environmental Protection Agency (BEPA).

72. 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 Pakistan EPA Review of IEE and EIA Regulations, 2000

73. 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.

74. The Review of IEE and EIA Regulations 2000, prepared by Pak-EPA under the powers conferred upon it by PEPA-97, categorizes projects for IEE and EIA, respectively. The proposed interventions under Restoration & rehabilitation of flood damaged water conservation structures in irrigation division Quetta are likely to fall under the Category B as defined in Schedule – I of Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000. According to these guidelines, the proposed project would require an IEE to be conducted.

75. According to the details provided in the regulations regarding preparation, submission, and review of IEE’s and EIA’s, 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 Pak-EPA guidelines.
- The EIA or IEE is submitted to the concerned EPA: provincial EPAs if the project is located in the provinces or Pak-EPA if it is located in the Federal administered area.
- 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 EPA 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 EPA 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 EPA 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 the EPA 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 EPA 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

76. 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.

77. 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

78. 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.

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

2.5.7 The Antiquities Act, 1975

80. 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

81. 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

82. 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

83. 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

84. 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

85. 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

86. 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)

87. 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

88. Asian Development Bank in its Safeguard Policy Statement (June 2009) affirms that “environmental and social sustainability is a cornerstone of economic growth and poverty

89. reduction in Asia and the Pacific” (p 14). Furthermore, the document underlines the ADB’s Strategy 2020, promoting the “sustainability of project outcomes by protecting the environment and people from project’s potential adverse impacts”.

90. The Initial Environmental Examination in hand 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”.

91. 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.

92. Main reasons behind assigning category B is that the interventions are basically upgradation and rehabilitation of existing irrigation system 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 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.

93. 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

94. 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. 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-	no involuntary resettlement is envisaged for the proposed project.

		displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	
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 Relevant International Treaties

- **Convention on Biological Diversity**

95. 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.

96. 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.

- **Convention on the Conservation of Migratory Species of Wild Animals**

97. 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.

- **ADB's Accountability Mechanism Policy 2012**

98. 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.

99. 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.

- **ADB's Access to Information Policy 2018 (AIP)**

100. 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 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS

101. 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.

102. 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.

103. 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.

104. 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.

105. Similar to the standards for air and Noise quality, the comparison of 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 CaCO₃. NEQS for Chemical, Toxic inorganic and organic parameters are

mostly similar/comparable zinc, residual chlorine, Phenolic compounds (as Phenols) mg/l, Poly-nuclear 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 Comparison of International and Local Air Quality Standards

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

Table 2-3 Comparison of International and Local Noise Limit in dB(A) Leq

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

106. 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 National and WHO Environmental Quality Standards for Drinking Water

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

107. National Environmental Quality Standards for vehicular emissions and wastewater are given in Table 2-5 and 2-6 respectively.

Table 2-5: National Environmental Quality Standards for Motor Vehicle Exhaust And Noise

Sr. No.	Parameter	Standards (maximum permissible limit)	Measuring method
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	<u>Emission Standards:</u> <u>New Used Vehicles</u> 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 ^o C
2.	pH value (acidity/basicity)	6-10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20 ^o 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(asCl ⁻)	1000mg/L
10.	Fluoride (as F ⁻)	20mg/L
11.	Cyanide (as CN ⁻)	2mg/L
12.	An-ionic detergents ⁽²⁾ (as MBAS) ⁽⁵⁾	20mg/L
13.	Sulphate(SO ₄ ²⁻)	600mg/L
14.	Sulphide (S ²⁻)	1.0mg/L
15.	Ammonia (NH ₃)	40mg/L
16.	Pesticides, herbicides, fungicides and	0.15mg/L
17.	insecticides Cadmium ⁽⁴⁾	0.1mg/L
18.	Chromium (4) (trivalent and hexavalent)	1.0 mg/L
19.	Copper ⁽⁴⁾	1.0mg/L
20.	Lead ⁽⁴⁾	0.5mg/L
21.	Mercury ⁽⁴⁾	0.01mg/L
22.	Selenium ⁽⁴⁾	0.5mg/L
23.	Nickel ⁽⁴⁾	1.0mg/L
24.	Silver ⁽⁴⁾	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

108. Balochistan is the largest province of Pakistan in terms of area and smallest in terms of population. It is reckoned to be comparatively less developed and the sole reason is scarcity and paucity of water. Islamic Republic of Pakistan received financing for the proposed project from ADB through NDRMF. The project will support implementation of the integrated water resources management policy of the Government of Balochistan (GoB).

109. In the project areas, the increased pumping of groundwater for irrigation, domestic, and other purposes have placed an enormous burden on groundwater resources. Most of the water demand in the area is met by groundwater. The present exploitation of groundwater far exceeds the natural recharge into the groundwater aquifer, creating an alarming situation as groundwater is rapidly depleted. To address this problem, the restoration of damaged storage/delay action/check dams has been conceived as an effective tool to enhance recharge into the groundwater. Flash floods have been experienced in all parts of the province, particularly in the project area, resulting in the loss of human lives, erosion of arable lands, damage to residential areas, loss of livestock, and damage to irrigation infrastructure, roads/bridges, etc. Therefore, it is necessary to manage hill torrents for irrigation/recharge purposes. Hence, the restoration and rehabilitation of these schemes are proposed.

3.2 LOCATION OF THE PROJECT

110. The project Restoration & Rehabilitation of Flood Damaged Water Conservation Structures is located in District Quetta. Location map of the project area has been provided in Figure 3.1 below.

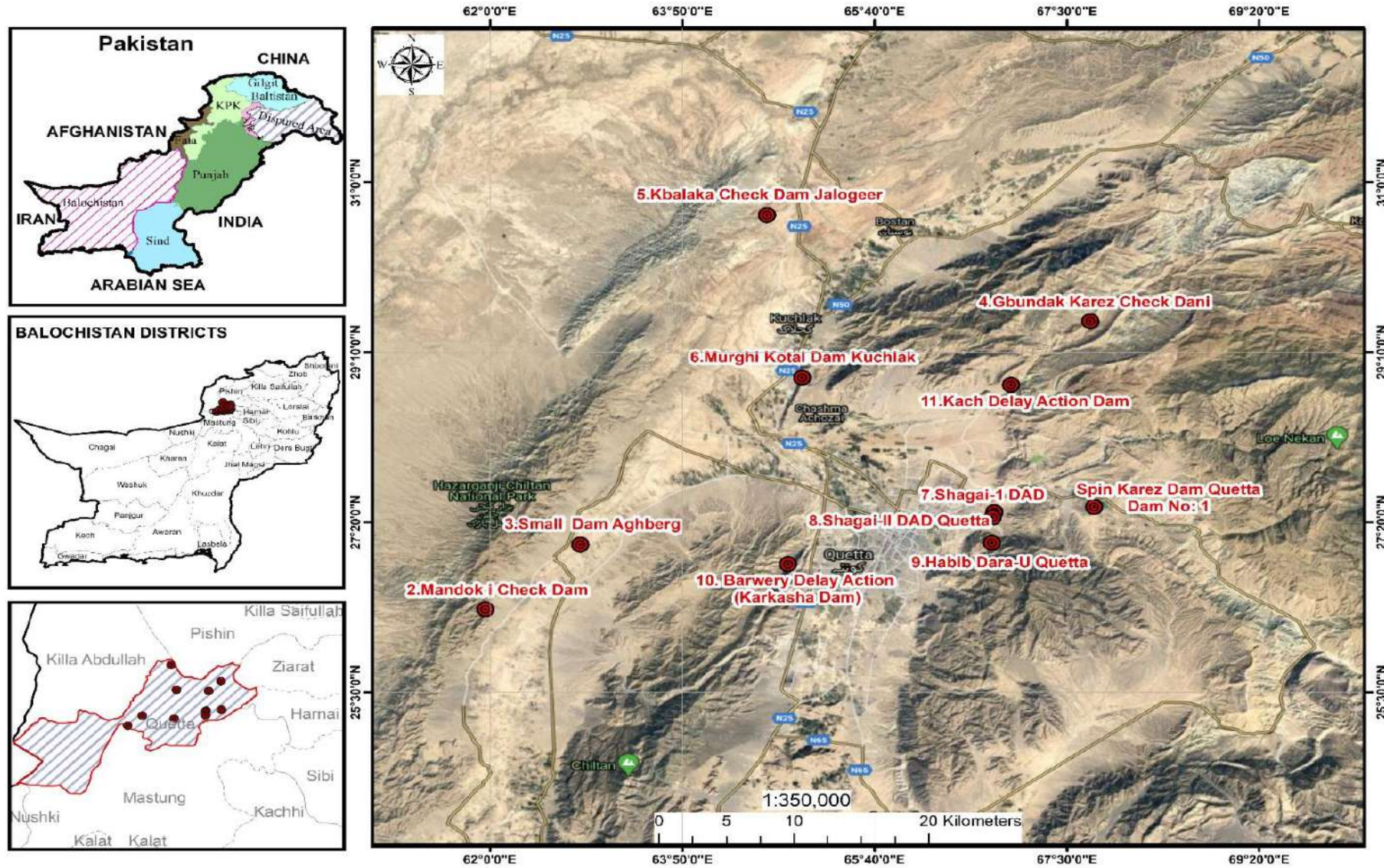


Figure 3-1: Location Map of the Project

3.3 COMPONENTS OF THE PROJECT AND SCOPE OF WORK

111. Main components of the sub-project include;

- Restoration of Water Conservation Structures (Small dams, check dams, delay action dams, spillways, outlet works)
- Restoration of river training / flood mitigation structures

112. The salient features of the project and details of the scope of work are presented in areas under

3.3.1 SPIN KAREZ DAM

113. The dam was constructed in 1945 by the British Raj/British Baluchistan Government for flood mitigation and to conserve floodwater for drinking and agriculture during scarce periods. Over the decades, the storage capacity of the dam has been reduced due to silt accumulations, and the dam body has also weakened due to rain floods. Furthermore, the spillway was completely damaged during the recent unprecedented floods from 4th July to 26th August 2022. Since its inception, this dam has served as a sustainable source of water supply for Quetta Cantt and WASA for drinking purposes. It supplies around 1MGD through 12" Dia Pipe Outlets.

114. The existing components of the structure are;

DAM BODY

Length	=	2500 ft.
Height	=	45ft
Designed Storage Capacity	=	1564 MG
Current Capacity	=	782MG
Catchment Area	=	28 Sq. Miles
Pipe Outlet	=	12" Dia

SPILL WAY:

Length of Spillway	=	250 Rft
Width	=	180ft
Design Discharge	=	7800 Cusecs
Flow Depth	=	4.0 ft.
Free Board	=	2.0 ft.

Scope of Work for Restoration

Dam Body (Earthen)		
Length	=	2500 ft.
Height	=	45 ft.
U/S Slope	=	2.5:1
DIS Slope	=	3:1
Top Width	=	20ft
U/S Stone Pitching	=	1.5 ft.
Shingle Laying on Top	=	0.5ft
Storage Capacity	=	782MG
Catchment Area	=	28 Sq. Miles

SPILL WAY:

115. Since the spillway was collapsed during 2022 floods. A Spillway is proposed with significant width(220 ft), sufficient free board, cut off walls and concrete walls to accommodate the revised design discharge. The parameters are:

Length of Spillway	=	300 Rft
Width	=	220ft
Design Discharge	=	1,3548 Cusecs
Flow Depth	=	6.0 ft.
Free Board	=	5.0 ft.

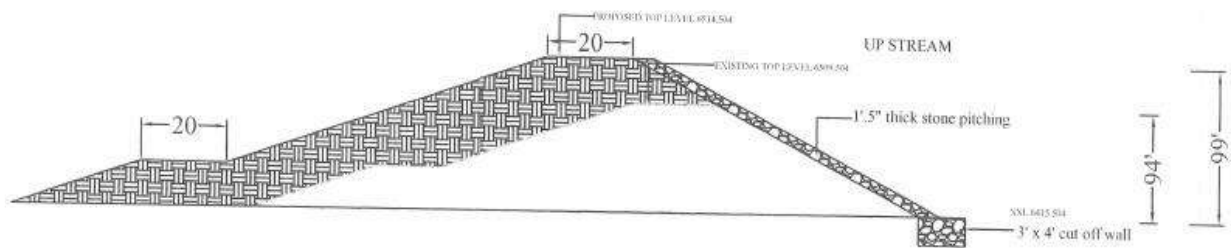


Figure 3-2: Typical Cross Section of Spin Karez Dam

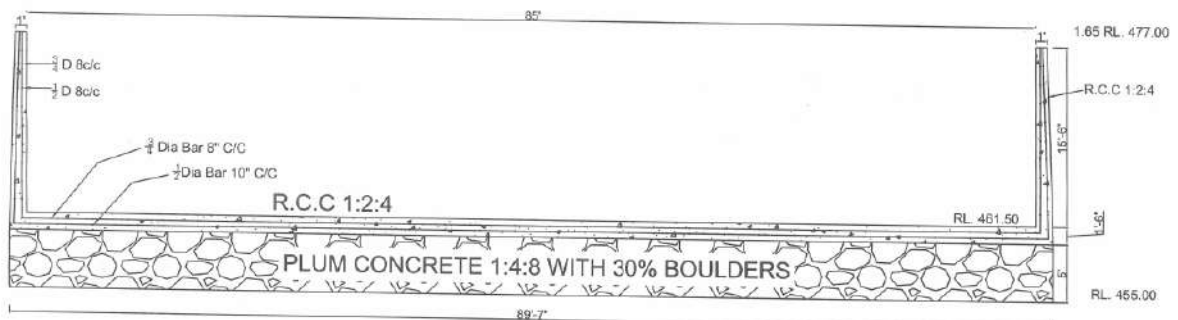


Figure 3-3: Typical X Section of Spin Karez Dam



Figure 3-4: Location of Spin Karez Dam

3.3.2 MANDOKI CHECK DAM

116. The check dam was constructed in the Aghberg area of District Quetta under the PSDP 2010-11 of the Government of Baluchistan. According to the initial design parameters, it was an earthen dam located in a mountain gorge in the western hills. However, during the recent unprecedented floods from 4th July to 26th August 2022, the dam body suffered significant damage.

117. The existing components of the dam are as follows:

Dam Body (Earthen) (Breached)

Length	=	120ft
Height	=	40ft
Top Width	=	20ft
Storage Capacity	=	60 Acre-Feet
Catchment Area	=	1.00 Sq. Mile

SPILL WAY

Length of Spillway	=	110 Rft
Width	=	60ft
Design Discharge	=	1000
Flow Depth	=	5.0 ft.

Scope of Work for Restoration

Dam Body (Gravity)		
Length	=	140ft.
Height	=	45 ft.
Top Width	=	4ft.

Storage Capacity = 92 Acre-Feet
 Catchment Area = 1.00 Sq. Miles
 Total Discharge = 1592 Cusecs

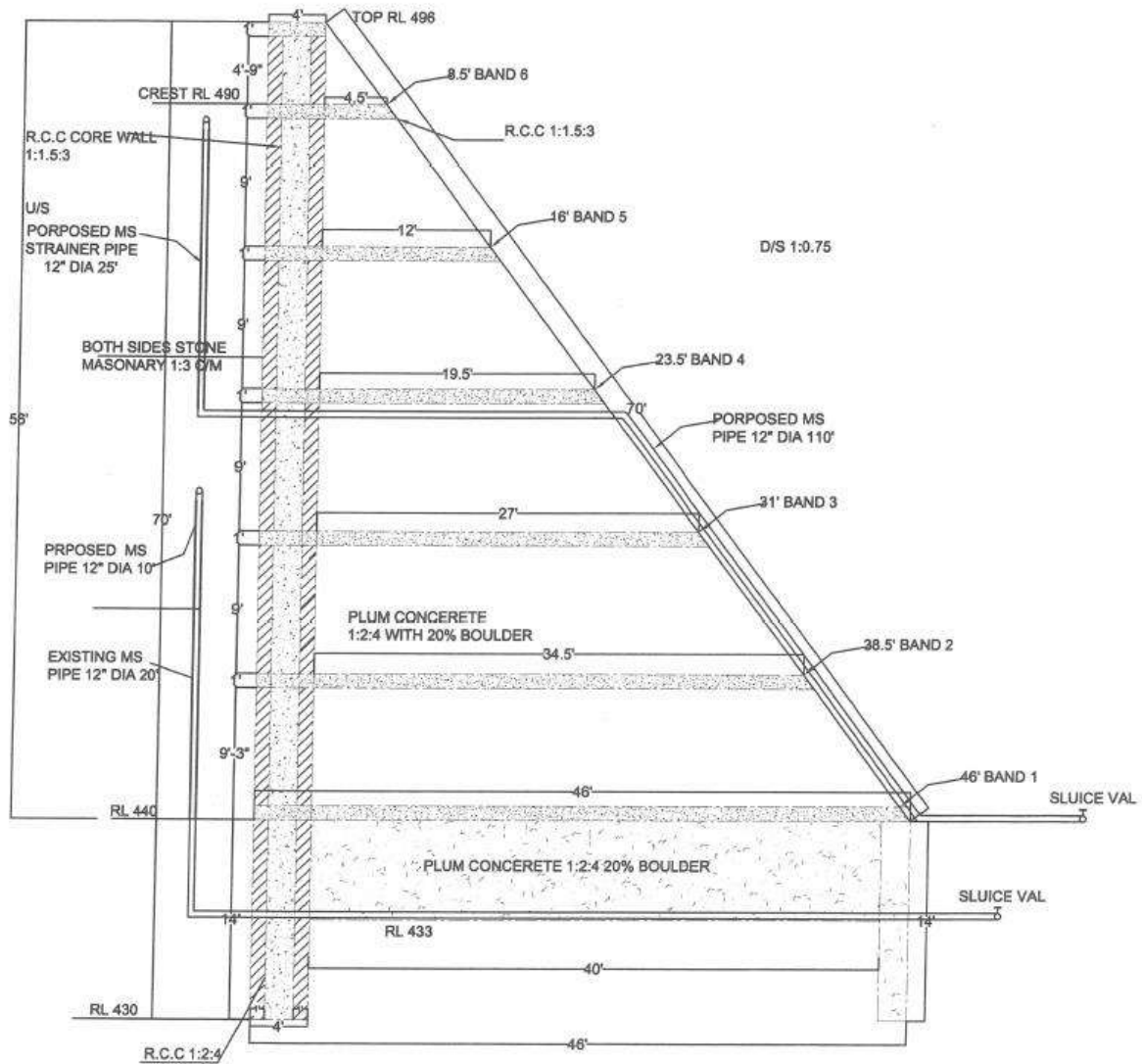


Figure 3-5: X-Section of Mandoki Dam

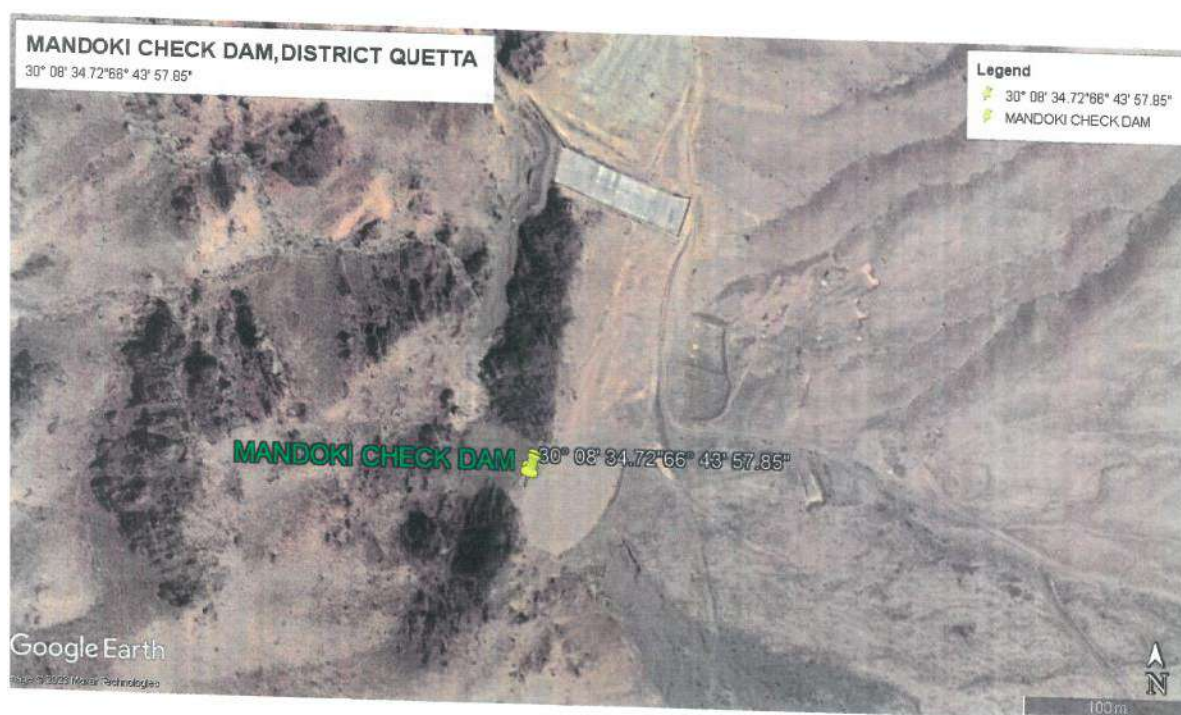


Figure 3-6: Location of Mandoki Dam

3.3.3 SMALL DAM AGHBERG

118. The Small Dam Aghberg was constructed under the Federal PSDP 2016-17 by the Ministry of Water and Power, Government of Pakistan, through the Balochistan Irrigation Department. However, during the recent unprecedented flood from 4th July to 26th August 2022, the wall and bed of the spillway suffered damage due to high velocity and heavy flash discharge, causing erosion downstream. To prevent further loss or collapse of the structure, urgent restoration is proposed. The width of the spillway will be increased with sufficient freeboard based on a 500-year design return period. Additionally, an apron will be included in the restoration works to prevent erosion.

119. The existing components of the dam are as follows:

Dam Body (Earthen)

Height	=	38.50 ft
U/S Slope	=	2:1 & 3:1
Top Width	=	20ft
Bottom Width	=	395ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	2034 Acre-Feet

SPILL WAY:

A Concrete Structure Spillway is existing. The parameters are:

Length of Spillway	=	314 Rft
Width	=	200 ft.
Design Discharge	=	12625 Cusecs

Flow Depth = 5ft
 Free Board = 3.5 ft.

Scope of Work for Restoration / Rehabilitation

120. The Damaged Spillway is to be rehabilitated by proposing cut off walls, retaining walls, bed and apron to accommodate the flood discharge redesigned on 500 years return period. The parameters are:

Length of Spillway = 314 Rft
 Width = 275ft
 Wall length (Damaged) = 60ft
 Apron = 50ft
 Design Discharge = 15638 Cusecs
 Flow Depth = 5.0 ft.
 Free Board = 5.0 ft.

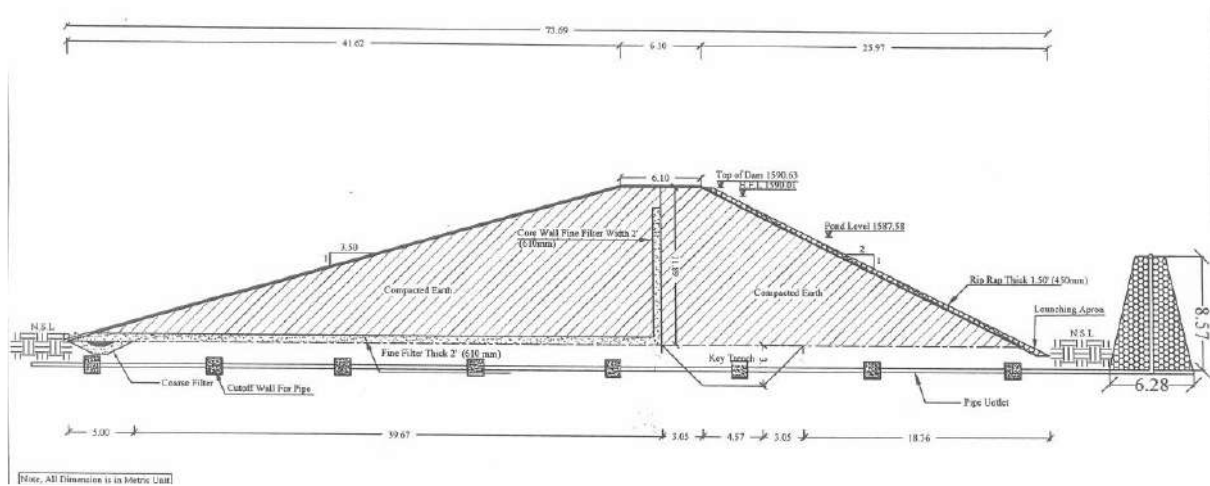


Figure 3-7: Typical X-section of the dam body



Figure 3-8: Location of Small Dam Aghberg

3.3.4 GHUNDUK KAREZ CHECK DAM

121. The aforementioned check dam was constructed under the PSDP 2003-2004 as part of an umbrella scheme called "Construction of small check dams in Quetta Valley Package-1." The check dam successfully achieved its goals, including groundwater table recharge, provision of drinking and irrigation water, and flood mitigation during wet spells. However, during the recent floods and heavy rainfall from 4th July to 26th August 2022, the spillway experienced a massive discharge. Although the dam/bund body remained intact, unfortunately, the spillway completely crumbled due to the excessive discharge and high velocity.

122. The existing components of the dam are as follows:

DAM BODY

Length	=	615 ft.
Height	=	40 ft.
U/S Slope	=	2.5:1 & 3:1
Top Width	=	20ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	85 Acre-ft.
Catchment Area	=	3.24 Sq. Miles
Storage Capacity	=	85 Acre-ft.
Total Discharge	=	2800 Cusecs

SPILLWAY:

Length of Spillway	=	150 Rft
Width	=	60 ft.
Design Discharge	=	2800 Cusecs
Flow Depth	=	5ft



Figure 3-9: Location of Ghunduk Karez Check Dam

Scope of Work for Restoration / Rehabilitation

123. The Spillway is totally damaged. A new spillway is proposed with sufficient Free Board, cut off Walls and Concrete Walls to accommodate the flood discharge. The parameters are

Length of Spillway	=	210 Rft
Width	=	80ft
Design Discharge	=	4617 Cusecs
Flow Depth	=	5.0 ft.
Free Board	=	5.0 ft.

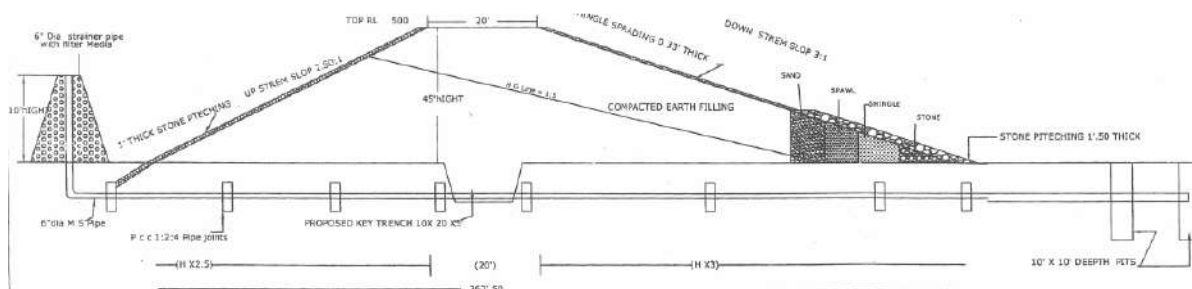


Figure 3-10: Typical X-Section of Ghunduk Karez Check Dam

3.3.5 KHALAKA CHECK DAM JALOGEEER KUCHLAK

124. The Khalaka Check Dam was constructed under the PSDP 2003-2004 as part of an umbrella scheme called "Construction of small check dam in Quetta Valley Package-III." The check dam successfully achieved all its goals, including groundwater table recharge, provision of drinking and irrigation water, and flood mitigation during wet spells. However, during the recent floods and heavy rainfall from 4th July to 26th August 2022, the spillway experienced a significant discharge. Although the dam/bund body remained intact, the retaining walls, bed, and cut-off wall suffered damage, which is crucial to be repaired before the next flood event.

125. The existing components of the dam are:

DAM BODY

Length	=	1970 ft.
Height	=	30ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	120 Acre-ft.
Catchment Area	=	1.66 Sq. Miles
Total Discharge	=	800 Cusecs

SPILL WAY:

126. A collapsed brick work spillway. The parameters are:

Length of Spillway	=	350 Rft
Width	=	60ft
Design Discharge	=	800 Cusecs
Flow Depth	=	3.0 ft.
Free Board	=	2.5 ft.

Scope of Work for Restoration

SPILL WAY:

Length of Spillway	=	150 Rft
Width	=	70ft
Design Discharge	=	1708 Cusecs
Flow Depth	=	4.0 ft.
Free Board	=	4.0 ft.
Brick retaining wall	=	14ft
Concrete bed	=	150 Rft
Apron	=	50 Rft
Cut-off Walls	=	5 Nos.

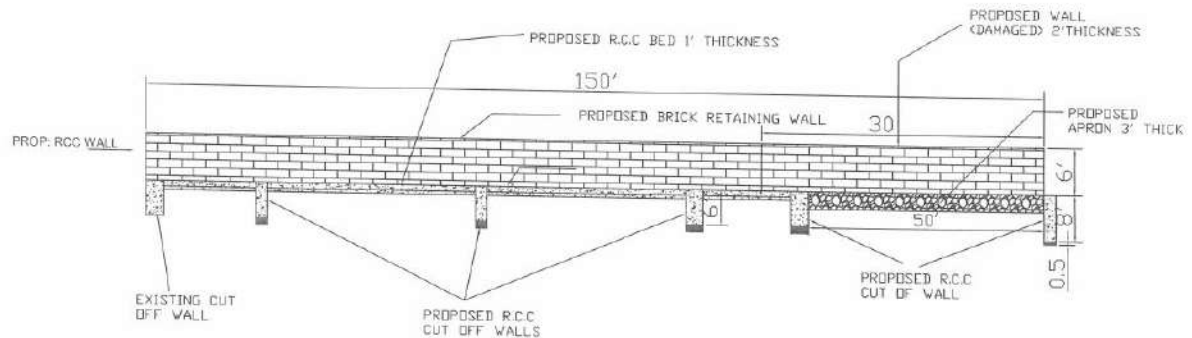


Figure 3-11: Plan Profile

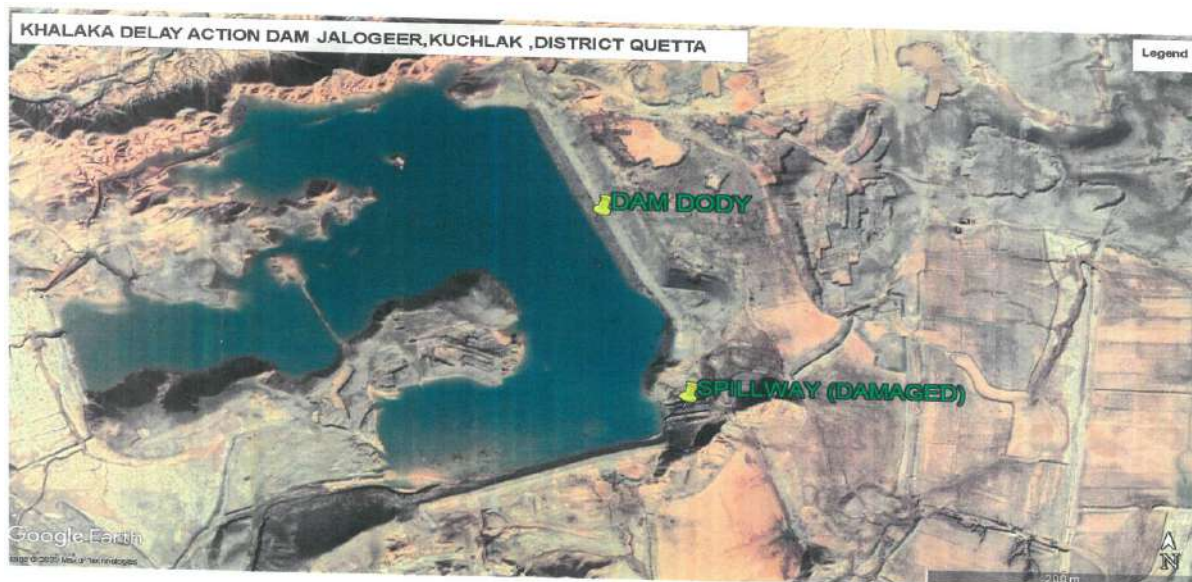


Figure 3-12: Location Map of Khalaka Check Dam

3.3.6 MURGHI KOTAL DELAY ACTION DAM

127. The aforementioned dam was constructed under the 2003-2004 PSDP with the purpose of flood mitigation and water conservation in the area during heavy rainfall in the wet season. After its completion, the dam functioned effectively and achieved its intended goals. However, in the recent heavy floods caused by unprecedented rainfall (from 4th July to 26th August 2022) due to regional climatic diversities, the dam's spillway has been severely affected. The spillway has undergone overturning and erosion downstream due to the immense discharge passing through it. Immediate restoration of the spillway structure is necessary to ensure the safety of the dam and to combat future floods. Failure to strengthen and restore the dam in a timely manner may result in irreparable damage to agricultural lands, public and private infrastructure, and human lives.

Restoration Work

A Collapsed concrete structure spillway to be rehabilitated by proposing the following structural members.

Length of Spillway	=	300 Rft
Width	=	40ft
Design Discharge	=	2861 Cusecs
Flow Depth	=	7.0 ft.
Free Board	=	6.0 ft.
Divide wall across Dam Body	=	300 Rft
Apron	=	80 X 40 X 3ft
Cut-off Wall (3 No.)	=	40 X 6 X 2ft

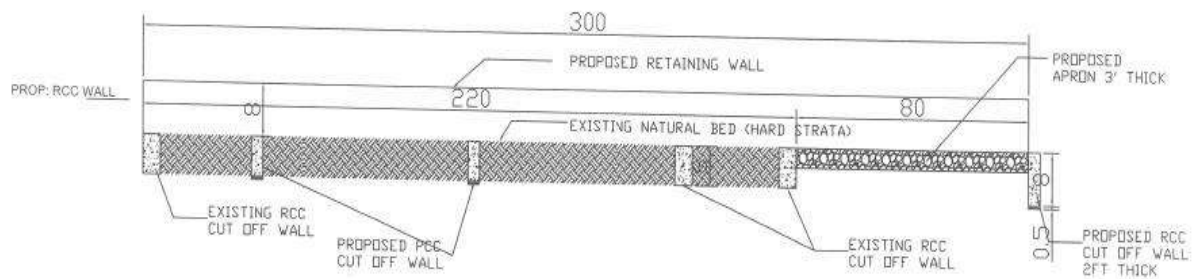


Figure 3-13: Plan Profile

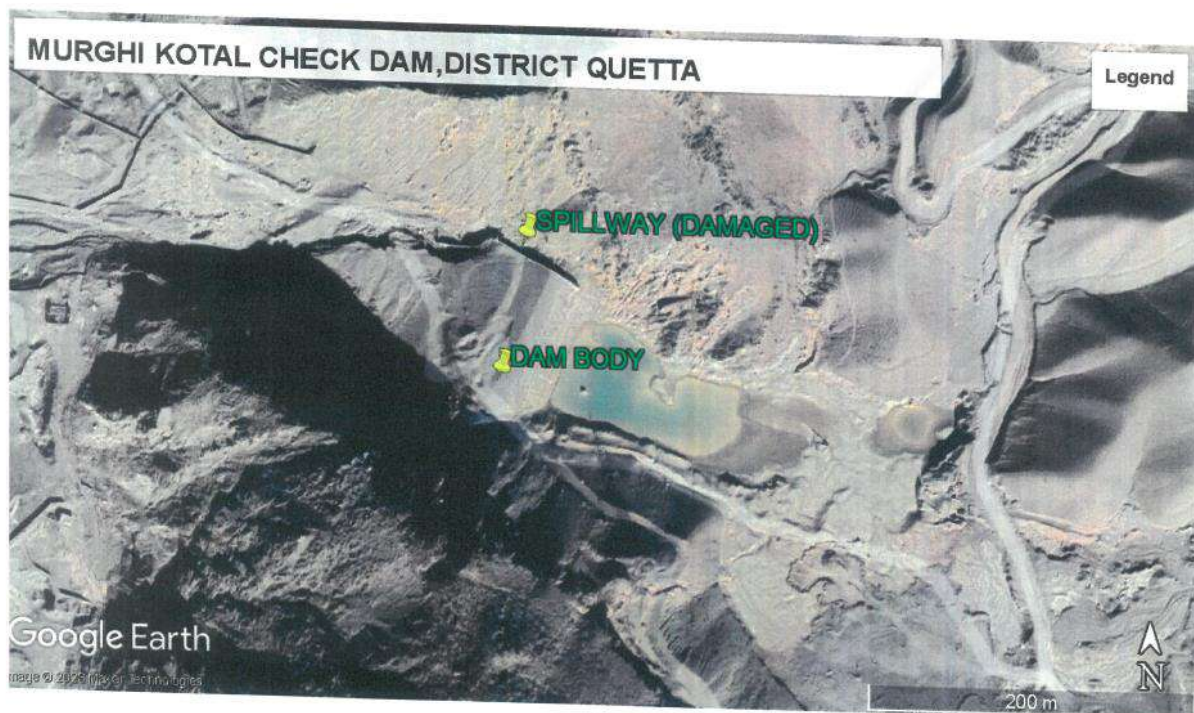


Figure 3-14: LOCATION MAP OF MURGHI KOTAL DELAY ACTION DAM

3.3.7 SHAGAI-I DELAY ACTION DAM

128. The dam was constructed in 1992 by the Irrigation Department of the Government of Baluchistan with the purpose of conserving floodwater generated from the Koh-e-Murdar Gatt mountainous ranges and nearby hill torrents. However, due to the unavailability of funds for a prolonged period, the condition of the dam is not satisfactory to effectively combat future floods. Moreover, the catchment area of the dam contributes to heavy flooding, posing a natural disaster risk to low-lying areas such as Quetta Garrison and Staff College. During the recent flood in 2022, the existing dam sustained significant damages, including excessive seepage in the dam body and spillway damages caused by erosion and a high rate of scouring. Therefore, it is crucial to take immediate and solid remedial steps for the restoration of this important public asset.

129. The existing components of the dam are:

Dam Body (Earthen)

Length	=	850ft
Height	=	45ft
U/S Slope	=	2:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	265ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	250 Acre-Feet
Catchment Area	=	3.0 Sq. Miles
Total Discharge	=	2100 Cusecs
MS Pipe 6" Dia	=	300 Rft (Non-Functional)

SPILL WAY:

Length of Spillway	=	150 Rft
Width	=	100ft
Design Discharge	=	2100 Cusecs
Flow Depth	=	3.0 ft.

Restoration I Improvement

Dam Bod (Earthen)

Length	=	880ft
Height	=	45ft
U/S Slope	=	2.5:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	295ft
U/S Stone Pitching	=	1.5 ft.
Shingle Laying on Top	=	0.5 ft.
Storage Capacity	=	250 Acre-Feet
Catchment Area	=	3.0 Sq. Miles
Total Discharge	=	5271 Cusecs
MS Pipe 6" Dia	=	370 Rft

SPILL WAY:

Length of Spillway	=	150 Rft
Width	=	100ft
Design Discharge	=	5271 Cusecs
Flow Depth	=	5.0 ft.
Free Board	=	5.0 ft.
Emergency Escape Pipe	=	18 in Dia

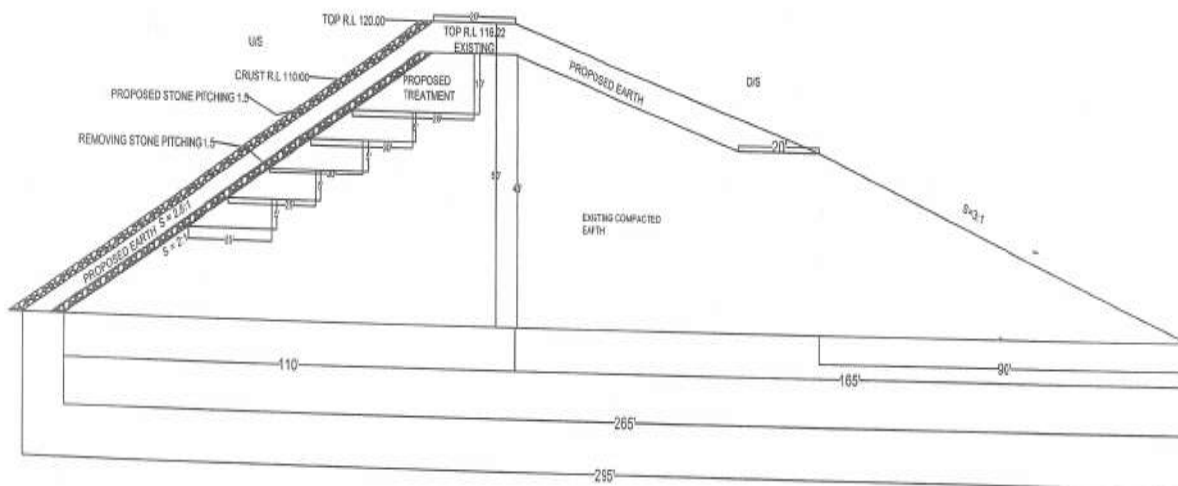


Figure 3-15: Typical X-Section Shagai-1 Delay Action Dam RD 800



Figure 3-16: Location Map of Shagai-1 Delay Action Dam

3.3.8 SHAGAI-II DELAY ACTION DAM

130. The dam was also constructed in 1992 by the Irrigation Department of the Government of Baluchistan. It is situated on a parallel creek to the Shagai-1 Delay action Dam and serves the purpose of conserving floodwater generated from the Koh-e-Murdar Gatt mountainous ranges and nearby hill torrents. However, due to the unavailability of funds for a prolonged period, the condition of the dam is not satisfactory for effectively combating future floods. Additionally, the catchment area of the dam contributes to heavy flooding, posing a natural disaster risk to low-lying areas such as Quetta Garrison and Staff College.

During the recent flood in 2022, the existing dam sustained significant damages, including excessive seepage in the dam body and spillway damages caused by erosion and a high rate of scouring. Therefore, it is crucial to take solid remedial steps for the restoration of this important public asset.

131. The structure parameters of the dam are:

Dam Body (Earthen)

Length	=	467ft
Height	=	40ft
U/S Slope	=	2:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	220ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	168 Acre-Feet
Catchment Area	=	1.65 Sq. Miles
Total Discharge	=	1200 Cusecs
MS Pipe 6" Dia	=	300 Rft (Non-Functional)

Spill Way

An un-gated Stone Pitching parameter are:

Length of Spillway	=	435 Rft
Width	=	55ft (average)
Design Discharge	=	1200 Cusecs
Flow Depth	=	4.0 ft
Free Board	=	4.0 ft

Restoration

Dam Body (Earthen)

Length	=	467ft
Height	=	40ft
U/S Slope	=	2.5:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	240ft
U/S Stone Pitching	=	1.5 ft
Storage Capacity	=	168 Acre-Feet
Catchment Area	=	1.65 Sq. Miles
Total Discharge	=	3005 Cusecs
MS Pipe 6" Dia	=	300 Rft (Non-Functional)

Spill Way

The Spillway is considered sufficient to accommodate safe discharge. No significant changes proposed. But during detailed design by consultant the same will be assessed and reviewed to ensure safe disposal of flood runoff.

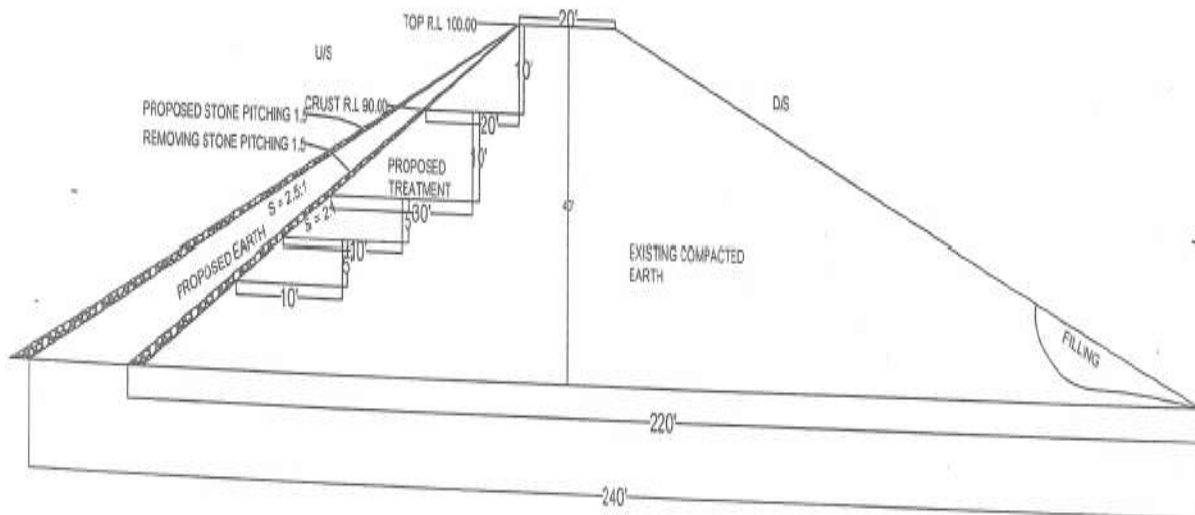


Figure 3-17: Typical X-Section Shagai-11 Delay Action Dam RD 400

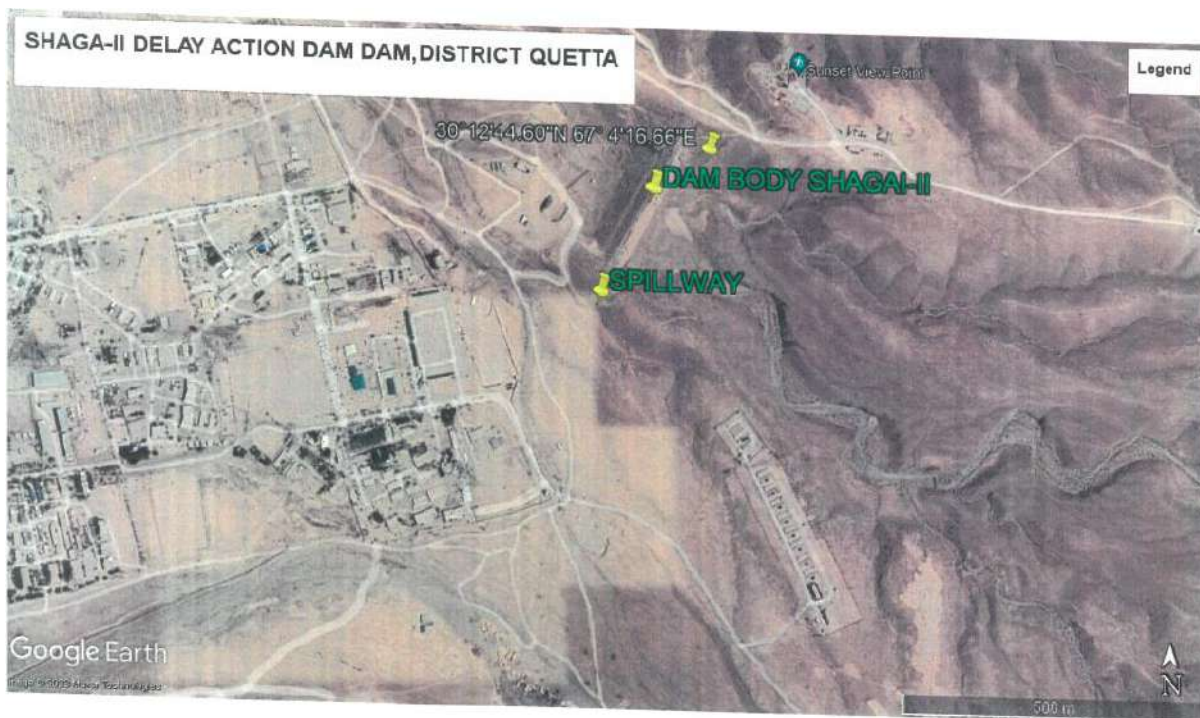


Figure 3-18: Location Map of Shagai-11 Delay Action Dam

3.3.9 Habib Dara Delay Action Dam-11

132. This dam was constructed during 1992-93 by the Irrigation Department of the Government of Baluchistan. Habib Dara, located in the narrow gorge of the Murder Hill range northeast of Quetta town, experiences flood flows from a small rivulet that affects the northeastern suburbs of Quetta. The entry of flood flows into the Marriabad area creates numerous problems for the residents of this low-lying area, as floodwater accumulates in Khad Ghulam (a closed depression) and spills into residential areas, requiring drainage through pumping.

133. In the past, prior to 1970, several small streams originating from the nearby hills surrounding Quetta Valley carried flashy flows as a result of rainfall. These flood flows were utilized for agricultural purposes and to recharge the groundwater aquifer through the construction of minor bunds. However, with the rapid increase in Quetta's population after 1970, these plains have been converted into residential areas, with many houses built encroaching on the waterways of these streams that drain the watershed. Consequently, these areas are significantly affected by floods as they flow towards Sariab Lorha, the main drainage line of the city.

134. Another pressing issue is the depletion of the groundwater table in Quetta Valley, which is being overexploited by both the public for agriculture and the government for domestic use. Despite delivering desired benefits until the unprecedented floods from 4th July to 26th August 2022, this dam was constructed on a tributary of Habib Nallah, and it could not withstand the heavy thrust of continuous floodwaters throughout its history, resulting in the breakage of the dam body. Therefore, immediate rehabilitation and restoration are necessary before the upcoming spell for the safety of public lives and properties.

135. The existing components of the dam are:

Dam Body (Earthen)

Length	=	300ft
Height	=	40ft
U/S Slope	=	2:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	220ft
U/S Stone Pitching	=	1.5 ft
Storage Capacity	=	45 Acre-Feet
Catchment Area	=	1.44 Sq. Miles
Total Discharge	=	1900 Cusecs

Spill Way

136. A simple cut spillway in Hard Soil with a stone Masonry Divide wall across Dam Body The parameters are:

Length of Spillway	=	200 Rft
Width	=	35ft (average)
Design Discharge	=	1900 Cusecs
Flow Depth	=	4.0 ft.
Free Board	=	4.0 ft.

Restoration

Dam Body (Earthen)

Length	=	300ft
Breached Portion L	=	130
Height	=	40ft
U/S Slope	=	2.5:1
DIS Slope	=	3:1

Top Width	=	20ft
Bottom Width	=	220ft
U/S Stone Pitching	=	1.5 ft.
Shingle laying on Top	=	0.5ft
Storage Capacity	=	45 Acre-Feet
Catchment Area	=	1.44 Sq. Miles
Total Discharge	=	3400 Cusecs
MS Pipe 12" Dia	=	320 Rft (Non-Functional)
RCC Core Wall	=	175 Rft

Spill Way

137. The Spillway is provided an extended wall up to 30 ft. across the Dam Body for avoiding retrogression. Side and Bed Cutting in rock is also proposed.

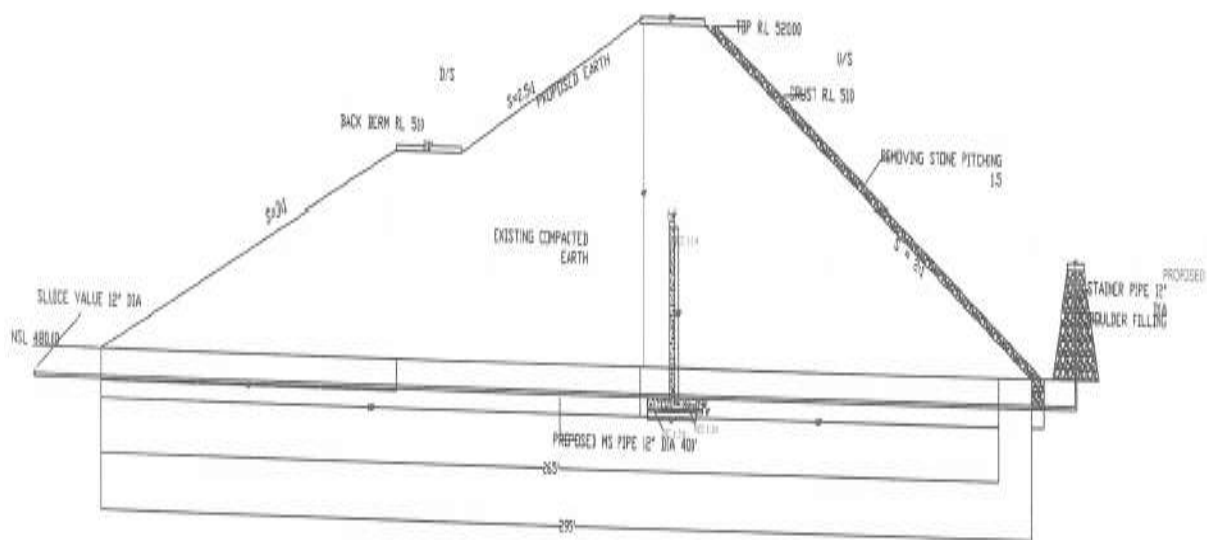


Figure 3-19: Typical X-Section Habib Dara II Delay Action Dam



Figure 3-20: Location Map of Habib Dara II Delay Action Dam

3.3.10 BREWERY DELAY ACTION DAM

138. The Brewery Delay Action Dam, commonly known as Kar Khasa Dam, was constructed during 2004 to 2006 under the program "Groundwater Recharge of Pishin, Quetta, Mastung, and Mangochar Valley" in the Federal PSDP. The dam is located in Kar Khasa Valley, approximately 6 km west of Quetta City. As part of the aforementioned program, the main purpose of the dam is to conserve floodwater for groundwater table recharging and flood mitigation.

139. There are approximately 10 tube wells of the Public Health Engineering Department located downstream of this dam, which have been providing a good discharge for the past two decades.

140. During the recent unprecedented flood of 2022, the spillway of the dam was functional. However, the high velocity discharge caused extensive damages downstream due to erosion. This resulted in threats to public and private properties, as well as to the lives of the inhabitants of Hazara Town, Bahadur Abad, Amin Abad, Killi Kiazai, Kirani, and the adjoining population. The high velocity spillway water carried a significant amount of silt, gravel, and even boulders downstream, which accumulated in the streets and roads of Hazara Town. This accumulation blocked traffic and hindered human movement. Therefore, immediate restoration of the main dam body is required, along with raising the crest level to increase the storage capacity of the dam and retain maximum water.

141. The existing parameters of the dam are:

Existing:**Dam Body (Earthen)**

Length	=	850ft
Height	=	45ft
U/S Slope	=	2:1
DIS Slope	=	3:1
Top Width	=	20ft
Bottom Width	=	325ft
U/S Stone Pitching	=	1.5 ft.
Storage Capacity	=	662 Acre-Feet
Catchment Area	=	10.90 Sq. Miles
Total Discharge	=	5600 Cusecs
MS Pipe 12" Dia	=	430 Rft (Non-Functional)

Spill Way

A Dry Hand Packed Treated spillway with following parameters are as under: Length of Spillway.

Length of Spillway	=	650 Rft
Width	=	150ft (average)
Design Discharge	=	5600 Cusecs
Flow Depth	=	4.0 ft.
Stone Pitching	=	1.5 ft.

Restoration**Dam Body (Earthen)**

Length	=	850ft
Height	=	45ft
U/S Slope	=	2.5:1
DIS Slope	=	3:1
Top Width	=	20ft
U/S Stone Pitching	=	1.5 ft.
Shingle laying on Top	=	0.5ft
Storage Capacity	=	857 Acre-Feet
Catchment Area	=	10.90 Sq. Miles
MS Pipe 12" Dia	=	370 Rft (Non-Functional)

Spill Way

Length of Spillway	=	13072 Rft
Width	=	75 x 18ft (average)
Width of Causeway	=	18ft
Pipe Culvert	=	24" Dia 5 Nos.
Length of Pipe Culvert	=	20ft
Pipe Culvert 12" Dia	=	12 Nos.
Length of Pipe Culvert	=	20ft

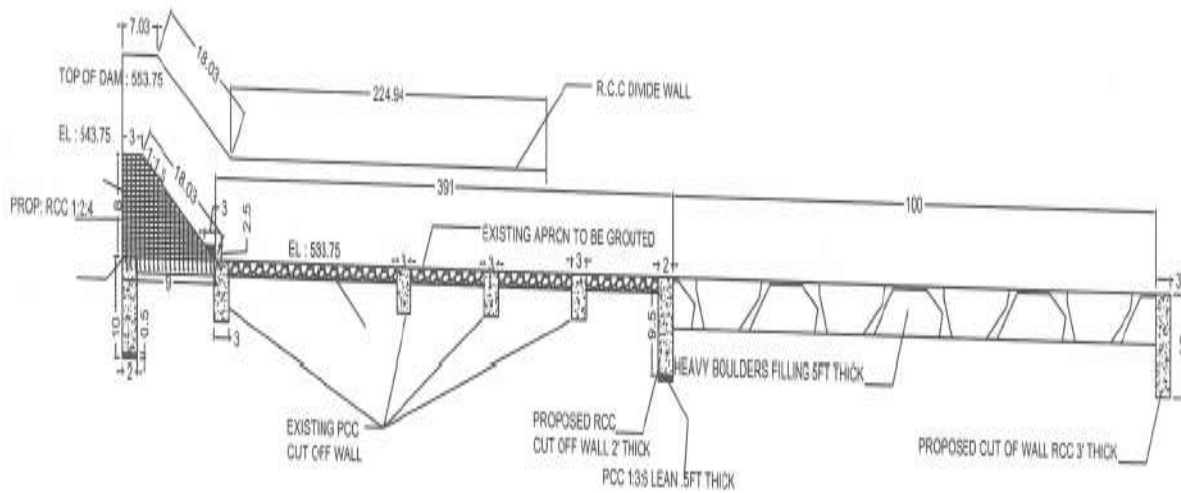


Figure 3-21: Typical X-Section of Spillway Brewery Delay Action Dam



Figure 3-22: Location Map of Brewery Delay Action Dam

3.3.11 KACH DELAY ACTION DAM

142. The Delay Action Dam suffered damage due to unprecedented heavy rainfall during July-August 2022. The dam body and core wall were damaged as a result. Hydrological studies indicate a high rate of runoff in the Kach hill torrents, which flow towards the Sarakhulla and Saraghurgai areas. This situation creates a sense of insecurity and life-threatening conditions, causing damage to public and private infrastructure and significantly impacting the socio-economic conditions of the downstream population. Therefore, it is crucial to take concrete steps in the restoration of the dam in order to conserve flood flows and facilitate the direct utilization of water by the local population throughout the year, even during dry periods. Additionally, there are plans to connect the available water from the dam

to the WASA and PHED Water Supply Network for drinking purposes using a 12" diameter pipe outlet.

143. The existing parameters of the dam are:

Dam Body

Length	=	889.72ft
Max Height	=	40ft
U/S Slope	=	3:1
DIS Slope	=	4:1
Top Width	=	20ft
U/S Stone Pitching	=	25 ft.
Shingle laying on Top	=	1.5ft
Storage Capacity	=	650 Acre-Feet
Catchment Area	=	42.50 Sq. Miles
Total Discharge	=	8174 Cusecs
RCC Core Wall	=	Max Height 48 ft.

Access Road

Length	=	13072 Rft
No. of Causeways	=	75 x 18 ft.
Width of Causeways	=	18 ft.
Pipe Culverts	=	24" dia 5 Nos.
Length of Pipe Culvert	=	20 ft.
Pipe Culverts 12" Dia	=	12 Nos.
Length of Pipe Culvert	=	20 ft.

Spill Way

RCC spillway with following parameters:

Length	=	502 Rft
Width	=	200ft (average)
Design Discharge	=	9000 Cusecs
Flow Depth	=	7.0 ft. & FB 3.0 ft.

Restoration

The restoration of damaged water way portion is proposed to be constructed along with provision of a RCC Core Wall.

Dam Body Restoration Length	=	300 Rft
Core Wall	=	162 Rft damaged/breached
Portion	=	Max Height 12 ft.

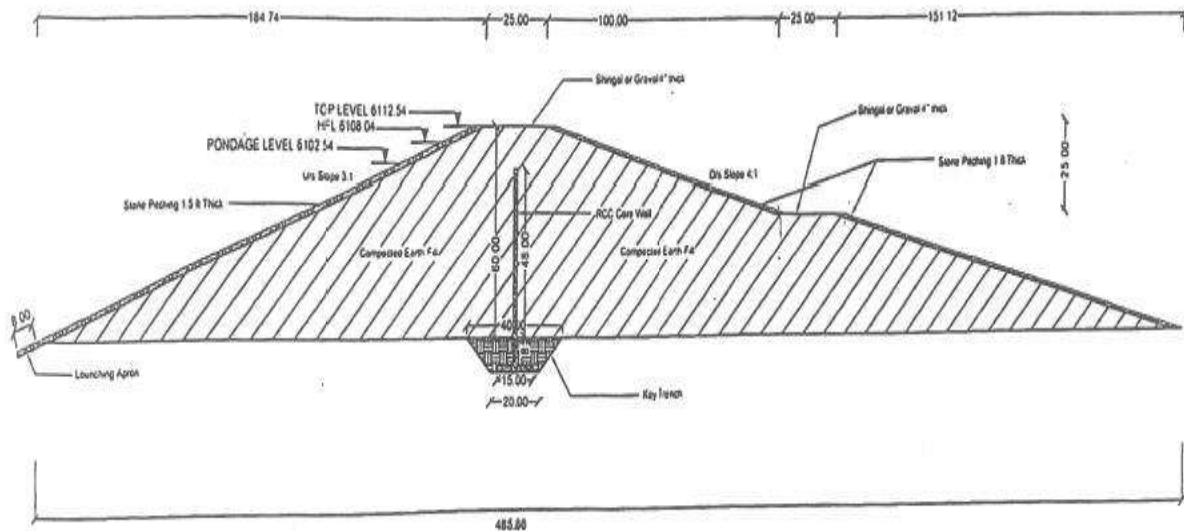


Figure 3-23: Typical X-Section of Kach Delay Action Dam



Figure 3-24: Location Map of Kach Delay Action Dam

3.4 Project Cost

144. The estimated total cost for construction of proposed project is 992.689 Million PKR. This cost is tentative and will be finalized with the detailed technical design of the proposed project.

3.5 Project Administrative Jurisdiction

145. The proposed project falls under the jurisdiction of Deputy Commissioners of Quetta, Balochistan province.

3.1 Project Implementation Schedule

146. It is estimated that with efficient management the work will be completed within 10 months after the commencement subject to availability of funds.

3.2 Construction Activities and Civil Works

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

- **Excavation:** Earthwork excavation in irrigation channels and drains to designed section, grades, and profiles. Excavated material to be disposed of and dressed within a 50 ft. (15m) lead, using shingle or gravel.
- **Retaining Walls:** Filling and compacting soil, earth, and boulders behind retaining walls, including excavation of soil.
- **Concrete Work(Spillway):** Providing and laying 1:4:8 cement concrete using crushed stone (19 mm or 3/4") and down gauge in the foundation, including leveling, compacting, and curing.
- **Wall and Piers:** In situ laying of cement concrete (1:1.5:3) in wall and piers using approved coarse sand and crushed aggregate (19mm or 3/4" and down gauge), including compacting, curing, formwork cost, and its removal.
- **Reinforcement:** Providing, fabricating, and laying deformed Grade 60 steel reinforcement (deformed bar) for R.C.C work, including the cost of preparation and positioning.
- **Waterstop and Joints:** Installing P.V.C. ribbed waterstop, forming expansion joints with cork bitumen, and providing joint sealing compound.
- **Drainage:** Filter granular backfill behind retaining wall to prevent weep hole choking. Laying and testing PVC pipes (2 inches Dia, C-Class) as per specifications.
- **Dam Foundation:** Excavation, layout, dressing, refilling around structures with excavated earth, watering, and ramming, with a lead of any lift and lead.
- **Concrete Work(Dam):** Providing and laying 1:2:4 cement concrete using crushed stone (19 mm or 3/4") and down gauge in the foundation, including leveling, compacting, and curing.
- **Masonry:** Providing, dressing, and laying random rubble stone masonry in foundation, plinth, and basement, with cement sand mixture 1:4.

148. No demolition works are to be conducted as part of the proposed works and the construction material of all types is available in district Quetta through commercial suppliers and no material will be sourced from river / stream bed.

3.3 Construction Camps

- 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

149. 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 shall be selected away from settlements. The contractors may acquire land on lease from private landowners.

3.4 Workforce Requirement

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

Workforce during Construction Phase

151. Total man power required on site for all the site of proposed Project will be approximately 220 workers per day, depending on the type of construction. They will be inside of the area of possession, under the supervision of a Contractor who will be awarded the contract.

Workforce during Operation Phase

152. Total man power required during operation phase for proposed Project will be approximately 44 workers comprising skilled and unskilled staff.

3.5 Solid Waste Generation

153. 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).

154. Considering the labourers (about 220 in numbers) residing in the construction camp and the locally available labour, an average solid waste generation rate of 0.5 kg/capita/day⁴ is adopted for the estimation of solid waste generation². Based on this assumption, a total of about 110 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 Quetta District.

3.6 Water requirement

Construction Phase

155. The water consumption is estimated to be 8800 gallons/day³ for 220 construction workers during construction phase of the proposed Project.

² Source: The World Bank Report 2012. What a Waste: A global review of solid waste management, Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day

³ Tentative Work Force Requirements Contractor Staff =

Operation Phase

156. The water consumption is estimated to be 1760 gallons/day for 44 workers during operation phase of the proposed project.

3.7 Waste Water Generation

157. The wastewater generation is estimated to be 7,040 litres/day. Constructed wetland will be best option for wastewater treatment. Considering location of the project area in the outskirts of Quetta, best disposal option will be a constructed wetland for wastewater treatment. Its operation will result in treated water within the WHO standards being discharged into the environment and thus is expected to reduce the load on the aquatic and terrestrial habitats present in proximity to the receiving water bodies in the project areas.

Power Requirement

Construction Phase

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

3.6 CONSTRUCTION EQUIPMENT

159. 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 ³)	Various depending upon contractor progress
2	Motor Grader cat 14G or Equivalent	
3	Front End Loader Bucket capacity = 6 m ³	
4	Sheep foot roller for core compaction (10-ton capacity)	
5	Dump Trucks (capacity = 14 m ³)	
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	

Water consumption per (1) worker = 40 liters/day

(220 workers) x (40); = 8800 liters/day

Wastewater generation=(220 workers) x (80% of water consumption)=7040 liters/day

4. ENVIRONMENTAL AND SOCIAL BASELINE

4.1 GENERAL

160. 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

161. 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.

Spatial project boundary is defined as the specific site area that includes the areas of construction and operation and the zones of influence around the project site i.e. physical, biological and socioeconomic. It specifically includes the construction area and the land adjacent to it. The adjacent land includes any area that is directly disturbed by the construction and operational activities of the project. The project boundary may vary for different major areas covered under physical, biological and socioeconomic environment depending upon the areas of influence. In this report, the Area of Influence (AOI) is referred where the potential impacts of the Proposed Project are anticipated. The AoI includes all those areas in the region within 5 km from the project site and which may be affected directly or indirectly by the project activities.

162. This chapter describes the environmental setting of the proposed interventions.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Topography

163. The general characteristics of the area is mountainous. The mountains are intersected by long narrow valleys consisting of flat alluvial plain with heavy pebbly slopes rising on either side. The general elevation of the District is about 1,200 to 3,500 meters above mean sea level (msl), while the elevation of project area ranges from 1,600 to 1,700 meters. **Figure 4.1** shows the topography of the project area.

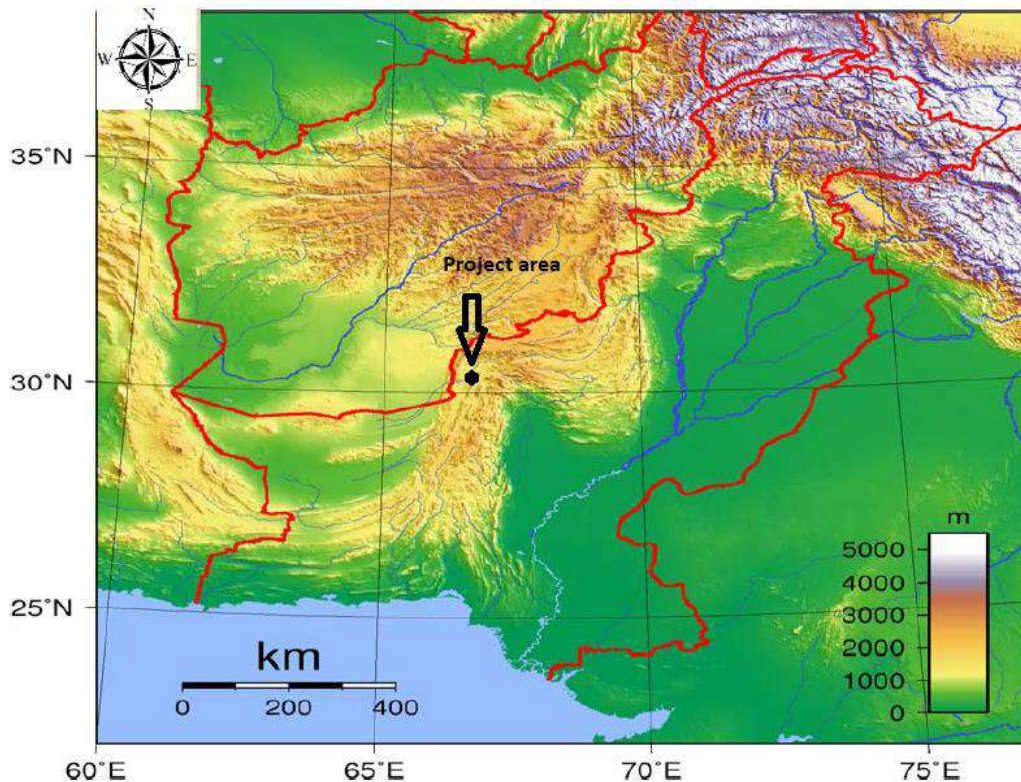


Figure 4-1: Topography of the Project Area

4.3.2 Geology and Soil

164. The Geological Quetta Transverse Zone, mainly composed of EW-trending mountain ranges of the Sulaiman Fold Thrust Belt and Sibi - Zarghun Trough, primarily consists of ridges of Miocene-Pleistocene Molasse-type sediments with over 7 km thicknesses in the Quetta and Pishin basins. The Quetta Sub-basin is an inter-mountainous valley in the northernmost part of the Kirthar Fold-Thrust Belt, with Lower Jurassic to Holocene rock successions. It is a synclinal valley filled with alluvial deposits, primarily silt, sand, clay, and gravel. Between Murdar Ghar Mountain to the east and Chiltan Mountain to the west, it is an extended depression. The valleys form broad synclinal basins, mostly consists of softer/incompetent rocks and parallel or concentric low homoclinal ridges, hogbacks, and cuestas. Groundwater in the basin is being drawn from both confined and unconfined aquifers. Alluvial fan aquifer is the most common and commonly utilized aquifer, consisting of gravel dominated and sand-dominated deposits. The Shirinab Formation and Chiltan Limestone, as well as conglomerates and sandstones from the Urak and Spin Karez groups, make up the bedrock aquifer. Thick and massive limestone succession, are ideal aquifer because of their secondary porosity and permeability. The Jurassic Chiltan Limestone hosts most tube wells in the “hard-rock” aquifer.

165. The soil of the project area is shallow Loamy Gravelly and rock outcrops of plateaux. The central part of the Quetta valley is covered by a soil that ranges from sandy loam to silt loam. This type of soil is good for crop production. At the margin of the valley near foothills, the soil consists of sandy loam, mixed with pebbles and rock fragments and is suitable for vegetation.

4.3.3 Hydrology of the Quetta Valley

166. The Quetta Sub-basin is one of the nine sub-basins of the Pishin Lora River Basin in terms of hydrology. The hydrological features of Quetta Valley are influenced by both structural and stratigraphic factors. The valley is geomorphological separated into two drainage basins northern and southern. The surface water divide, on the other hand, is not well defined and indicates a rolling form of terrain in Landi Hill. The river systems of the Sariab Lora and Baleli make up the northern basin. The Samungli-Baleli gap is where these rivers depart the basin. The Chiltan, Murdar, Zarghoon, and Takatu mountain ranges supply the basin's primary streams. Both rivers also convey Quetta's and its surroundings' municipal effluent. The Dagari and Kumbelan mountain ranges provide flood water to the southern basin, which is known as Dasht e Khuni. All flood water pools in Dasht Playa evaporate and/or percolate into the ground due to the basin's closed drainage system. The Baleli River flows through the valley's center, mainly from south to north, where it joins the Pishin River (Pishin Sub-basin). The Baleli River is fed by little passing streams originating in the neighboring mountains and the other side Hanna Lake is in the hills towards the beginning of the Urak Valley, 17 km east of Quetta. This lake was constructed to keep rain and flood water from flowing into Quetta from the Zarghoon and Murdar Mountains. The Hydrological features map of Quetta Valley indicates that the red line depicts the district's boundaries, the blue lines indicate streams and tributaries, and the green dots depict dams in the research region (Fig. 4-2).

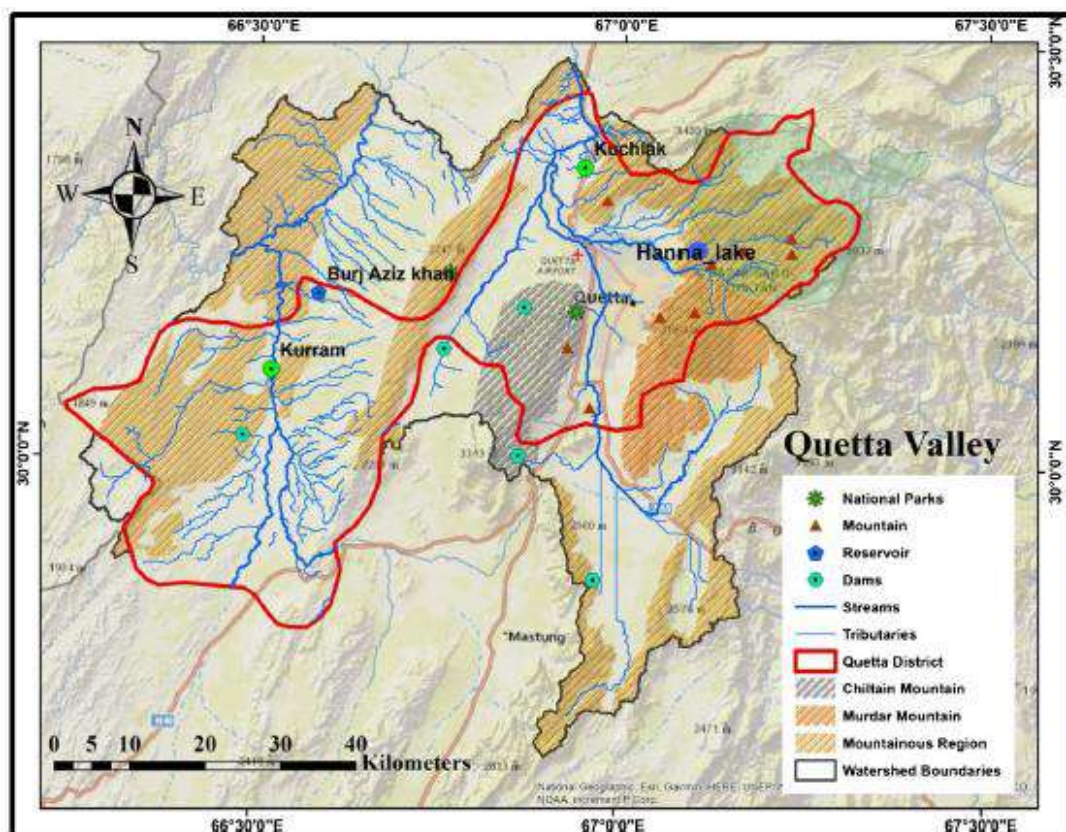


Figure 4-2: Hydrological features map of Quetta Valley⁴

⁴ Qureshi, A. L., Jamali, M. A., Hussain, S., Memon, F. A., Zaidi, A. Z., Zafar, S., & Ahmed, W. (2022). Subsurface depleting aquifers in the sedimentary terrain of Quetta Valley in Balochistan: a review. *Arabian Journal of Geosciences*, 15(21), 1648.

4.3.4 Climate and Meteorology

a) Average Temperatures

167. Figure 4-3 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 Quetta. 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 years⁵

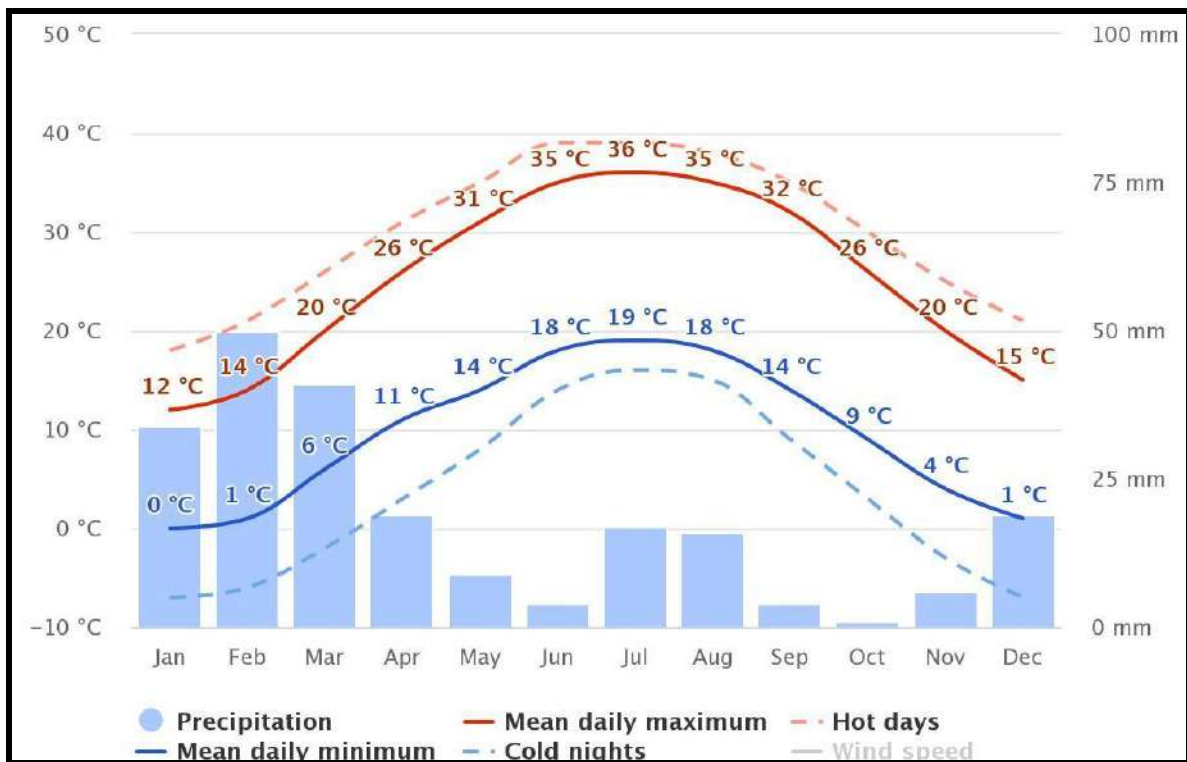


Figure 4-3: Average Temperatures

168. As it can be seen from Figure 4-3 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 36 °C and 19 °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 0 °C in January. The maximum temperatures are presented in Figure 4-4.

⁵ https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/liaquatpur_pakistan_1172020

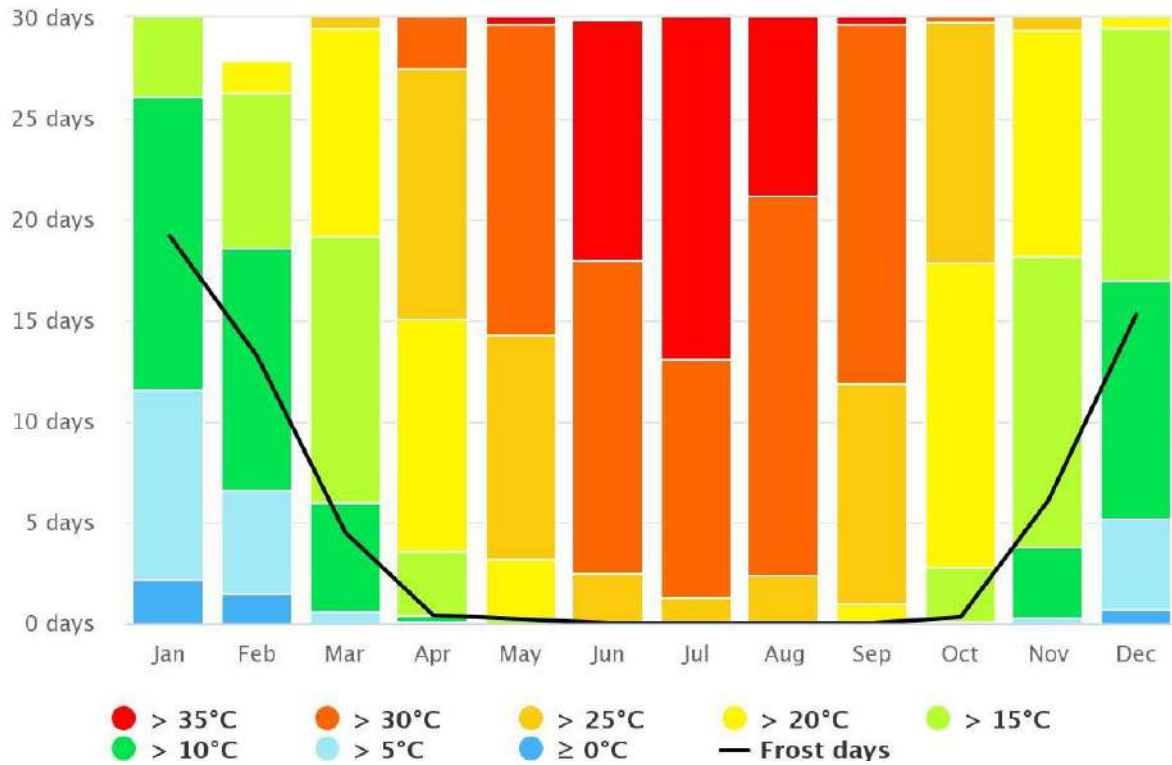


Figure 4-4: Maximum Temperatures

b) Rainfall

169. Table 4-1 shows mean monthly and annual rainfall. The average annual rainfall of the Quetta is about 183.98 mm, while on the average the maximum monthly rainfall is 42.04 mm during the month of February and a minimum of 1.44 mm in July. The maximum rainfall occurs during the months of January to April, which is about 79% of the annual rainfall. July is normally the months with least precipitation.

Table 4-1: Mean monthly and annual Rainfall in Quetta

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2009	69.00	78.00	22.00	42.40	10.00	0.00	1.00	0.00	0.00	0.00	0.00	97.00	319.40
2010	27.00	26.00	4.00	16.00	9.00	13.00	2.00	1.00	0.00	6.00	0.00	0.00	104.00
2011	15.00	101.00	0.00	43.00	0.00	2.00	1.10	5.00	47.00	16.00	21.00	1.00	252.10
2012	12.20	30.10	8.10	85.30	1.00	0.00	0.00	0.00	0.00	0.00	3.10	30.30	170.10
2013	4.10	94.20	41.10	35.00	0.00	0.10	0.10	24.00	0.00	0.00	20.10	0.10	218.80
2014	1.00	17.10	58.20	17.20	25.40	0.10	0.00	0.00	0.00	0.00	0.00	1.00	120.00
2015	15.00	15.10	43.00	24.10	5.10	0.10	7.10	1.00	1.00	3.00	34.10	5.00	153.60
2016	56.00	0.00	64.10	2.20	1.00	14.10	5.00	0.10	0.10	0.00	0.00	0.10	142.70
2017	84.01	26.00	48.32	0.01	0.64	0.00	0.02	0.00	0.00	0.00	1.01	0.01	160.02
2018	1.01	31.12	38.81	48.41	0.03	0.00	0.00	0.00	0.00	0.01	0.01	0.01	119.41
2019	37.34	39.82	67.22	50.32	0.06	0.00	1.00	0.00	0.00	5.00	23.31	13.02	237.09
2020	88.61	46.02	31.02	31.22	13.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	210.48
2021	0.00	1.01	28.00	4.03	13.03	0.00	1.02	20.02	0.00	0.00	13.01	6.03	86.15
Average	34.19	42.04	35.49	32.93	5.49	2.45	1.44	2.59	4.01	2.50	8.55	12.30	183.98

Source (Pakistan Meteorological Department-Quetta Station Data)

c) Wind:

170. Figure 4-5 shows the days per month, during which the wind reaches a certain speed. Maximum wind speeds can be observed in the months of March to June which is >28 km/h. Wind speed >12 km/h dominates throughout the year.

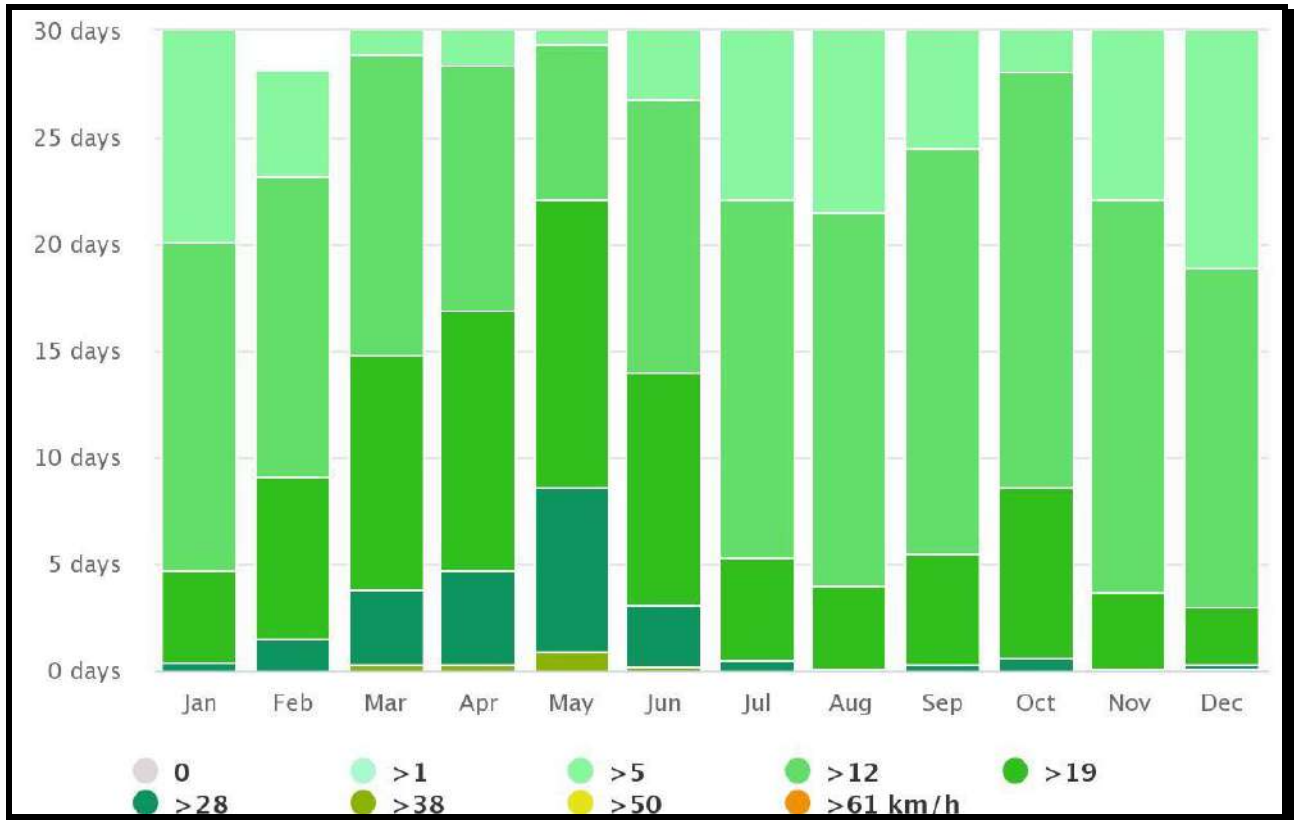


Figure 4-5: Wind Speed

171. The wind rose for Quetta shows how many hours per year the wind blows from the indicated direction. Wind rose is shown in Figure 4-6. It can be seen from the wind rose that dominant wind direction is towards West (W), WNW (West North-west), WSW (West South-West) and South (S).

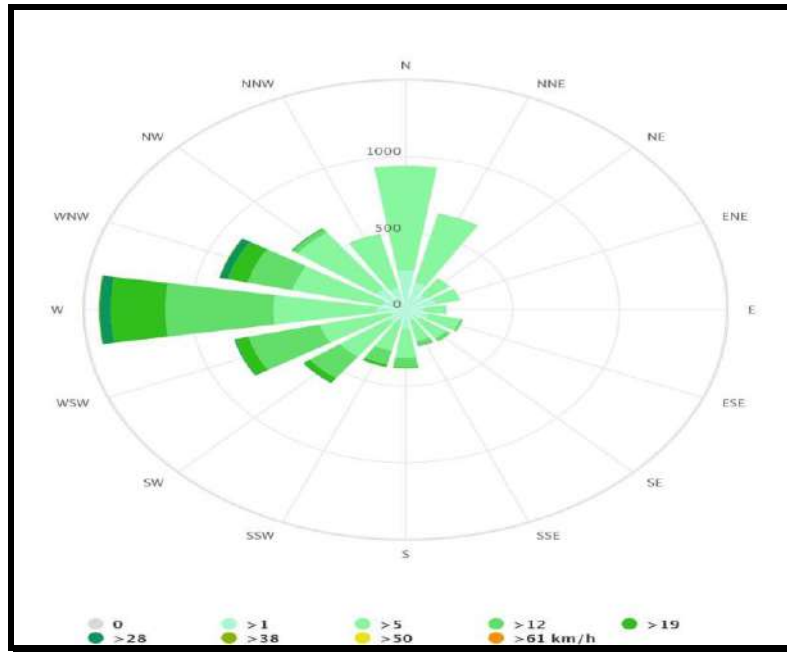


Figure 4-6: Wind Rose

4.3.5 Climate Change.

172. 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 Baluchistan Provinces, already considered intense heat zones.

173. 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 Quetta 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 4-7: Balochistan plateau, 18 River Basins and Quetta Valley

Climate Risk and Vulnerability Assessment (CRVA)⁶

174. Quetta valley that is part of Pishin Lora basin is located adjacent to Zhob and Mula River Basins (as shown in Figure 4-7). 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

175. Climate Change analysis was conducted using Global Climatic Model(GCM). 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.

176. Data from Global Climatic Model for 83 years (2017-99) show 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. Figure 40 (a) and Figure 40 (b) represents highest seven years of precipitation data for Zhob and Mula watersheds.

177. For vulnerability analysis, Flood Inundation Modelling was done using HEC-RAS and SWAT models. A vulnerability and impact matrix was developed to evaluate the possible climatic effects on both the river basins. It was concluded from matrix that Zhob river basin is prone to losses associated with increasing temperatures, decreasing rainfall and more frequent droughts. Whereas, Mula river basin is characterized by a decreasing maximum

⁶ 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>

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.

178. **Climate Risks and Vulnerabilities in the Project Area**

179. The increasing trend in frequency and magnitude of floods in river basin adjacent to the Quetta valley 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

180. Quetta lies in a seismically active red zone at the nexus of a major rift. The 1935 earthquake (7.6 on R/C) remains the most massively destructive earthquake to date. The entire city was destroyed and 30,000-60,000 people were killed. Since then, it has faced quite a few earthquakes; especially the one in 1997 and on October, 28/29, 2008 which occurred in the Suleiman fold. The tremors were felt in Quetta, Mastung, and Sibi Bolan. Most of the casualties were from two villages on the outskirts of Ziarat Town.

181. The project area is located in Seismic Zone-IV, where zone-IV represents seismic factor ground acceleration $>0.32g$. **Figure 4.8** shows the seismic zoning map of Pakistan indicating that project area is falling under Seismic Zone-IV that is high seismic zone.

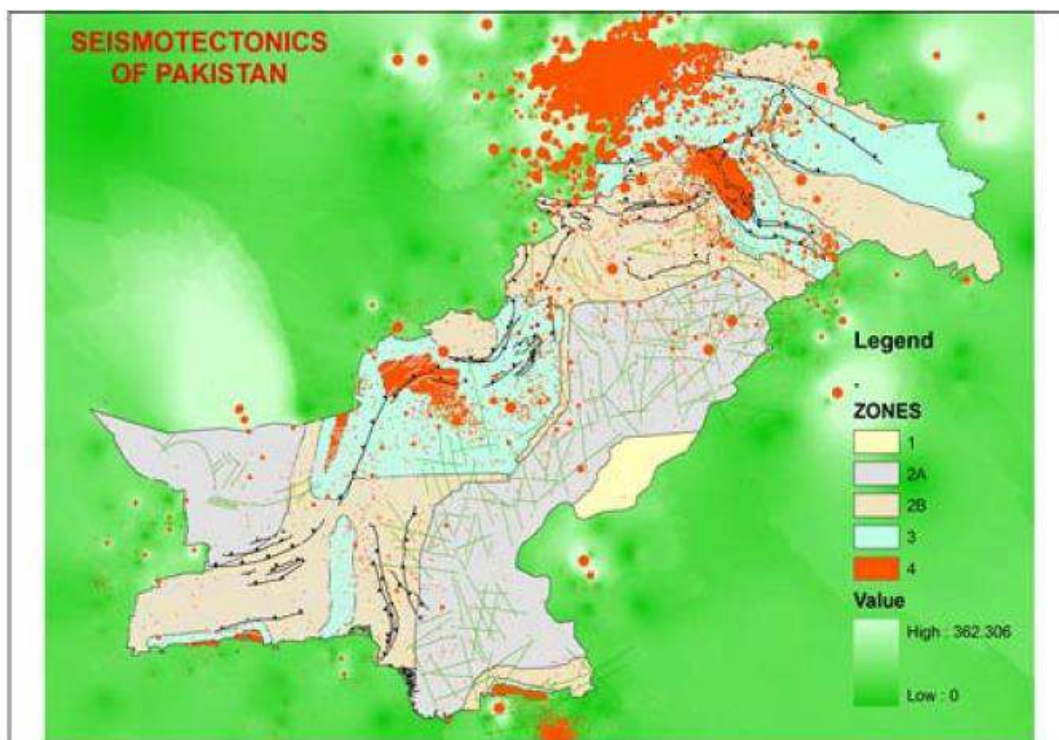


Figure 4-8: Seismic Zoning Map of Pakistan

4.3.7 Sensitive Receptors

182. All the settlements having sensitive receptors i.e School, basic health units are located away from the rea of Influence (500 m) of the proposed project (Figure 4-9a) Only Brewery settlement is located about 330 m from the Brewery Delay Action dam (as shown in Figure 4-9 b) that is very small settlement having few houses. It has no sensitive receptor in it.

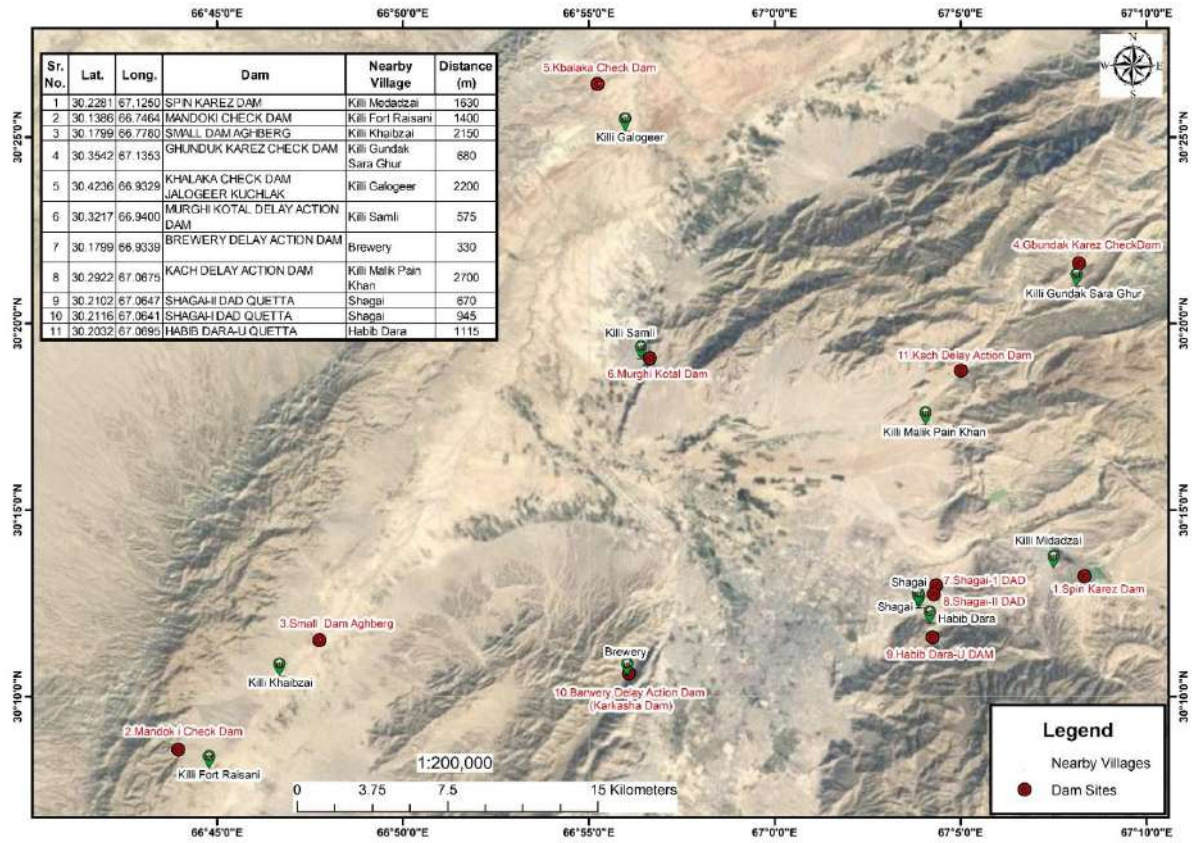


Figure 4-9:a) Sensitive Receptors and b) Brewery village location from nearby dams



4.3.8 Ambient Air Quality

183. Air quality in the project area is fairly clean. There are no significant sources of air pollution in the area. The other 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.

184. Industries and commercial areas are fairly far away from the project site. Domestic sources of air pollution, such as emissions from wood stoves in some households, are a minor source of air pollution.

185. The ambient air quality monitoring was conducted by EPA registered Lab Sustainable Environmental Services in March 2023 at proposed water resources building site Quetta of Balochistan Irrigation Department. 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 PM2.5 is exceeding WHO limit, Possible reasons for high values of emissions are vehicles, commercial activities and other household activities.

Table 4-2: Ambient Air Quality

Parameters	NO	NO ₂	SO ₂	CO	Ozone	PM _{2.5}	PM ₁₀	SPM
NEQS & BEQS Limits	24 hrs. (40 µg/m ³)	24 hrs. (80 µg/m ³)	24 hrs. (120 µg/m ³)	8 hrs. (5 mg/m ³)	1 hr. (130 µg/m ³)	24 hrs. (35 µg/m ³)	24 hrs. (150 µg/m ³)	24 hrs. (500 µg/m ³)
WHO Limits	-	24 hrs. (25 µg/m ³)	24 hrs. (40 µg/m ³)	8 hrs. (4 mg/m ³)	60 (Peek Season)	24 hrs. (15 µg/m ³)	24 hrs. (45 µg/m ³)	-
Average Test Result	6.65	20.70	1.38	0.023	5	24.23	39.2	107.8

Source: ADB Funded Balochistan Water Resources Development Sector Project of BID (March 2023)

4.3.9 Ambient Noise

186. Noise monitoring was conducted by EPA registered Lab Sustainable Environmental Services in March 2023 at proposed water resources building site Quetta of Balochistan Irrigation Department. Noise level was monitored with the help of a portable digital sound meter. Table 4-3 indicates that noise levels monitored in Project area during day time and night time were within prescribe limits of NEQS and WHO values. Limits for commercial area is considered because monitoring was conducted in urban area having commercial activities. Environmental Monitoring report has been attached as Annexure-III.

Table 4-3 Ambient Noise Quality

Time	WHO Limits dB(A)	NEQS & BEQS Limits dB(A)	Average Results dB(A)
Day Time	65	75	54.2
Night Time	55	65	47.5

Source: ADB Funded Balochistan Water Resources Development Sector Project of BID (March 2023)

4.3.10 Waste Water Quality

187. Wastewater sample was collected by EPA registered Laboratory Sustainable Environmental Services in March 2023 at proposed water resources building site Quetta of BID. However, the tested parameters of the sampled comply the drinking water National Environmental Quality Standards. Environmental Monitoring report has been attached as Annexure-III.

Table 4-4: Water Quality of the project area

Sr. No.	Parameters	Unit	Testing Method	NEQS Limits	WHO Limits	BEQS Limits	Results
1.	Temperature AT 40°C	°C	By Calibrated Thermometer	40 + ≤ 03°C	40 + ≤ 03°C	40 + ≤ 03°C	31.2
2.	pH @ 25°C	---	ASTM D-1293	6 to 9	6 to 9	6 to 9	7.45
3.	Biological Oxygen Demand	BOD5	APHA-5210	80	80	80	64.5
4.	Chemical Oxygen Demand	COD (mg/L)	ASTM D-1252	150	150	150	129
5.	Total Dissolved Solids	(TDS) (mg/L)	APHA-2540 C	3500	3500	3500	2210
6.	Total Suspended Solids	(TSS) (mg/L)	APHA-2540 D	200	200	200	113
7.	Greases & Oil	O. Gr (mg/L)	ASTM D-4281	10	10	10	0.09
8.	Chloride	Cl ¹⁻ (mg/L)	ASTM D-512	1000	1000	1000	732
9.	Phenolic Compound	Phol (mg/L)	ASTM D-1783	0.3	0.3	0.3	ND
10.	Fluoride	F ⁻ (mg/L)	APHA-4500-F-1	10	10	10	5.6
11.	Anionic Detergent	Det (mg/L)	ASTM D-6173	20	20	20	3.4
12.	Selenium	Se ² (mg/L)	APHA-4500-Se	0.5	0.5	0.5	ND
13.	Sulphide	S ² (mg/L)	APHA-4500-S ⁻²	1.0	1.0	1.0	0.36
14.	Ammonia	NH ₃ (mg/L)	ASTM D-1426	40	40	40	15.2
15.	Cadmium	Cd ² (mg/L)	ASTM D-3557	0.1	0.1	0.1	< 0.1
16.	Chromium Trivalent	Cr ³ (mg/L)	APHA-3500-Cr	1.0	1.0	1.0	ND
17.	Chromium Hexavalent	Cr ⁶ (mg/L)	APHA-3500-Cr	1.0	1.0	1.0	0.029
18.	Lead	Pb ² (mg/L)	ASTM D-3559	0.5	0.5	0.5	0.3
19.	Mercury	Hg ² (mg/L)	Kit Method	0.01	0.01	0.01	ND
20.	Nickel	Ni ² (mg/L)	HACH Dimethylglyoxime Method	1.0	1.0	1.0	ND
21.	Silver	Ag (mg/L)	ASTM D-3866	1.0	1.0	1.0	ND
22.	Zinc	Zn ² (mg/L)	HACH Zincon Method	5.0	5.0	5.0	0.5
23.	Total Iron	Fe ²⁺ (mg/L)	APHA-3500-Fe	8.0	8.0	8.0	0.7
24.	Manganese	Mn ² (mg/L)	APHA-3500-Mn	1.5	1.5	1.5	0.06
25.	Boron	B (mg/L)	APHA-3500-Mn	6.0	6.0	6.0	0.8
26.	Sulphate	So ₄ (mg/L)	APHA-4500-SO ⁻⁴	600	600	600	226
27.	Arsenic	As (mg/L)	Palintest Kit	1.0	1.0	1.0	ND
28.	Copper	Cu ²⁺ (mg/L)	HACH Biquionoline	1.0	1.0	1.0	0.04
29.	Chlorine	Cl ₂ (mg/L)	HACH DPD Method	1.0	1.0	1.0	ND
30.	Aluminum	Al (mg/L)	HACH Eriochrome Cyanine R	1.0	1.0	1.0	ND

Sr. No.	Parameters	Unit	Testing Method	NEQS Limits	WHO Limits	BEQS Limits	Results
31.	Total Kjhedal	(mg/L)	Kit Method	2.0	2.0	2.0	0.26
32.	Barium	Ba (mg/L)	ASTM D-4382	1.5	1.5	1.5	0.35

Source: ADB Funded Balochistan Water Resources Development Sector Project of BID (March 2023)

4.4 BIOLOGICAL ENVIRONMENT

4.4.1 Flora

188. Major tree species in District Quetta are Obusht Apurs or (Juniperous excelsa polycarpus), Wild Ash (Fraxinus Xanthoxyloides), Shinay or Wild pistachio (pistatio khinjjak), Surai (Rosa beggeriana), Anjir (Ficus johannis), etc. In the valleys, Ghaz (Tamarix spp) is found in streambeds.

189. The main shrubs and bushes are Adang (Lonicera hypoleuca), Chank (Cerasus rechingrii), Delako (Convolvulus spinosus), Gringosehchob (Spiraea brahuica), Makhi (Caragana ambigua), Mateto (Salvia cabulica), Mazhmunk (Amygdalusbrahuica), Phiphal (Daphne mucronata), Saisubai (Onobrychs cornuta), Sehchob (Cotoneaster afghanica), Shenalo (Astragalus stocksii), Tharkha (Artemisia maritime), Oman (Ephedra nebrodensis), Wild almond (Prunus ebernea), Zralg (Berberis lyceum), etc.

190. The ground cover of District Quetta is constituted mainly by Herbs like: Atambae (*Valerianella szovitsiana*), Cheir (*Ferula costata*), Kamha (*Ferula ovina*), Sagdaru (*Heliotropium dasycarpum*), Ushi (*Ferula oopoda*), etc. and grasses like: Adin (*Phacelurus speciosus*), Gasht (*Stipa trichoides*), Hawae (*Cymbopogon jawarancusa*, *C. commutatus*), Kaj (*Chrysopogon aucheri*), Kholambae (*Avena sterilis*), Lashabae (*Poa bulbosa*), Sarandu (*Biossiera squarrosa*), etc.

191. Vegetation zones of the district consist mainly of the following categories (Table 4-5):

Table 4-5 Vegetation Zones of Quetta District

Vegetation Zone	Floristic composition
Uphill steep rocky cliffs	Like Chiltan, Takatu, Murdar and Zarghoon hills, where <i>Juniperus Excelsa polycarpus</i> is the predominantly climax Species associated with <i>Pistacia khinjjak</i> and <i>Fraxinus xanthoxyloides</i> .
Foot hills and Piedmont plains	Mostly modified for urbanization, agriculture and other land uses. However, where ever the area is still undisturbed, it is dominated by a variety of shrubs like <i>Artemisia meritima</i> (<i>Tharkha</i>), <i>Prunus ebernea</i> (<i>Wild almond</i>), <i>Caragana ambigua</i> (<i>Makhi</i>), <i>Berberis lyceum</i> (<i>Zralg</i>) and <i>Sophora griffithii</i> (<i>Ghuzaira</i>) associated with herbs and grasses.
Dry stream beds	Tamarix Spp. is commonly seen

Reference: (Provincial and District Forest Departments, IUCN, UNDP, WWF, GEF)

Rangelands

192. Rangelands of the Quetta districts are classified as Central Balochistan Ranges. Some of their species include: Gung (*Vitex agnus-castus*), Ghureza (*Sophora lopcuroides*), Tharkha (*Artemisia maritime*), Zawal (*Achillea santolina*), Zoz (*Alhagi camalorum*), Spanda

(*Peganum harmala*), Washta (*Stipa pennata*), Weezh (*Pennisetum orientale*), Sargarai (*Cymbopogon jawarancusa*), Margha (*Pennisetum annulatum*) etc. Productivity is moderate with average productive capacity of 160 kg / hectare. The rangelands have degraded due to overgrazing and fuel wood collection, and the only remnants are less palatable and poisonous plants like Ghuzera (*Sophora griffithii*). Degradation has been further aggravated by traditional nomadic migrants.

193. Most of the rangelands in the district belong to communities living around them. Due to communal ownership, usually these are accessible to all members of the community and also to nomads passing through the area on their traditional routes of migration to new areas. On the management side, no one assumes the responsibility for undertaking any activity aimed at restoration of depleted areas or for improvement to increase the forage production and other tangible and intangible benefits.

194. **Flora of sub-Project area** includes Almond, Apple, apricot, grapes, pomegranates, Chinar, Euclayptus, Ber (*Zizyphus nummularia*), Phulai (*Acacia modesta*), Makhi (*Caragana ambigua*), Tamarix sp. And Saccharam sp.

Figure 4-10: Flora in the vicinity of Dams

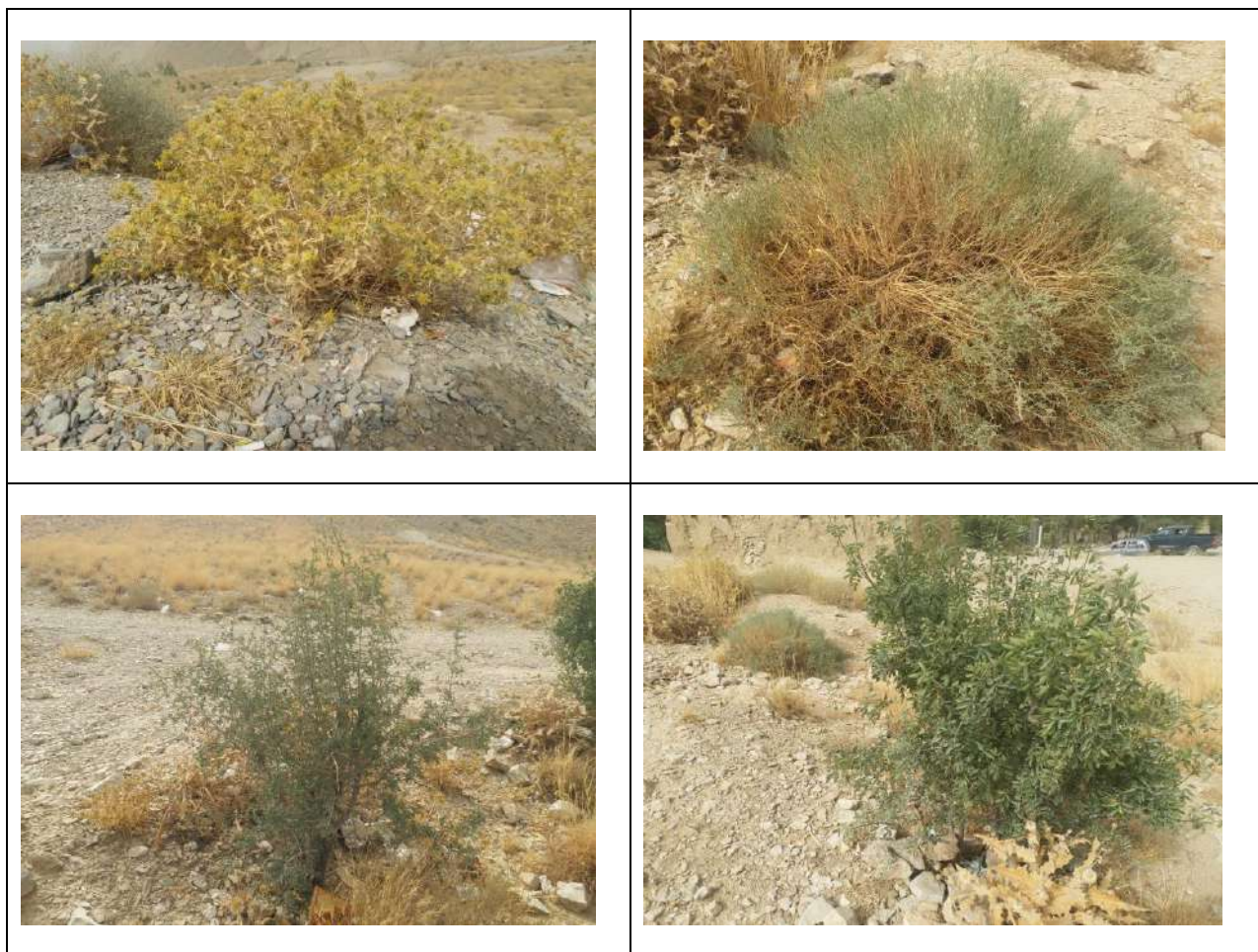




Figure 4-11: Flora Near Settlements



4.4.2 Fauna

195. Wildlife habitat type is Dry Steppe. Hazarganji Chiltan National Park is an outstanding example of representative fauna of the district. The key habitats are Chiltan, Takatu, Murdar and Zarghoon hills, where following species could be found:

196. **Mammals:** Wolf, Common red fox, Afghan fox, Asian jackal, Striped hyena, Indian crested porcupine, Cape hare, Hedgehog, Migratory Hedgehog, Beech or stone marten,

Marbled pole cat, Afghan pika, House mouse, Long - tailed hamster, Grey hamster, Persian jird, etc.

197. **Birds:** Accentor, Bulbul, Bunting, Chat, Chough, Chukar partridge, Eagle, Falcon, Lark, Magpie, Owl, Shrike, See partridge, Vulture etc.

198. **Reptiles:** *Lizards (Agama, Monitor)*, Afghan Tortoise (*Agrionemys horsfieldii*), Saw-scale viper (*Echis carinatus*), Levantine viper (*Macrovipera lebetina*), etc.

199. 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.

200. No protected area exists within or adjacent to the project area.

4.5 SOCIO-ECONOMIC BASELINE STRUCTURE

4.5.1 Population Size, Growth and Distribution

(i) Population Size and Growth

201. The population of Quetta District according to census 2017 is 22,756,99 which was 773, 936 in 1998 as compared to 381,570 in 1981 recording an increase of 99.16 percent over the last 17 years i.e. 1981-98. The increase of 51.19 and 77.64 percent was observed during Intercensal period 1972-81 (8.46 years) and 1961-72 (11.67 years) respectively. Overall the population of the district has increase quite rapidly showing substantial increase of 434.91 percent during the last 37 years i.e. 1961-98 which is more than five times. The average annual growth rate of population in the district is 5.83 during the intercensal period 1998-2017 which was 4.13 percent during Intercensal period 1981-98 as against 5.01 percent during 1972-81 and 5.05 percent in 1961-72.

Table 4-6: Population of different intercensal period

Description	1961	1972	1981	1998	2017
Population(thousand)	142070	252380	381570	773936	2275699
Intercensal increase %	--	77.64	51.19	99.16	--
Cumulative increase %	--	77.64	168.58	434.91	--
Average annual growth rate %	--	5.05	5.01	4.13	5.83

202. The total area of the district is 2653 square kilometers according to census report 2017 the population density of district is 857.78 persons per square kilometers, which was 286.04 persons per square kilometers according to census report 1998.

(ii) Household Size

203. According to census report 2017 the Average household size for the district is 8.22 persons, which was 8.5 persons in 1998. The household size varies at 8.61 and 7.78 for rural and urban areas respectively.

(iii) Rural/ Urban Distribution

204. The rural population of the district is 1274494 constituting 56 percent of the total population. The average annual growth rate of rural population is 9.96, which was 4.26

percent during 1981-98 and was 0.19 and 8.75 percent during 1972-81 and 1961-72 respectively. The urban population of the district is 1001205 constituting 44 percent of the total population. The average annual growth rate of urban population according to census report 2017 is 3.05 percent, which was 4.09 percent during 1981-98 and was 7.25 and 3.43 percent during 1972-81 and 1961-72 respectively.

(iv) Sex Ratio

205. 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 is 110.37, which was in 1998 118.45 for the district. The sex ratio in rural and urban areas of the district is 108.91 and 112.26 respectively which indicates that the male proportion is higher in the urban areas as compared to the rural areas.

(v) Religion

206. The population of the district is almost Muslim. They constitute 96.41 percent of the total population with a breakup of 98.52 percent in rural and 95.68 percent in urban. There are few Christian, Hindu, scheduled caste and other communities which are 3.59 percent of the total population.

Table 4-7: Religion of the district.

Religion	All Areas	Rural	Urban
Muslim	96.41	98.52	95.68
Christian	2.68	1.00	3.27
Hindu (Jati)	0.50	0.10	0.64
Scheduled Caste	0.05	0.08	0.04
Others	0.11	0.06	0.13

(vi) Cast and Tribes

207. There are many casts and tribes present in the project area. Major casts and tribes of the project area include Raisani, Mengal, Kakar, Bazai, Pirkani, Barech, Pashtoon, Muhammad Shahi, Syed, Khilji, Kiyazai and Muhammad Hassani.

(vii) Mother Tongue

208. 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.

209. The predominant mother tongues of population of the district are Pashto and Bullochi, spoken by 57.54 percent of the total population followed by others at 17.46 percent and Punjabi at 16.01 percent. The proportion of the population speaking Pashto and Bulloch is significantly higher in rural areas at 84.23 percent as compared to the urban areas at 48.34 percent. In contrast the proportion of others and Punjabi is higher in urban areas at 40.68 percent as against rural areas at 12.58 percent. The proportion of the population speaking Urdu, Sindhi and Saraiki is 8.99 percent.

(viii) Source of Drinking Water

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

(ix) Ground Water Depth

211. The groundwater depth in the project area ranges from 80 to 1000 ft. Dam wise estimated groundwater depth is as follows: in the settlement of Mandoki Check Dam, the depth is 300 ft; in Small Dam Aghberg, it is 200-250 ft; in Ghunduk Karez Check Dam, it is 80-90 ft; in Khalaka Check Dam, it is 800-1000 ft; in Jalogeer Kuchlak, it is 650 ft; in Murghi Kotal Delay Action Dam, it is 150-160 ft; in Kach Delay Action Dam, it is 400 ft; and in Killi Berwezy, it is 400 ft.

(x) Migration

212. 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.

(xi) Economically Active population

213. The economically active population of the Quetta district among the population aged 10 years and above to the total population is 23.35 percent which is 177.45 thousand souls with 96.33 percent male and 3.67 percent female. The remaining 76.65 percent economically inactive population consists of 29.16 percent children below 10 years, 30.32 percent domestic workers including 65.35 percent female amongst the total females and 0.74 percent male workers amongst the total males. In which 12.66 percent are students, while all other categories constitute 4.51 percent in the total economically inactive population of the district.

214. The labor force participation rate as percentage of total labor force to the population aged 10 years and above is computed at 32.96 percent for the district. There is a significant difference in the participation rates between male and female labor forces as 57.59 percent for male compared to 2.70 percent for female. The labor force participation rate is slightly higher i.e. 33, 00 percent in urban area as compared to 32.84 percent in the rural area.

4.5.2 Administrative Set up

(i) Executive, Judiciary and Revenue System

215. The district is headed by a Deputy Commissioner on the executive side aided by the Additional Deputy Commissioner and the two Sub-Divisional officers who are in charge of the city and Saddar sub-divisions. At the tehsil level, in Quetta there is a full-fledged tehsil which is headed by a Tehsildar assisted by one Naib Tehsildar and the usual subordinate revenue staff. However, there is nowadays a Naib Tehsildar, whereas in ancient times there used to be only a Kanungo to look after the revenue work and was assisted by patwari and the Levies staff.

216. Besides, there are Extra Assistant Commissioners at Quetta who are also first-class Magistrates. Consequent upon the long-standing principle of separating the executive from judiciary, there have been since been appointed Judicial magistrates as well at Quetta. However, to maintain law and order Quetta district is divided into two Sub-divisions, Quetta city and Quetta Saddar and sub-tehsils is Quetta tehsil and Panjpai.

(ii) Health

217. In addition to the provincial Civil Hospital of the British days, following additional health facilities in the public sector are available in Quetta city.

- Sardar Bahadur Khan T.B Sanatorium
- Railway Hospital
- Combined Military Hospital (C.M.H)
- Helpers Eye Hospital
- Christian Hospital
- Lady Duffer in Hospital for women
- Children Hospital Quetta (C.H.Q)

218. During recent years a number of private clinics and hospitals have sprung up in the city. Prominent among them are the following

- Al-Rehman Hospital
- Saleem Hospital
- General Hospital
- Jilani Hospital
- Tariq Hospital
- Alfahad hospital
- Al-Noor hospital
- Universal Medical Complex

219. Specifically, the basic healthcare facilities in the project area are insufficient. Basic Health Units (BHU) are only present in the areas of Murghi Kotal Delay Action Dam and Kach Delay Action Dam. The population of Spin Karez Dam and Ghunduk Karez Check Dam has relocated to Hannah Urak, which is approximately 5 and 12 kilometers away from their respective settlements. On the other hand, the population of Karkasa Dam and Berwezy Dam have access to the T.B Hospital and Bolan Medical College Hospital.

(iii) Education

220. Besides the university of Baluchistan, two private sector institutions namely juniper and Princeton universities are catering to the higher studies need of the students of the province. Additionally, two professional colleges that is Bolan Medical College and Agriculture College are functioning under the aegis of the University of Baluchistan.

221. Moreover, the following colleges are also available in the city.

- Two-degree colleges one each boy for boys and girls
- Five intermediate colleges two for boys and three for girls
- Two intermediate colleges co-educational being run under the aegis of the Federal Board of Education
- Three colleges in the PTV sector, one co-educational and one each for boys and girls.

222. There are primary schools for boys in the settlements present in the vicinity of Spin Karez Dam, Khalaka Check Dam, Jalogeer Kuchlak, Murghi Kotal Delay Action Dam, and Kach Delay Action Dam. Additionally, primary schools for girls are present in the settlements located close to Spin Karez Dam, Murghi Kotal Delay Action Dam, Kach Delay Action Dam, Karkasa Delay Action Dam, and Berwezy Delay Action Dam. Middle schools for both boys and girls are present in the settlements close to Spin Karez Dam and Small Dam Aghberg, while the settlement located in the vicinity of Murghi Kotal Delay Action Dam only has a

middle school for boys. Furthermore, a degree college is also located in the settlement of Murghi Kotal Delay Action Dam

4.5.3 Industry and Trade

(i) Industry

223. In all there are thirty-five industrial establishments at Quetta. Pharmaceutical manufacturing, fruit preservation and coal mining are the main industrial activities. The Bolan textile mill (presently not functioning) at Baleli and Chiltan ghee mills at Quetta are the main industrial units. The development of cottage or small-scale industries especially in Quetta city is now taking shape. The embroidery industry is developing and its products are supplied to various parts of the country and exported abroad.

(ii) Communication

224. The railway traverses the district from Sariab through Quetta to kuchlak and the principal roads are those running from Quetta to Chaman: to Sibi via Bolan Pass; to Mastung through Lak pass onward to Karachi on RCD Highway. Quetta is linked with all the districts of Baluchistan through a well-developed network of roads. It is also directly linked with the other provinces through roads. Quetta occupies a central and strategic position. It is seen as the gateway to Central Asia. Quetta is also connected to the rest of the country and to Iran and Afghan borders by rail. The railway was introduced by the British. Radio and television stations are functioning in Quetta. The first radio station was established in Baluchistan in 1956 at Quetta. The Program of PTV World and STN can also be clearly watched at Quetta. There is also a very good network of telecommunication in the district. Digitalized telephone exchanges have been installed in the district.

225. There are 34 post offices in Quetta district. The Pakistan post office Quetta is additionally providing the following services: e.g. Fax Money order, Fax Messages, Urgent Mail Service, and Air Express Service. There are also a number of courier services available in the district.

226. In Quetta there are seven grid stations and one power house. More than 99 percent of the population has been provided with electric connections. Piped natural gas for domestic and industrial use is also available in the district.

(iii) Trade and Trade Centers

227. A Chamber of commerce and trade is functioning at Quetta. There is also a market committee. The federal government has an office of the controller of imports and exports to look after the issue arising from border and facilitate local traders.

4.5.4 Socio Economic Environment

(i) Agriculture

228. The soil of the center of the valley is good, but the district is mostly barani. However, with the coming of grid electricity the tube wells have replaced the old karez system and mechanization of farming has been introduced.

229. There are two cropping seasons in Quetta district, kharif and rabbi. Kharif crops are sown in summer and harvested in late summer or early winter, while rabbi crops are sown in winter or early winter and harvested accordingly. The important rabbi crops are wheat,

barley, cumin, vegetables and fodder. The crops grown during kharif are vegetables, potato, melon, fodder, onion etc.

(ii) Irrigation

230. The major sources of irrigation during the last quarter of the 19th century were karezes. The construction of karezes and its maintenance was an expensive affair.

231. Now a day's tube well becomes the major source of irrigation. Following irrigation schemes have been initiated in Quetta district.

- Flood irrigation
- Perennial Irrigation schemes
- Small delay action dams and flood protection work

(iii) Forestry

232. Small scale natural forests are found in Quetta and at Urak such as Karkhasa, Takatu south and Hazargunji. While those in Urak area are Spin Karez, tagha Tarkhar and zarghun central. Total estimated area under forests comprises 34,634 hectares. There is no private commercial forestry in the district.

(iv) Horticulture

233. Hanna and Urak valleys are well known for their extensive orchards of apple, peach, apricot, almond and plum. These are all cash crops. Average production and yield of major fruits grown in the Quetta district during the year 1997-98 is shown in the table 4-7

Table 4-8: Average, Production and yield of Major fruits grown in Quetta District

Sr. No.	Fruit	Total Area (Hectares)	Production (Tones)	Yield per Hectare (Kilograms)
1	Almond	98	404	4124
2	Apple	3025	44553	15149
3	Apricot	564	10215	18438
4	Grapes	851	9320	11135
5	Peach	510	7022	14158
6	plum	541	9173	17573
7	pear	38	400	10526
8	Pomegranate	2	40	20000
9	Cherry	216	1014	5172
10	Pistachio	16	16	2000
11	Other Fruits	5	5	1000

(v) Livestock

234. A minor but a sizeable proportion of the rural population is engaged in livestock rearing activities. In Urban areas, dairy farms are maintained for commercial purpose. There is a network of veterinary institutions which include hospitals, dispensaries, artificial insemination center (A.I.C) and Disease Investigation Laboratory (D.I.L). Livestock population of Quetta district according to the livestock Census, 1996 in Table 4.8

Table 4-9: Livestock population of Quetta district according to the Census, 1996

Sr.#	Live stock	Number
1	Cattle	10392
2	Buffalo	5496
3	Sheep	67204
4	Goat	39,738
5	Camel	2
6	Horse	204
7	Mule	43
8	Ass	429
9	Poultry	100,071

4.5.5 Important/ Historical places of Quetta City

235. No archeological or historical places exists within area in the vicinity or AOI of at all sub projects. The Chance Find Procedure is provided as Annexure 8. Also, following are the land marks and important sites of Quetta city.

(i) Hazarganji Chiltan National park

236. In the Hazargunji Chiltan Park, 20 kilometers south–west of Quetta, markhors have been given protection. The park is spread over 32.500 acres' altitude ranging from 2021 to 3264 meters.

237. Hazargunji literally means “A thousand treasures” Legend has it, that there are a thousand treasures buried, in the fold of these mountainous which relate to the passage of great armies down the corridors of history. The Bactrian's, Scythians, Mongols and then the great migrating hordes of Baloch, all passed this way.

(ii) Karkhasa

238. Karkhasa is a recreation park situated at a distance of 10 kilometers to the west of Quetta. It is a 16 kilometers long narrow valley having a variety of flora like ephedra, Artemisia and Sephora. One can see birds like partridge and other wild birds in the park. Limited recreational facilities are provided to the visitors through the forest department.

(iii) Urak Valley

239. The Urak valley is 21 kilometers from Quetta city. The road is lined on either side with wild roses and fruit orchards. Peach, Plum, apricot and apple of many varieties are grown in this valley.

240. The water falls at the end of the Urak valley, which is full of apple and apricot orchards, makes for an interesting picnic spot.

(iv) Hanna Lake

241. A little short of the place where the Urak valley begins and 10 kilometers from Quetta is the Hanna Lake, where benches and pavilions on terraces have been provided. Gold fish in the lake comes swimming right up to the edge of the lake. A little distance away, the waters of the lake take on a greenish blue tint. All along the edge of the lake plantation of pine trees have been made. Chair lift has recently along the lake for the attraction of visitors.

242. The greenish- blue water of the lake provides a rich contrast to the sandy brown hills that sound it. One can promenade on the terraces.

(v) Askari Park

243. Askari Park at the airport road offers amusement and recreational facilities.

Table 4-10: Economically active population.

Economic Category	All Areas			Rural			Urban		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Economically active	23.35	41.48	1.87	21.60	39.07	1.47	23.95	42.30	2.02
Economically inactive	76.65	58.52	98.13	78.40	60.93	98.53	76.05	57.70	97.98
Children below 10 years	29.16	27.97	30.56	34.24	33.75	34.80	27.41	26.02	29.07
Domestic workers	30.32	0.74	65.35	29.64	0.70	63.00	30.55	0.76	66.18
Students	12.66	21.61	2.07	10.35	18.71	0.72	13.47	22.60	2.54
All others	4.51	8.19	0.14	4.17	7.78	0.01	4.62	8.33	0.19
Labor force participation rate (Refined)	32.96	57.59	2.70	32.84	58.96	2.25	33.00	57.17	2.85
Un-Employment rate	24.99	25.83	2.82	28.93	29.88	0.00	23.76	24.57	3.54

- Vulnerable
- Through this assessment, it has been confirmed that no such vulnerable groups are present within the Dam's Right of Way (RoW) and its vicinity.

5. ANALYSIS OF ALTERNATIVES

5.1 GENERAL OUTLINE AND SCOPE .

244. The discussion and analysis of alternatives in IEE should consider other pragmatic strategies that will promote the elimination of negative environmental and social impacts identified. This section is a requirement of the EPD and ADB and is critical in consideration of the ideal development with minimal environmental and social disturbance. It is very imperative to assess different alternatives to reach at the finest possible option. Different alternatives were considered at the design stage of the proposed Project, and at the time of performing the IEE.

5.2 Categorical Analysis of Alternatives

245. Categorical analysis of alternatives is an integral part of the IEE process to select the best preferable option among all the possible Project options as follows, and 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 Alternative was analysed.

A. Alternative-I: Zero Alternative/Without Project

B. Alternative-II: With Project

246. Comparing the "No project" option with the execution of the project for the restoration and rehabilitation of breached dams and damaged spillways in District Quetta, Balochistan, entails evaluating the potential benefits and drawbacks of each option.

5.2.1 Alternative-I: Zero Alternative/Without Project

247. If the project is not taken up at all then all the funds, efforts and inconvenience will be saved and these will become available for diversion to other projects. No disturbance will be caused to any physical, biological and social part of the environment.

248. Without restoration and rehabilitation of the existing water conservation structures, this alternative state to consider the originality of the environment. Since, it is necessary to be considered with all possibilities, going for no action alternative as an option is a crucial part in decision making. However, this alternative will increase following problems

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

249. 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:***

250. The streams flowing into Quetta Valley 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 persist.

- **Damages and Risk Reduction:**

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

- **Cost and Time Considerations:**

252. 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 Of Flood Damaged Water Conservation Structures In Irrigation Division Quetta)

- **Water Level and Aquifer Depletion:**

253. 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:**

254. The project aims to mitigate these issues by repairing the damaged Water Conservation Structures and Flood Mitigation 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:**

255. 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 flashy floods from the surrounding hills.

- **Cost and Time Considerations:**

256. 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.

257. In conclusion, the "No project" option maintains the status quo, leaving the District Quetta 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.

258. Table 5.1 provides brief comparison of both alternatives with respect to environment and social view point.

Table 5-1: Comparison of Alternatives

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
NO PROJECT OPTION VERSUS PROJECT OPTION				
No Project Option	Under the "No project" option, there are no specific technical interventions or improvements planned or implemented. This means that the existing issues related to water scarcity, aquifer depletion, and flood risks will persist without any targeted solutions.	Without any project intervention, the environmental consequences are likely to remain unaddressed. Aquifer 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.	The "No project" option can have negative social implications. Water scarcity affects various aspects of people's lives, including 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.	In the short term, the "No project" option may seem cost-effective as it does not involve any immediate financial expenditure. However, the long-term costs associated with water scarcity, increased flood damages, and emergency response efforts can be substantial.

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
<p>Project Option</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>
<p>RESTORATION/REHABILITATION OF DAMS OPTIONS VERSUS CONSTRUCTION OF NEW DAMS</p>				
<p>Restoration/ Rehabilitation of Dams</p>	<ol style="list-style-type: none"> 1. Utilizes existing infrastructure, which can capitalize on established site features and configurations. 2. Requires thorough inspection, assessment, and engineering expertise to determine the extent of damage and necessary repairs. 3. Rehabilitation may involve structural strengthening, sediment removal, and repairs to ensure the dam's safety and functionality. 4. Benefits from 	<ol style="list-style-type: none"> 1. Preserves the existing ecosystem and landscape. 2. Avoids the environmental impacts associated with new construction activities. <p>Requires careful sediment management during rehabilitation to prevent downstream contamination.</p>	<p>May be more readily accepted by local communities due to as land acquisition and resettlement are not involved.</p>	<ol style="list-style-type: none"> 1. Initial costs might be lower compared to constructing a new dam. Costs depend on the extent of damage and required repairs. 2. Could have lower long-term operational and maintenance costs if the existing structure is well-preserved.

Options	Technical Comparison	Environmental Comparison	Social Comparison	Cost Comparison
	existing topographical and geological data.			
New Dams Construction	<ol style="list-style-type: none"> 1. Involves planning and designing a new structure from scratch, including site selection, geological investigations, and engineering design. 2. Requires permits, approvals, and compliance with current engineering standards and regulations. 3. Can incorporate the latest technologies and design features for improved safety and efficiency. 4. Might require more time for planning, design, and construction. 	<ol style="list-style-type: none"> 1. May lead to habitat disruption, deforestation, and alteration of waterways. 2. Can impact local ecosystems and biodiversity. 3. Might result in increased waterlogging, changes in water temperature, and alteration of natural flow patterns. 	<p>Could require land acquisition and relocation of communities. May face resistance from communities concerned about losing their homes or traditional lands.</p>	<ol style="list-style-type: none"> 4. Initial costs could be higher due to design, construction, and land acquisition expenses. 5. Long-term operational and maintenance costs need to be considered.

5.3 Recommended Option .

Based on a comprehensive analysis of alternatives between the Restoration/Rehabilitation of existing dams and the construction of new dams, 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 / EIA process for development projects. The adequacy of the public consultation and information disclosure is one of the basic criteria used to determine the project compliance with the national laws.

260. The consultation process was carried out in accordance with the requirements of Pakistan Environmental Procedures. 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 Identification of Stakeholders

261. There are three types of stakeholders that were considered during planning for the stakeholder consultation process as described below.

6.2.1 Primary Stakeholders

262. The primary stakeholders are primarily the Project Affected Persons (PAPs) and general public including women residing in the project area - for example, people living in the project area, particularly those affected by the proposed project activities. These are the people who are directly exposed to the project's impacts, though in most cases they may not be receiving any direct benefit from the project.

6.2.2 Secondary Stakeholders

263. The secondary stakeholders are typically institutional stakeholders – for instance, related government department/agencies, local government, and organizations that may not be directly affected by the project; however, they may influence the project and its design.

6.2.3 Key stakeholders

264. The stakeholders considered to possess the ability to significantly influence a project, or who are critical to the success of a project are considered key stakeholders.

265. Key stakeholders may be from the primary and/or secondary stakeholder groups.

6.3 Consultation and Participation Process

266. 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 for IEE studies of Restoration & Rehabilitation of Flood Damaged Water Conservation Structures in Irrigation Division Quetta in the month of 4-6 July (3 days) 2023. Consultation meetings were carried out during the site visit with local communities of Killi Medadzai, Killi Malik Pain Khan, Killi Gundak, Sara Ghurgai, Killi Murghi Kotal, Killi Berwery etc. Attendance sheets have been provided as Annexure II. Consultation is a continuous process and would be carried throughout all stages of the project implementation.

6.4 METHODS OF PUBLIC CONSULTATION

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

- Scoping Sessions
- Informal Meetings
- Individual Interview

6.5 IDENTIFICATION OF STAKEHOLDERS

268. 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 apprehensions. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders.

6.6 MAJOR STAKEHOLDERS AND THEIR APPREHENSIONS

269. Among all stakeholders some major stakeholders were identified in the proposed project area. Table-6.2 contains the list of major stakeholders.

Table 6-1 Stakeholders Contacted in the Project Area

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

270. No major apprehensions 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 project. Figure: 6-1 shows the pictorial view of Interviews and consultation meetings held with the stakeholders. Attendance sheets of Public consultations are attached as Annexure-II.

6.7 CONSULTATION MEETINGS AND FORMAL AND INFORMAL GROUP DISCUSSIONS

271. 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.

272. 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 around the Quetta city.

273. 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.

Table 6-2: Community Concerns and Consultant Responses

Sr. No	Concern	Response
1.	Proposed project should start as soon as possible without any delay.	The project will commence after the final design phase.
2.	Local residents should be given priority for jobs during the construction and operation phase.	During the construction phase of the proposed project, priority will be given to hiring local residents.
3.	Exposure to noise and dust pollution will cause disturbance and health & safety issues to local residents and other stakeholders during construction	Necessary arrangements will be made to minimize the effects of noise and dust pollution on local residents. Dust pollution will be controlled through regular water sprinkling
4.	Due to the movement of loaded trucks during construction, congestion on the access road will increase.	Construction machinery and asphalt plant will be situated away from residential areas. To avoid restricting daily movement, construction vehicles will remain confined within designated areas.
5.	Due to the construction of the proposed project, public utilities (roads) will be disturbed.	Utilities affected by the project will be rehabilitated on a priority basis to minimize impacts on stakeholders.
6.	Increase in traffic and safety hazards will create problems for the local population and surrounding communities.	A detailed health and safety plan will be developed to mitigate construction and operation risks on local residents and communities.
7.	Solid waste produced during construction should be disposed of timely.	Solid waste generated during construction will be disposed of safely at approved waste disposal sites.
8.	Will a new dam be constructed?	The existing dam will be restored, not newly constructed.
9.	Which department is restoring the dam?	The Balochistan Irrigation Department, with funding from the National Disaster and Risk Management Fund (NDRMF), is responsible for

		restoring the dam.
10.	How long will it take to start the construction work of the dam?	The rehabilitation of the dam will begin as soon as possible possibly within 3 months
11.	How long will it take to complete the project?	The project is expected to take approximately 10 months to complete.
12.	New large dam should be constructed that will result in an increase in crop production and provision of drinking water for a large population.	Currently, the government has no plans to construct new or large dams.
13.	Nullahs and private land should be protected from construction waste.	Contractor will prepare waste disposal plan and will get it approved from BID. He will be directed to not dump construction waste in Nullas or private lands
14.	Will drinking water provided to communities from these dams?	This concern will be shared with the BID. At present, it is not part of this project
15.	Can restoration of the dam will be helpful in recharging the aquifer?	Yes. It will enhance recharge rate of aquifer

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





Berwery Settlement (Karkasa Berwery Dam)

Killi Khaibzai (Small dam Augburg)

Killi Fort Raisani (Mandoki Check Dam)

6.8 Departmental Consultation

274. The Environmentalist has conducted the Stakeholder’s Consultation with relevant departments i.e. Forest Department, Wildlife Department etc. during the field visits in 6 July 2023. Consultations to get their views/concerns for the proposed Project. Table 6.6 below presents the details of consultations including stakeholder’s designations/department and their views/concerns regarding the proposed Project.

275. Following the point of discussion and their responses given in the Table below.

Table 6-3: Departmental Consultation Concerns and Responses

Concerned Departments/Persons	Stakeholder Views/Concerns	Response/Actions
Wildlife Department, Quetta Syed Tairq Shah Conservator officer wildlife and forest. Hazar ganji chiltan national park Quetta. 0333 7942404 Khalid Mehmood Assistant wildlife and forest	The reservoir will be silted up if there are no desilting will be done, and the life of the reservoir will reduce	There will be regular desilting of the reservoir during high flow season through under sluices
	There is a risk of hunting and poaching of animals by the workers	Workers' code of conduct will include a ban on illegal cutting of trees and hunting and poaching of wildlife. The contractor will carry out regular awareness

Concerned Departments/Persons	Stakeholder Views/Concerns	Response/Actions
Quetta. 03112046660		programs to the workers on the protection of flora and fauna
	People should be sensitized and mobilized for environmental protection and growing more trees.	The Project will support the on-going conservation programs of the forest department and wildlife department.
	Department is in favor of rehabilitation of the flood damaged dams specially Korkasa Dam because it is beneficial for the forest and wildlife present in its vicinity	Yes. These Check dams will serve multiple purposes beyond flood control, encompassing the conservation of wildlife and forest ecosystems, thereby providing substantial benefits to these ecological components.
Forest Department, Quetta Syed Nasir Shah Conservator of forest, Range Management Balochistan 03337717345 Nasrullah Khan Mandokhel Deputy Conservation of forest and coordinator Research and training Quetta. 03003907399	Is there any tree cutting involved in the project	No, there is no tree cutting involved in the project
	If any tree cutting involved(during construction phase) who will be the responsible for the compensation of the trees cutting.	The BID will compensate the price of trees cutting to the owners. Average price of sapling will be Rs.100 and replantation will be done with ratio of 10 each cut tree
	There may be risk of damaging the trees during the construction by workers.	Workers' code of conduct will include a ban on illegal cutting of trees. The contractor will carry out regular awareness programs to the workers on the protection of flora.
	Dams should be constructed with 100 years of planning so the local community will be safe for longer period of time and further flood damages.	Dams are being redesigned to account for flood discharges based on a 500-year return period
	Dams should be protected through the construction of check dams and trees plantation which will help to slow down the water flow and silt.	Basic purpose of these dams is flood protection. Tree plantation may be considered by the BID depending on funds availability.

Figure 6-2: Pictorial View of Departmental Consultation

	
<p>Conservator of forest , Range Management Balochistan</p>	<p>Deputy Conservation of forest and coordinator Research and training Quetta.</p>
	
<p>Dept conservator officer wildlife and forest. Hazar ganji chiltan national park Quetta</p>	

6.9 Women Consultations

276. 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 Quetta 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

277. 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 both Project Area and AOI is presented in the following sections.

7.2 METHODOLOGY FOR IMPACT SCREENING

278. 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.

279. The procedure for determining the level of risk associated with each potential impact is described below.

280. 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

281. 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.

7.3 IMPACT ASSESSMENT - OVERVIEW

282. The Initial Environmental Examination (IEE) study has revealed that the project is not likely to have any severe negative impacts on the environment and people of the area. All the potential impacts which have been identified during the present assessment are associated with the construction stage of the project, and mild to moderate in severity; and can easily be avoided (through good design and construction planning) or mitigated (through proper implementation of the EMP)

283. On the other hand, the project will be beneficial; job opportunities particularly for the local population during construction stage and extremely beneficial for agricultural production once this proposed project is complete. In addition, the social assistance activities at the dam site will greatly enhance the project benefits for the local communities.

284. Significant social indicators of the project benefits are mentioned below:

- Improvement in infrastructure pertaining
- Significant changes in sustainable development;
- Assurance of better drinking water supply;
- Enhancement in agricultural/livestock/fisheries produce

Table 7-4: Impact Assessment Matrix

Activity / Impact	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
Design Phase				
Seismicity	Likely	Major	Medium	Low
Flooding	Likely	Major	High	Low
Construction Phase				
Soil Contamination	Likely	Major	Medium	Low
Soil erosion/ silt run-off	Likely	Major	Medium	Low
Disposal of spoil	Likely	Major	Medium	Low
Use of local water resources	Likely	Moderate	Medium	Low
Contamination of water resources	Likely	Moderate	Medium	Low
Air Pollution	Certain	Moderate	Medium	Low
Noise	Likely	Major	Medium	Low
Vibration	Likely	Minor	Low	Minimal
Flora	Likely	Minor	Medium	Low
Fauna	Likely	Moderate	Medium	Low
Impact on local communities and work force	Likely	Major	Medium	Low
Contractor Mobilization: Campsite & Equipment Yard Establishment	Likely	Major	Medium	Low
Gender Issues	Likely	Moderate	Medium	Low
Safety Hazards for local people	Likely	Major	Medium	Low
Traffic disruption	Likely	Minor	Low	Low
Occupational Health and Safety	Certain	Moderate	Medium	Low
Impact of Construction Debris	Certain	Moderate	Medium	Low
Operation Phase				
Construction material left overs	Likely	Moderate	Medium	Low
Breaching of dam, spillway and Structures	Certain	Moderate	High	Medium
Periodic Cleaning and Maintenance of the System	Likely	Moderate	Medium	Low
Safety	Likely	Major	Medium	Low
Climate Change Aspects(Heat waves etc.)	Likely	Major	Medium	Low

7.4 Anticipated Impacts during Pre-Construction/Design Phase Design Phase

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

7.4.1 Land acquisition:

286. The proposed works will be carried out on the land of the Irrigation Department (Govt of Balochistan) 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 this project.

287. 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.

7.4.2 Seismic Hazard

288. The project area is situated in Seismic Zone 4, which this zone indicates severe damage. In this zone, the design of various types of structures should be based on Peak Ground Acceleration (PGA). An earthquake of severe intensity affecting the project site can have a detrimental impact on its development, which would be a significant negative consequence. This factor necessitates special consideration by the designers, taking into account the major earthquakes of 2015, 2013, 2012 and others. This impact will have moderate significance.

Mitigation Measures

289. 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.

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

7.4.3 Flooding

291. 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 High Magnitude Flash Flood of 2022, future flooding can breach the dam body and damage spillways and other infrastructure. This impact will have 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.

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

7.5 Construction Phase

A. LAND RESOURCES

293. This section explains how the proposed project could potentially affect the land resources through change in land use, soil erosion and contamination, and describes mitigation measures to manage these impacts.

7.5.1 Disposal of Soil Material

294. 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 1,941 m³ material will be excavated most of which will be reused after approval of quality control engineer. Estimated 200 m³ spoil will be dumped safely and leveled to avoid any harm to aesthetic sense at approved disposal areas. This impact would be of moderate significance.

Mitigation Measures

- The spoil material from the excavation will be dumped at designated places. The dumping sites must be approved by CSC environment specialist.
- 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 spoil management plan, prior any disposal of spoil.

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

7.5.2 Soil Erosion

296. Major considerations are as follow.

- 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.
- This impact would be of moderate significance.

Mitigation Measures

297. 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.

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

7.5.3 Soil Contamination

299. 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 refuelling
- 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.

300. This impact would be of moderate significance.

Mitigation Measures

301. 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. The empty containers are produced. These containers still have 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.

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

B. HYDROLOGY AND WATER RESOURCES

303. This section explains how the proposed project may affect the water resources of the project area through alterations in drainage pattern, consumptive and non-consumptive use of water during construction and operation phases, contamination of water bodies and groundwater, and siltation of nullahs/springs and, etc. The section also describes mitigation measures to manage these impacts.

7.5.4 Use of Local Water Resources

304. The water resources of the project area mainly comprised of surface water (springs, 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 I. This impact would be of moderate significance.

Mitigation Measures

305. Mitigations 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.

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

7.5.5 Contamination of Water Resources

307. The water resources (surface and sub-surface water) 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.

Mitigation Measures

308. 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, 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.

309. 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

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

C. Air Quality and Noise Pollution

311. This section discusses the impact of the construction and operation on the ambient air quality and noise levels along the project area. It also describes the mitigation measures to manage these impacts.

7.5.6 Impact on Air Quality

o Fugitive Dust Emissions

312. 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. Only Brewery settlement is located about 330 m from the Brewery Delay Action dam (as shown in Figure 4-9 b) that is very small settlement having few houses. It has no other sensitive receptor in it. It can be seen from the wind rose (Figure 4-6) that dominant wind direction is towards West (W) and while this village is located in North-West direction to Brewery dam. The impacts would be medium..

Mitigation Measures

313. The mitigations measures include the following:

- 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.

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

o Smoke from Burning of Waste Material or Burning Firewood

315. 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

316. The mitigations measures include the following:

- 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.

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

o Vehicular and Generator Exhaust Emissions

318. 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. Especially the movements of heavy machinery and vehicles of old make and poor engine condition tends to release more than new well-tuned vehicles. Use of low-grade fuels and lubricants also increases the emission levels.

Mitigation Measures

319. The mitigations measures include the following:

- 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 is 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.

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

7.5.7 Impact of Noise Pollution

o Noise from Construction Activities

321. 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. This impact will, however, be temporary and moderate negative in nature.

Mitigation Measures

322. 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.

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

7.5.8 Vibration

324. 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. All settlements are more than 500 m distance from construction sites except Brewery village (340 m). Consequently, no potential significant adverse vibration impacts would be anticipated to occur and therefore, the impact is "low".

Mitigation Measures

325. However, 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.

326. By adopting the aforementioned measures, the impact would be minimum.

D. Biological Resources

327. The impact on flora and fauna and corresponding mitigation measures are described in the following paragraphs:

7.5.9 Flora

328. 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.

Mitigation Measures

329. 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 trees will be replanted in case a tree is cut as per EPA rule.

7.5.10 Fauna

o Mammals and Reptiles

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

331. 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

332. 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.

333. 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 will be of medium significance.

o **Birds-Avian Fauna**

334. 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.

335. The key avifauna species in the project area are

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

336. 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

337. 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. Overall impact will be of medium significance.

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.
338. 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.
339. By adopting the aforementioned measures, the impact would be of low significance.

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E. SOCIO ECONOMIC, CULTURAL AND ARCHAEOLOGICAL ISSUES

340. This section describes the impacts of the proposed project on local communities, construction worker, indigenous and vulnerable people as well as on structures and sites of cultural and religious significances.

7.5.11 Impacts on Local Communities/Workforce

341. Communities of surrounding settlements will be affected during the construction phase as follows:

- During the construction phase, general mobility of the local residents and their livestock in and around the project area is likely to be hindered. Likewise access to the natural resource may be affected. This particularly applies to the women and children.
 - Usage of Community's common resources like potable water, fuel wood etc. by Contractor workforce may create conflicts between the community and the Contractor.
 - Communities will have to face the noise and dust hazards during the construction activities.
 - The presence of outside construction workers inevitably causes some degree of social disruption and even active disputes with the local community as a result of social/cultural differences. This particularly relates to the disruption of the privacy of women working in the fields or in the yards of their houses, located at lower elevation than the working sites. Likewise, the risk of theft of community assets by the workers and vice versa may occur.
 - The labors with different transmittable diseases (e.g., HIV/AIDS, COVID-19) may cause spread out of those diseases in the local residents.
342. These impacts will be of medium significance.

Mitigation Measures

343. Potential social conflict will be contained by implementing the measures listed below:

- The contractor will ensure that the mobility of the local communities, particularly women and children, and their livestock is not hindered by the construction activities. The contractor will provide alternate and safe track for community quite at a distance away from the construction areas. Similarly, appropriate crossing points will be provided at the access road during its construction for daily works and having free access to the natural resources of the local population.
- Generally, the contractor will avoid using the village tracks for hauling the construction material. However, if it is unavoidable, the existing ones will be widened, overlain with shingle or surface treated to accommodate local as well as contractor's traffic.
- Camps will be located at least 500 m away from the nearest local settlement to avoid the contamination of community-owned water resources.
- Approval from the Engineer will be obtained before using the local water resources by the Contactor.
- The Contractor will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly.
- Establish a formal consultation mechanism with local authorities to discuss issues disturbing inhabitants and to find solutions satisfying all parties
- Effective construction controls by the Contractor to avoid inconvenience to the locals due to noise, smoke and fugitive dust. The contractor will frequently sprinkle water at the work areas and haul tracks to avoid generation of fugitive dust. The frequency of sprinkling will be determined by the weather condition in consultation with the client's Engineer. During long spell of hot and dry weather the sprinkling will be done at 2 or 3 hour intervals.
- Haul-trucks carrying concrete, aggregate, sand and earth fill materials will be kept covered with tarpaulin to help contain construction materials being transported between the sites.
- Good relations with the local communities will be promoted by encouraging Contractors to provide opportunities for skilled and unskilled employment to the locals, as well as on-the-job training in construction for young people. Contractor will restrict his permanent staff to mix with the locals to avoid any social problems.
- The contracts issued for carrying out the construction work will have to contain clear ruled for the recruitment of staff, which states that local persons have to be given preference in the recruitment process. Compliance to these conditions will have to be checked regularly by Irrigation Department. To the extent possible it should be avoided that large numbers of workers are being brought to this area from outside, and the project should generate a local economic benefit by employing staff from the area.
- Local vendors will be provided with regular business by purchasing campsite goods and hiring services from them.
- The Contractor will warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of employing, Contractor has to take care that the workers should be of good repute. The Contractor camp will be properly fenced and main gate will be locked at night with a security guard to check the theft issues from community side.

- Contractor will remain sensitive towards the local customs and traditions, particularly in the context of privacy of women.
- In case of night time working, the Contractor will adopt the following measures:
- It is desirable that the night-time working may be avoided at places where settlements are very close to the construction sites.
- If the above is unavoidable, the use of heavy machinery generating noise should be avoided only the manual works or light machinery may be deployed.
- The contractor will provide adequate light at the site and display florescent sign boards in Urdu, Pashto at appropriate places for warning to the communities and machine operators.
- Take safety precautions for the workers and the local communities.
- The Contractor will keep first aid boxes at the site and make available ambulance for transporting the injured workers to the hospital. This arrangement will also be made even for the local communities.
- The Contractor will share the plan and schedule of night time working with the Supervision Consultants for approval.
- Contractor should include awareness raising on Covid-19, HIV/AIDS and sexually transmitted disease and prevention and treatment of vector borne disease in Contractor training plan.

COVID-19 specific measures GOP

Advice for Site Managers:

- Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants.
- Workers should not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.
- Ensure the availability of the thermal gun at the entry and exit of the construction site and no worker should be allowed without getting his/her temperature checked.
- Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage.
- Develop the employee roaster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a

face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.

- Non-essential work trainings must be postponed avoiding gathering of people.
- Ensure the physical distance by creating more than one route of entry and exit to the site.
- Instruct the workers to inform the construction manager (or authorities) if
 - They develop any symptoms of cough, flu or fever.
 - They have been exposed to someone suspected or confirmed with COVID 19.
 - They have met someone who has a travel history of COVID 19 endemic country. They have travelled in last couple of days or plan to travel soon.
- All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby healthcare facility with arrangements for quick transportation of workers in case of an emergency.
- Persuade the workers to inform the authorities for their safety and of other if they observe any signs and symptoms in a colleague
- Do not allow any worker at the construction site who has the symptoms
- Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site.
- Everyone on the construction site must observe sneezing and coughing etiquettes. • Workers shall be requested and required to wash their hands as frequently as practicable and shall also be advised not to touch their face with their hands during work.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Only sanitize-able dinning surfaces shall be used, which must be cleaned before each service. Food must be heated to a temperature to no less than 70o C before consumption and shall preferably be served in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal

communications.

- In the wake of current restrictions on transportations site managers will ensure safe transport arrangements for worker which should not be crowded and should have social distancing in place during the entire process from pickups till drops at destination.
- In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms
- A supply of safe drinking water must be made available at the project site and maintained.

Advice for Construction Workers:

- All possible and prescribed measures shall be taken to ensure your and others health. Enter your contact details in the register maintained at the site, in case a follow up or tracing and tracking of contacts is required at a later stage.
- Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Workers should wash their hands as frequently as practicable and shall not to touch their face with their hands during work.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Sick worker should immediately inform the site manager and must get medical advice from nearby health centre.
- Only sanitize able dinning surfaces shall be used. Food must be heated to a temperature to no less than 70 oC before consumption and shall preferably be in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- Do not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.

- Use safe transport arrangements which should not be crowded and should have social distancing in place during the entire process from pickups till drops at destination.
- In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms.

Deliveries or Other Contractors Visiting the Site:

- Non-essential visits to the construction sites should be cancelled or postponed.
- Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and should be given clear instructions for precautions to be taken while on site.
- Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors.
- Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries.
- Instruct the visiting truck drivers to remain in their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers.

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

7.5.12 Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard

345. It may cause Changes in land use Pattern, Loss of vegetation and Cultural conflict. This impact would be of moderate significance.

Mitigation Measures

- Location for establishment of campsite shall be duly discussed and approved by BID. This will include provision for solid waste disposal, latrines / soak pits etc. Soak pits shall be properly designed approved by BID before establishment of campsite.
- Photographs of site before establishment of campsite shall be taken and it will be responsibility of the contractor to make site better or as good as original. A comparison report shall be submitted to Project Director, BWRDP before release of final payment. Site for camp site shall be selected keeping in view the cultural norms of the area to avoid undue interference of the Construction contractor's staff with the local residents. The land shall be rented for the camp site and equipment yard. No resettlement is envisaged for this purpose.

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

7.5.13 Gender Issues

347. The rural women actively participate in outdoor socio-economic activities such as livestock rearing, fetching of drinking water, etc. Their privacy may suffer due to the project activities. Moreover, it will cause hindrance to the mobility of local women for working in the

field, herding livestock, bringing drinking water from springs, picking fuel wood, etc. The induction of outside labour may create social issues due to the unawareness of local customs and norms.

Mitigation Measures

348. Mitigation measures regarding gender issues include the following:

- The contractor will have to select the specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population particularly women considering their peak movement hours.
- The contractor will have to carry out the construction activities in such a way that the open field latrine usage timings by the local community particularly women, should not be affected. The normal timings to use the toilet facilities by the rural women are early in the morning and at late in the evening. The Contractor will limit construction works to between 6 am and 7 pm if it is to be carried out in or near settlements.
- Contractor will take due care of the local community and sensitivity towards local customs and traditions will be encouraged.
- Contractor will warn the staff strictly not to involve in any un-ethical activities and to obey the local norms and cultural restrictions particularly with reference to women.
- During construction activities, if privacy of the nearby households is affected, the Contractor will inform the house owner to make some 'parda' arrangements.

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

7.5.14 Safety Hazards

350. Occurrence of accidents/incidents during the construction activities, particularly from excavation activities is a common phenomenon. Safety of general public residing close to excavation work will particularly be at stake. The local people, particularly the children and women, may get injuries or even fatalities. Contractor staff while working at heavy machinery may get injuries.

Mitigation Measures

351. Mitigation measures regarding the safety hazards will include the following:

- Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety material including safety boots, helmets, and gloves, hearing protection and protective masks, and monitoring their proper and sustained usage.
- The Contractor will ensure the provision of medical services, medicines, first aid kits, vehicle, etc. at the campsite and working place. For this purpose, he will install, staff, equip and operate a clinic on site. It is recommended that this clinic should also be open to the population of the nearby villages, in order of give them some direct benefits from the project.
- Cordon off the work areas where necessary.
- The storage of all solid waste shall be practiced so as to prevent the attraction, harbourage or breeding of insects or rodents, and to eliminate conditions harmful to

public health or which create safety hazards, odours, unsightliness, or public nuisances.

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

7.5.15 Impact of Induced Traffic

353. 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.

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.

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

7.5.16 Impacts related to Occupational Health and Safety

355. Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavourable working environment and due to storage, handling and transport of hazardous construction material. Detail of main construction activities and impacts, which may result in ill health, injury, or in extreme cases death as given in following Table 7.5.

Table 7-5: Detail of main Construction activities and Impacts

Activity	Potential Impact (Worse Case)
Working at height	Injury/death from fall
	Injury/death
Movement of vehicles & plant	Injury/death from traffic accident
Earthworks	In poor health due to dust or injury/death following accident caused due to poor visibility
Use of hazardous substances	In poor health/injury/death from improper handling
Manual handling	Injury from improper lifting
Working in vicinity of heavy plant	Injury/ill health due to high noise or emissions
Inhabitation of construction camp	Ill health due to poor quality or unhygienic camps
General site works	Injury from slips & trips

Mitigation Measures

- All suggested project-specific health and safety plans would include appropriate training and supervision of employees and enforcement of workplace safety policies.
- All processes and equipment will be designed and constructed for safe operation.

- A process of safety management program will be developed and implemented to identify hazards associated with each applicable chemical.
- 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.
- Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.
- Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them.
- Use of correct signage for better understanding of all the health safety instructions and precautions for the workers. Signage will be in languages appropriate to the workforce employed.
- Contractor will initiate monthly health and safety champion program to encourage workers adhere with H&S requirements

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

7.5.17 Impact of Construction Debris

357. Construction debris may have following impacts

- Construction debris can lead to soil erosion, sedimentation, and water contamination in nearby water bodies.
- Disruption of natural habitats and potential harm to local wildlife.
- Aesthetic degradation of the project site and surrounding areas

358. This impact will be of moderate significance.

Mitigation Measures

- Implement erosion control measures like silt fences and sediment basins to prevent soil erosion and sediment runoff.
- Establish clear waste disposal guidelines to ensure proper handling and disposal of construction debris.
- Promote recycling and reuse of construction materials to minimize waste generation.
- Regularly clean and maintain the construction area to prevent debris accumulation.
- Educate workers about responsible waste management practices.
- Engage in post-construction cleanup to restore the site's natural appearance.

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

7.5.18 Graves, Cultural and Historical Sites

360. 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

361. 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.

362. 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 8.

7.6 OPERATIONAL AND MANAGEMENT PHASE

7.6.1 Impact on Biodiversity from Rehabilitation of dam structures

363. The proposed works are not a Greenfield project and in fact only 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)⁷ 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.

7.6.2 Construction material left overs

364. Construction material left over may likely happen after the closure of temporary construction sites. This might have short term and minimal insignificant impact on the project area.

Mitigation Measures

- All shivers and material that remain after the closure of temporary construction sites are to be removed from the location and re-used/recycled where possible.
- All remains are to be disposed of in a manner that will not be harmful to environment.

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

⁷ 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.

7.6.3 Breaching of Dam body, Damage to Spillway and other Structures

366. Breach of dam, damage to spillway and other irrigation structures is likely to occur. However, it will threaten 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

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

- BID (Irrigation Department) to monitor the system regularly;
- 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.
- The construction and rehabilitation of flood protection bunds as part of the project will be regularly checked to undertake any prone damage;
- Repairs on urgent basis; and
- Emergency response plan for Dam breach shall be followed, which is attached as Annexure-IV of this report.

Residual impact will remain moderate as the risk of breaching remains high especially due to flooding

7.6.4 Periodic Cleaning and Maintenance of the System Potential Impacts

368. The blessing of any available resource might be wiped out by poor governance. Improper maintenance of structure, broken outlets, and poorly maintained field channels may result in unequal utilization of water. This impact would be a moderate significant impact.

Mitigation Measures

369. By adopting the following measures, the impact would be finally of low significance:

- The BID will develop and implement a proactive maintenance plan for the proposed project, with predefined periodicity;
- Ensure proper disposal of waste at designated landfill/disposal sites; and
- Efficiency of the system will be at its best by adopting proper maintenance activities such as silt removal and bed scratching at periodic intervals.

7.6.5 Safety

370. During the operational stage of project significant human safety issues will arise due to the impounding of the reservoir. These include the need to raise awareness of the dangers of drowning in the reservoir, especially due to the rapid changes in water level that will be experienced. This issue is particularly important for children. The impact may lead to safety issues and would be of moderate significance.'

Mitigation Measures.

- A training program will be organized by BID at community level for safety practices adoption and ensure the community participation. This program should be instigated through the local schools to warn of these dangers to children. By adopting the aforementioned training on safety, the impact would be finally of low significance.
- Team members of HSE shall be deputed for the prohibiting swimming in dam, spillway or dykes. Warning signs should be posted and restrict the personnel working or visiting the site to follow the instructions.

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

7.6.6 Climate Change Aspects (Heat Waves, etc.):

372. Higher temperatures can accelerate the deterioration of infrastructure materials, including concrete, steel, and coatings. This might lead to increased maintenance costs and shorter operational lifespans of the rehabilitated structures

373. Rising temperatures can increase crop water requirements due to higher evapotranspiration rates. This might put additional pressure on water resources managed by the rehabilitation project.

374. Reduced water availability and increased maintenance costs due to climate impacts can have economic implications for local farmers and communities that rely on these structures for irrigation.

Mitigation Measures.

- Incorporate climate projections into the design of the rehabilitated structures to ensure they can withstand future temperature increases, extreme weather events, and changing precipitation patterns.
- Use climate-resistant materials and coatings for infrastructure construction and rehabilitation.
- Promote drought-resistant crop varieties and encourage water-efficient farming practices.
- Establish economic support mechanisms for farmers during periods of water scarcity, such as subsidies for water-efficient technologies.

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

7.7 Induced Impacts

376. 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.

7.8 Cumulative Impacts

377. 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.

8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1.1 General

378. 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.

379. 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.

380. This EMP addresses all the significant impacts that are identified during the impacts identification process. It should 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

381. The contents of this chapter are given below

- Regulatory Requirements
 - Purpose & Need of the EMP
 - Objectives of the EMP
 - Scope of the 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 & Documentation
 - Environmental Management Cos
 - Change Management

8.1.3 Regulatory Requirements

382. 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

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

384. Furthermore, to house the procedure, which the proponent 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 project;
- Ensure that anticipated impacts are maintained within the levels predicted;
- 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, rather than the Environmental Approval Process being a mere paper chase to secure a development approval.

8.1.5 Objectives of the EMP

385. 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

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

- Design Phase
- Construction Phase; and
- Operation Phase.

387. 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

388. The following is a broad guideline has been proposed for institutional setup under this project as a reference for BID. It is based on the recommendations for BID of ADB's current project. The final organizational structure, working and monitoring of Institutional

setup would be proposed by the BID and would be finalized in consultation with ADB's Resident Mission in Pakistan.

a) Institutional Arrangements for Implementation of EMP during Construction Phase

389. The Balochistan Irrigation Department (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; Balochistan Environmental Protection Department/ Agency, the Contractor and the Supervisory Consultants (SCs).

390. 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.
- Baluchistan EPA

391. The Construction Contractor will make a bond through contract documents to implement the EMP. The whole IEE 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

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

a) BEPA

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

b) Project Director:

394. 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 Baluchistan EPA on status of EMP Implementation.
- Reporting to ADB on status of EMP implementation.

c) Supervision Consultant: Resident Engineer

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

- To oversee the performance of Construction Contractor to make sure that the Construction 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 Construction Contractor and EA.

d) Supervisory Consultant: Environmental Specialist-Field

396. 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's 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

397. 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

398. 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

399. 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 ADB by BID on ADB cleared format.

400. PD will in turn add his remarks / comments / feedback and submit the Report to ADB and BEPA in accordance with the frequency defined by them. In case the frequency is not defined and/or communicated, bi-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

401. 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.

402. 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.

403. 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

404. 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"> 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. 	Design Engineer	BID
2.	Flooding	Failure of design	<ul style="list-style-type: none"> 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. 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. 	Design Engineer	BID
B. Construction Phase					
1.	Disposal of spoil	Negative impacts including silt runoff, change of land use, sedimentation of receiving water bodies and loss of aesthetic	<ul style="list-style-type: none"> The spoil material from the excavation will be dumped at designated places. The dumping sites must be approved by CSC environment specialist., prior dumping spoil. 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		values may be caused on the receiving lands due to improper disposal of spoil.	<ul style="list-style-type: none"> 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 spoil management plan, prior any disposal of the spoil. 		
2.	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"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>will be provided across the embankment.</p> <ul style="list-style-type: none"> 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. 		
3.	Soil Contamination	Soil Contamination by Oil, petrol etc	<ul style="list-style-type: none"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>containing 120% of the total volume of the tank in case of leakage.</p> <ul style="list-style-type: none"> 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. The empty containers are produced. 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. 		
4.	Use of local water resources	Burden on local water resources and possible social conflicts	<ul style="list-style-type: none"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>exploitation of the water resources.</p> <ul style="list-style-type: none"> 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. 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. 		
5.	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"> Camps will be located at least 500 m away from the nearest local settlement to prevent the contamination of hill torrents, 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>wastewater effluent from the campsite will be treated before disposal into a stream.</p> <ul style="list-style-type: none"> • 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. • 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 		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>tankbefore being released into the streams.</p> <ul style="list-style-type: none"> • Generally, waste should be reduced, re-used, recycled and the disposal has to be controlled. • Contractor will have to get water quality testing of dam sites at the start of construction and biannual basis as per NEQS. 		
6.	Air Pollution	Dust and exhaust emissions may cause nuisance to the local resident	<p><u>Fugitive Dust Emissions</u></p> <ul style="list-style-type: none"> • 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 start of construction activates and on biannual basis as per /WHO. • 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. • Any batching plants will be located at least 500m 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>away from any living area.</p> <ul style="list-style-type: none"> 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. <p><u>Smoke from Burning of Waste Material or Burning Firewood</u></p> <ul style="list-style-type: none"> 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. <p><u>Vehicular and Generator Exhaust Emissions</u></p> <ul style="list-style-type: none"> All vehicles during construction activities will be kept in good working condition and be properly 		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>tuned and maintained in order to minimize the exhaust emissions;</p> <ul style="list-style-type: none"> Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions. 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.	Noise	Disturbances to local residents in the form of increased noise levels due to movement of construction machinery	<ul style="list-style-type: none"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>will be trained about their usage.</p> <ul style="list-style-type: none"> 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 at the start of construction activities and on biannual basis at locations and schedule specified to maintain the level within the NEQS / WHO standards and to ensure the effectiveness of mitigation measures. 		
8.	Vibration	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	<ul style="list-style-type: none"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			employed		
9.	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"> • 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> 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. Ten trees will be replanted for each tree cut as per EPA rule. 		
10.	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><u>Mammals and Reptiles</u></p> <ul style="list-style-type: none"> 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. <p><u>Birds-Avian Fauna</u></p>	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> 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. 		
11.	Impacts on Local Communities/Workforce	<p>Hindrance in mobility of the local residents and their livestock in and around the project area;</p> <p>Usage of Community's common resources like potable water, fuel wood etc. by Contractor workforce may create conflicts;</p> <p>Communities will have to face the noise and dust hazards during the construction activities.</p> <p>Social disruption due to outside workers; labors with different</p>	<ul style="list-style-type: none"> The contractor will ensure that the mobility of the local communities, particularly women and children, and their livestock is not hindered by the construction activities. The contractor will provide alternate and safe track for community quite at a distance away from the construction areas. Similarly, appropriate crossing points will be provided at the access road during its construction for daily works and having free access to the natural resources of the local population. Contractor will remain sensitive towards the local customs and traditions, particularly in the context of privacy of women. 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		transmittable diseases (e.g., HIV/AIDS, COVID-19) may cause spread out of those diseases	<ul style="list-style-type: none"> • Generally, the contractor will avoid using the village tracks for hauling the construction material. However, if it is unavoidable, the existing ones will be widened, overlain with shingle or surface treated to accommodate local as well as contractor's traffic. • Camps will be located at least 500 m away from the nearest local settlement to avoid the contamination of community-owned water resources. • Approval from the Engineer will be obtained before using the local water resources by the Contactor. • The Contractor will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly. • Effective construction controls by the Contractor to avoid inconvenience to the locals due to noise, smoke and fugitive dust. The contractor will frequently sprinkle water at the work areas and haul tracks to avoid generation of fugitive dust. The frequency of sprinkling will be determined by the weather condition in consultation with the client's Engineer. During long spell of hot and dry weather the sprinkling will be done at 2 or 3 hour 		

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>intervals.</p> <ul style="list-style-type: none"> The contracts issued for carrying out the construction work will have to contain clear ruled for the recruitment of staff, which states that local persons have to be given preference in the recruitment process. Compliance to these conditions will have to be checked regularly by Irrigation Department. To the extent possible it should be avoided that large numbers of workers are being brought to this area from outside, and the project should generate a local economic benefit by employing staff from the area. Contractor should Include awareness raising on Covid-19, HIV/AIDS and sexually transmitted disease and prevention and treatment of vector borne disease in Contractor training plan 		
12.	Contractor Mobilization: Campsite & Equipment Yard Establishment	Changes in land use Pattern, Loss of vegetation and Cultural conflict.	<ul style="list-style-type: none"> Location for establishment of campsite shall be duly discussed and approved by BID. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BID before establishment of campsite. Photographs of site before establishment of campsite shall be taken and it will be responsibility of the contractor to make site better or as good as original. A comparison report shall be submitted to 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			Project Director, BWRDP before release of final payment. Site for camp site shall be selected keeping in view the cultural norms of the area to avoid undue interference of the Construction contractor's staff with the local residents. The land shall be rented for the camp site and equipment yard. No resettlement is envisaged for this purpose		
13.	Gender Issues	<p>The rural women actively participate in outdoor socio-economic activities such as livestock rearing, bringing of potable water, etc. which may also be affected by the project activities.</p> <p>The induction of outside labor may create social and gender issues due to the unawareness of local customs and norms.</p>	<ul style="list-style-type: none"> The contractor will have to select the specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population particularly women considering their peak movement hours. The contractor will have to carry out the construction activities in such a way that the open field latrine usage timings by the local community particularly women, should not be affected. The normal timings to use the toilet facilities by the rural women are early in the morning and at late in the evening. The Contractor will limit construction works to between 6 am and 7 pm if it is to be carried out in or near settlements. Contractor will take due care of the local community and sensitivity towards local customs and traditions will be encouraged. Contractor will warn the staff strictly not to involve in any un-ethical activities and to obey the local 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>norms and cultural restrictions particularly with reference to women.</p> <ul style="list-style-type: none"> During construction activities, if privacy of the nearby households is affected, the Contractor will inform the house owner to make some 'parda' arrangements. 		
14.	Safety Hazards for local people	Occurrence of accidents/incidents during the construction activities.	<ul style="list-style-type: none"> Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety material including safety boots, helmets, and gloves, hearing protection and protective masks, and monitoring their proper and sustained usage. The Contractor will ensure the provision of medical services, medicines, first aid kits, vehicle, etc. at the campsite and working place. For this purpose, he will install, staff, equip and operate a clinic on site. It is recommended that this clinic should also be open to the population of the nearby villages, in order of give them some direct benefits from the project. Cordon off the work areas where necessary. The storage of all solid waste shall be practiced so as to prevent the attraction, harbourage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			safety hazards, odours, unsightliness, or public nuisances.		
15.	Traffic disruption	Inconvenience to public mobility. due to movement of contractor light & heavy vehicles, construction machinery/equipment on local /access roads	<ul style="list-style-type: none"> 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. 	CC	SC
16.	Occupational Health and Safety	<p>Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling and transport of hazardous construction material.</p> <p>Spread of Communicable diseases to workers and community</p>	<ul style="list-style-type: none"> All suggested project-specific health and safety plans would include appropriate training and supervision of employees and enforcement of workplace safety policies. All processes and equipment will be designed and constructed for safe operation. A process of safety management program will be developed and implemented to identify hazards associated with each applicable chemical. 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. 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<ul style="list-style-type: none"> Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored. Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them. Use of correct signage for better understanding of all the health safety instructions and precautions for the workers. Signage will be in languages appropriate to the workforce employed. 		
17.	Impact of Construction Debris	<p>Construction debris can lead to soil erosion, sedimentation, and water contamination in nearby water bodies.</p> <p>Disruption of natural habitats and potential harm to local wildlife.</p> <p>Aesthetic degradation of the project site and surrounding areas</p>	<ul style="list-style-type: none"> Establish clear waste disposal guidelines to ensure proper handling and disposal of construction debris. Promote recycling and reuse of construction materials to minimize waste generation. Regularly clean and maintain the construction area to prevent debris accumulation. Educate workers about responsible waste management practices. Engage in post-construction cleanup to restore the site's natural appearance 	CC	SC

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

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
C. Operation & Maintenance Phase				
1.	Construction material left overs.	Construction material left over may likely happen after the closure of temporary construction sites.	<ul style="list-style-type: none"> All shivers and material that remain after the closure of temporary construction sites are to be removed from the location and re-used/recycled where possible. All remains are to be disposed of in a manner that will not be harmful to environment. 	Contractor
2.	Breaching of Dam body, Damage to Spillway and other Structures	Fatal accidents System sustainability	<ul style="list-style-type: none"> BID (Irrigation Department) to monitor the system regularly; 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. The construction and rehabilitation of flood protection bunds as part of the project will be regularly checked to undertake any prone damage; Repairs on urgent basis; and Emergency response plan for Dam breach shall be followed, which is attached as Annexure-IV of this report. 	EA Staff

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
3.	Periodic Cleaning and Maintenance of the System Potential Impacts.	Solid waste generation	<ul style="list-style-type: none"> • The BID will develop and implement a proactive maintenance plan for the proposed project, with predefined periodicity; • Ensure proper disposal of waste at designated landfill/disposal sites; and • Efficiency of the system will be at its best by adopting proper maintenance activities such as silt removal and bed scratching at periodic intervals. 	EA Staff
4.	Safety	human safety issues will arise due to the impounding of the reservoir.	A training program will be organized by BID at community level for safety practices adoption and ensure the community participation. This program should be instigated through the local schools to warn of these dangers to children. By adopting the aforementioned training on safety, the impact would be finally of low significance. Team members of HSE shall be deputed for the prohibiting swimming in dam, spillway or dykes. Warning signs should be posted and restrict the personnel working or visiting the site to follow the instructions.	EA Staff
5.	Climate Change Aspects (Heat Waves, etc.):	<p>Higher temperatures can accelerate the deterioration of infrastructure materials.</p> <p>Rising temperatures can increase crop water requirements due to higher evapotranspiration rates.</p> <p>Economic implications for local farmers Reduced water availability and increased maintenance costs.</p>	<ul style="list-style-type: none"> • Incorporate climate projections into the design of the rehabilitated structures to ensure they can withstand future temperature increases, extreme weather events, and changing precipitation patterns. • Use climate-resistant materials and coatings for infrastructure construction and rehabilitation. • Promote drought-resistant crop varieties and encourage water-efficient farming practices. • Establish economic support mechanisms for farmers 	EA Staff

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
			during periods of water scarcity, such as subsidies for water-efficient technologies.	

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

8.1.12 Planning for Implementation of EMP

405. NOC and Other Approvals

▪ BEPA Approval Process

406. The BID has submitted IEE report in EPA Baluchistan and coordinating for obtaining No Objection Certificate (NOC) that is mandatory requirement before project commencement.

▪ Stakeholder Coordination

407. Notwithstanding the efforts so far put in for public participation, this activity will have to be pursued through the forthcoming implementation phases of the project. In particular, the focus will be on the improvement and modification of the proposed intervention designs.

408. Participation mechanisms facilitate the consultative process and include information sharing and dissemination, disclosure, and participation of affected people and other stakeholders in the project related activities. In the peculiar social set-up of the Project Area, it is also important to involve the religious leaders as representatives of the public as well as part of effective communication process. They can provide a very effective medium to bring information to the affected male population through Friday prayers. Local business community, specially the affected one, should also be brought into the process of awareness and participation.

409. The related institutional arrangements should also be in place for continuous consultation throughout the process of planning, implementation and liaison with key stakeholders through continuous process of information disclosure, consultation and participation.

8.2 Training Schedule

410. Environmental training will form part of the Environmental Management Plan. The training will be conducted for all personnel involved in the project works. The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the subproject. The trainings to the staff will help in communicating environmental related restrictions specified in the EMP. The contractors will be primarily responsible for providing environmental training to all project personnel on potential environmental issues of the subproject. In addition to the training specified in the training log, special/ additional trainings will be provided during the subproject activity. A tentative Training Plan shown in Table 27 below:

Table 8-3: Training Schedule

Sr. No	Target Audience	Trainers	Contents	Schedule
1.	Selected management staff from Contractor	Contractor	<ul style="list-style-type: none"> • Key findings of IEE • Mitigation measures • EMP 	Before the start of construction activities
2.	All site personnel	Contractor	<ul style="list-style-type: none"> • Mitigation measures of EMP and IEE • Camp rules 	Before and during construction activities
3.	Construction crew	Contractor	<ul style="list-style-type: none"> • EMP 	Before and during

Sr. No	Target Audience	Trainers	Contents	Schedule
			<ul style="list-style-type: none"> Waste disposal procedures 	construction activities
4.	Drivers	Contractor	<ul style="list-style-type: none"> Road safety Defensive driving Road access restrictions Vehicle movement restrictions Waste disposal 	Before and during the construction phase
5.	Construction Staff	Contractor	<ul style="list-style-type: none"> Waste disposal Vehicle movement restrictions 	Before and during the construction phase
6.	Camp staff	Contractor	<ul style="list-style-type: none"> Camp operation Waste disposal Natural resource conservation Housekeeping Camp Rules 	Before and during the construction phase
7.	Construction Staff of Contractors	Contractor	<ul style="list-style-type: none"> Introduction to the Gender Code of Conduct Respectful and Inclusive Behavior Preventing and Addressing Sexual Harassment Equal Opportunities and Non-Discrimination Promoting Women's Participation 	Before and during the construction phase

8.3 Communication & Documentation

411. Communication and documentation is an essential feature of EMP. The key features of such mechanism are:

- **Data Recording and Maintenance**

412. All forms to be used for recording information during the environmental monitoring will follow a standard format which will correspond to the data base in to which all the gathered information will be placed. Check boxes will be used as much as possible to facilitate data entry. Tracking system will be developed for each form.

Database

413. The database may include the following information:

- Training programs;
- Staff deployment;
- Non-compliance;
- Corrective actions
- List of environmental data and

- List of environmental data to be maintained:
- Soil and land pollution
- Disposal of excavated silt and earth
- Disposal of waste
- Water resource
- Fuel oil and chemical spills
- Vegetation record
- Noise pollution
- Air and dust pollution
- Socio-economic data

▪ **Meetings**

414. The following environmental meetings during the project will take place. Primary meeting for setting out the requisite end frame sounding for the regular meetings. Scheduled meetings between Contractor and Supervising Consultants.

415. The purpose of the meeting will be to discuss the conduct of the operation, non – compliances noted by the consultant's environmental team and measures for their remedy. The meeting will be recorded in the form of a daily/monthly environmental report.

▪ **Social Complaint Register**

416. The Supervising Consultant (SC) and ESMMC will maintain a register of complaints record from local communities and measures taken to mitigate these concerns.

▪ **Photographic Records**

417. Contractors, SC and ESMMC will maintain photographic records during the implementation of the project. As a minimum, the photographic records will include the site photographs, all the roads, camp sites and monitoring activities etc.

8.4 Grievance Redressal Mechanism

418. In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance an Environmental Grievance Redress Mechanism (GRM) will be established for the proposed project. The mechanism will be used for addressing any complaints that arise during the implementation of projects. In addition, the GRM will include a proactive component whereby at the commencement of construction of project (prior to mobilization) the community will be formally advised of project implementation details by the PD, the Construction Supervision Consultants (CSC) and the contractor (designs, scheduled activities, access constraints etc.) so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This proactive approach with communities will be pursued throughout the implementation of the project.

419. The GRM will address affected people's concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism will not impede access to the Country's judicial or administrative remedies.

8.5 Redress Committee, Focal Points, Complaints Reporting, Recording and

Monitoring

420. The Grievance Redress Mechanism, which will be established at the proposed project is described below:

421. The Project Director will facilitate the establishment of a Dam Level Grievance Redress Committee (GRC) at each dam location prior to the Contractor's mobilization to site. The functions of the GRC are to address concerns and grievances of the local communities and affected parties as necessary.

422. The GRC will comprise of following members

- SDO-BID
- Representatives from local community
- CSCs Environmental Engineer/Scientist; and
- Contractors Environmental Engineer/Scientist.

423. The role of the GRC is to address the Project related grievances of the affected parties that are unable to be resolved satisfactorily through the initial stages of the Grievance Redress Mechanism (GRM).

424. A pre-mobilization public consultation meeting will be convened by the Sub Divisional Officer (SDO) and attended by Local community members of GRC, contractor, CSC, and other interested parties (eg. District level representatives, NGOs). The objectives of the meeting will be as follows:

- (i) Introduction of key personnel of each stakeholder including roles and responsibilities,
- (ii) Presentation of project information of immediate concern to the communities by the contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
- (iii) Establishment and clarification of the GRM to be implemented during project implementation including routine (proactive) public relations activities proposed by the project team (contractor, PIC, PMO) to ensure communities are continually advised of project progress and associated constraints throughout project implementation;
- (iv) Identification of members of the Grievance Redress Committee (GRC)
- (v) Elicit and address the immediate concerns of the community based on information provided above

425. Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown on Figure 8-1.

- i. Individuals will bring their complain to the attention of the Contractor.
- ii. The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the complainant.
- iii. The complainant will discuss the complaint with the Contractor and have it resolved;

- iv. If the Contractor does not resolve the complaint within one week, then the complainant will bring the complaint to the attention of the Grievance Redress Committee (GRC).
- v. The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.
- vi. If the complaint is not resolved through the GRC, then complainant will bring the complaint to the attention of the Project Director Office.
- vii. The Project Director Office will have to resolve the complaint within a period of 1 weeks and the resolved complaint will have to be communicated back to the community.
- viii. If complaint is not resolved through PD Office, the issue will be adjudicated through local legal processes.
- ix. PD Office will also keep track of the status of all complaints through the Monthly Environmental Monitoring Report submitted by the Contractor to the CSC and will ensure that they are resolved in a timely manner.

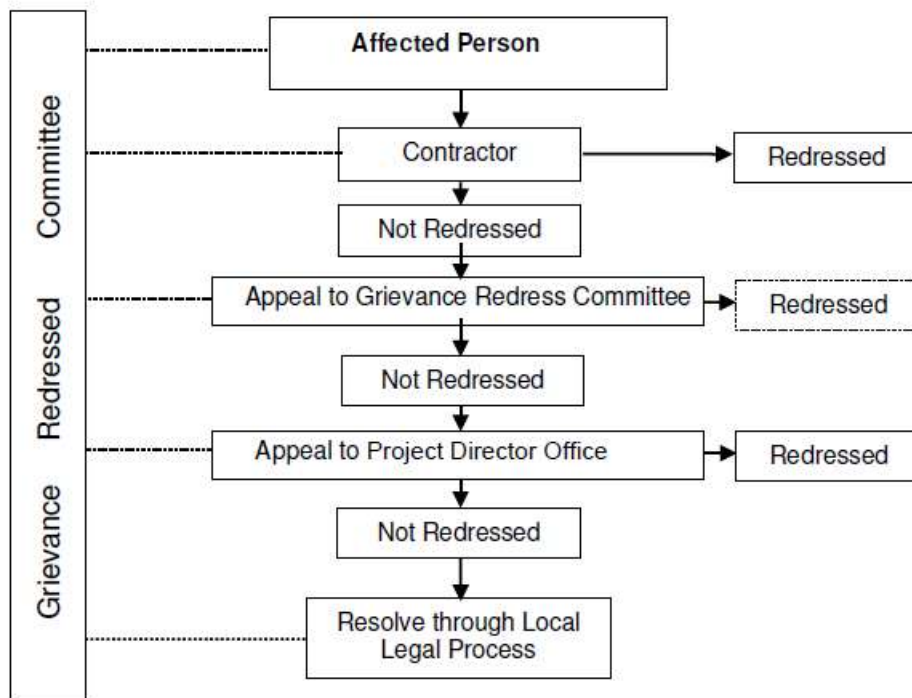


Figure 8-1: Grievance Redressal Mechanism

8.6 Estimated Budget for EMP Implementation

426. The budget presented in Table 8-3, 8-4 & 8-5 will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

Environmental Management and Monitoring Cost

Table8-4. Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Components	Parameters	Monitoring Location	No. of Samples/unit	Frequency	Responsibility	Cost PKR
During Construction Period						
Air quality	CO, NOx, SOx, PM ₁₀ , PM _{2.5}	Construction site, batching plant site, and access road/borrow area, nearby village (SC will guide)	11 (Total= 33)	Start of construction, semiannual	Proponent ¹ (though Environmental lab)	13,20,000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals	Nearby Construction site	1 (Total=11)	Start of construction, semiannual	Proponent (though Environmental lab)	112,000
Surface Water Quality	Physical-chemical parameters, biological contamination, heavy metals	Nearby Construction site and community	2 (Total= 22)	Start of construction, semiannual	Proponent (though Environmental lab)	224,000
Noise Level		Construction site, camp site, access roads, nearby community	2 (Total= 22)	Start of construction, semiannual	Proponent (though Environmental lab)	64,000
A. Sub-Total	1,200,000					PKR
During Operation & Maintenance Period(one year)						
Air quality	CO, NOx, Sox, PM ₁₀ , PM _{2.5}	PMU will guide	1 (Total = 22)	Bi-annually	Proponent(BID)	50000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals		1 (Total =2 2)	Bi-annually	Proponent(BID)	28,000
Surface Water	Physical-chemical parameters,		1	Bi-annually	Proponent(BID)	28,000

Quality	biological contamination, heavy metals		(Total = 22)			
Noise Level			2 (Total = 44)	Bi-annually	PMU, BWRDP	16,000
B. Sub-Total	122,000					
Total (A+B)=	PKR 1,322,000					

Table 8-5: Cost of Proponent

Sr. No	Description	Amount (PKR)
1	Environmental Monitoring cost for construction & operation period (from Table 8-4)	1,322,000
2	Tree Plantation Cost ⁸ (Lump sum)	200,000
3	Training & Community Engagement Cost	250,000
Total Cost		1,672,000

Table 8-6: Cost of Contractor

Sr. No	Description	Amount (PKR)
1.	Contractor Environmental Engineer (2 No.) salary @ Rs. 100,000/month	2,000,000
2.	PPEs (masks, goggles and gloves etc)	700,000
3.	First Aid	500,000
4.	Fire Safety	300,000

⁸ No tree cutting is involved in this restoration/rehabilitation project being executed within its already available RoW. A lumpsum cost for plantation is recommended for enhancing environmental benefits of the project

Sr. No	Description	Amount (PKR)
5.	Water Sprinkling	1,000000
6.	Solid waste collection & disposal	1,000000
7.	Noise monitoring, Dissolved Oxygen, pH and Electric Conductivity (EC) of the water Monitoring on Monthly Basis ²	328,000
Total Cost		5,828,000

Total EMP Cost = Rs. 75,00,000

SC= Supervision Consultant, PMU: Project Management Unit

¹ Proponent (BID) will hire an Environmental laboratory for Air, Noise quality monitoring and Water quality testing and will perform environmental testing according to Table 8-6.

²Contractor will purchase DO meter, EC meter, pH meter, Noise meter for monthly monitoring

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 GENERAL

427. This section presents the major conclusions and key recommendations of the IEE study.

Findings and Recommendations

428. This study was carried out at the planning stage of the project. Predominantly both primary and secondary data with site reconnaissance were used to assess the environmental impacts. The potential environmental impacts were assessed in a comprehensive manner. The report has provided a picture of all potential environmental impacts associated with the subprojects and recommended suitable mitigation measures.

429. There are some further considerations for the planning stages such as submission of IEE report to BEPA for grant of No Objection Certificate for the proposed subproject interventions under Baluchistan Environmental Protection Act 2012.

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

431. The environmental impacts from the project will mostly take place during the construction stage. The impacts are likely to be similar at most locations and impacts have been reviewed in the relevant section of this IEE report.

432. This project entails various significant impacts across different stages. The potential threat of severe flooding requires adherence to hydrological findings and pre-construction validation. Seismic considerations should be integrated into the detailed design, following seismic criteria. Proper disposal of soil material is crucial to prevent negative environmental effects. Noise pollution and air quality degradation should be controlled by adhering to noise and emissions standards. Waste generation necessitates a waste management plan and training for workers. Wildlife impacts, including mammals, reptiles, avian fauna, and flora, should be minimized through no-hunting policies, habitat protection, and avoiding disturbances. Traffic and safety hazards demand traffic management plans, immediate repairs, and safety protocols for workers. Local water resource usage necessitates prior approvals and adherence to local regulations. To maintain system sustainability, dam breach and structural damage risks must be monitored, addressed through community engagement, and managed with a comprehensive emergency response plan.

433. The proposed project does not impact biological component of the area, at construction phase as well as its operation phase. However, the project is likely to bring significant change in opportunities for the community and its surrounding ecosystem in the form of social uplift, agricultural productivity and prosperity.

434. The restoration and rehabilitation of the Check dam subproject will bring various benefits. Firstly, it will involve the restoration and strengthening of dams, ensuring their long-term functionality and resilience. Additionally, measures will be taken to stabilize slopes, minimizing the risks of landslides and erosion. The improved condition of the dams will extend their operational life, enabling continued benefits such as water storage and flood control. The subproject will also contribute significantly to groundwater recharge. It aims to protect the local population from the havoc caused

by floods, as well as safeguard physical infrastructure, reducing the need for costly repairs and disruptions. Furthermore, the implementation of the subproject will lead to a reduction in flood peaks and damages downstream, mitigating the adverse effects of flooding on surrounding populations. Moreover, it will provide opportunities for livelihood and promote production activities, fostering economic growth and development in the area.

435.

9.2 Conclusions

436. Environmental criteria adopted for this study is comprised of three phases, these are as follows:

- Impacts during Planning and Design Phase;
- Impacts during Implementation and Construction Phase; and
- Impacts during Operation and Maintenance Phase.

Following is the conclusion statement of the study on the basis of environmental assessment carried out in this report:

Some activities under this project have been identified to cause low to moderate environmental negative impacts and their mitigation measures have been prescribed. Proper and timely execution of these measures will reverse most the negative impacts in the long term however there will be some residual impacts of the project. Overall, the project causes moderate to high positive impacts on the physical and socio-economic environments and should therefore be approved for implementation.

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
A. Project Site			
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. Potential Environmental Impacts			
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


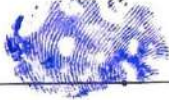

Screening Questions	Yes	No	Remarks
			the same will be documented in EMP
<ul style="list-style-type: none"> Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 	✓		Earth 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"> 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? 	✓		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.
Climate Change and Disaster Risk Questions			
<ul style="list-style-type: none"> The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks. 	Yes	No	Remarks
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes? 	✓		Project area is prone to floods and earthquakes. 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.
<ul style="list-style-type: none"> 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 	✓		climate resilience considerations will be incorporated into the project design and Restoration and rehabilitation of water conservation structures

Screening Questions	Yes	No	Remarks
cannot be used for some or all of the year)?			will be done
▪ Are there any demographic or socio-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)?		✓	
▪ 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)?		✓	

Annexure 2: Attendance Sheets

Killi Medadzai

List of Participants

Sr. No.	Name	Occupation	Signature/ Thumb
1)	M. Hanef-	Transporter Truck driver	 Handwritten signature
2)	M. Naseem	Transporter	Handwritten signature
3)	Noor Muhammad	Farmer	Handwritten signature
4)	Shahid Ahmed	Farmer	Handwritten signature
5)	Nazeer Ahmed	6335-3788411 Farmer	
6)	Ali Haider	Labour Farmer	
	=		

0335-621
18P.

Killi Malik Pain Khan

List of Participants

Sr. No.	Name	Occupation	Signature/ Thumb
1)	M. Adil	0333-7229787 ZKB worker	
2)	Shoial ullah	0336-4827232 TGS bus.	
3)	u ^{llah} Noor u ^{llah}		
4)	Hikmat u ^{llah}		
5)	Zia u ^{llah} .	Student	
6)	Pa ^{ind.} Malik Pain Khan	community head.	
	=		

Killi Murghi Kotal

List of Participants

Murghi Khatol

Sr. No.	Name	Occupation	Signature/ Thumb
1)	M. Tariq	Community head. Land lord.	M. Tariq
2)	H. Lal Muhammad	Farmers	H. Lal Muhammad

Killi Berwezy

List of Participants

Sr. No.	Name	Occupation	Signature/ Thumb
1)	Bashir Ahmed	Migration Shop keeper	learis
2)	Rifan	0331 89 85740 Transporter	Shah
3)	Noor Khan	0335 75 62461 Social activist	Qureshi
4)	Dood Shah	Clinic Lab Assistant	Dood Shah
5)	Ameen ullah	Painter	Amin
6)	Waheed Ahmed	Deliver	Waheed
	=		

0334-999
1346.

Annexure 3: Environmental Monitoring Report

Ambient Air Quality Monitoring Results



Sustainable Environmental Services SES

Analysis Report Ref # SES/ENV/Mar/23/1651/1481-A Date: 20-March-2023

Description:

Job Location:	Camp and Project site	Testing Instrument	24 Hours Air Monitoring Station
Job Performed By:	Mr. Mohsin	Job Date :	13-March-2023 to 14-March-2023
Monitoring Duration:	10:00AM to 09:00AM (24 Hrs.)		
Project name :	Construction of Water Resource Building at Quetta (NCB-05)		
Client :	Balochistan Water Resources Development Sector (BWRDSP) ADB Loan no. 3700-PAK Irrigation Department Balochistan		
Consultants Name:	NESPAK, RHC, EGC (JV)		
Contractor Name :	M/S HAJI ABDUL HAMEED BANGULZAI (JV) M.AKBAR SHAIWANI & BROTHERS		

Air Quality Test Report

Parameters	Temp	NO	NO ₂	SO ₂	CO	PM _{2.5}	PM ₁₀	SPM	O ₃
NEQS & BEQS Limit	-	24 hrs. (40 µg/m ³)	24 hrs. (80µg/m ³)	24 hrs. (120µg/m ³)	08 hrs. (5 mg/m ³)	24 hrs. (35 µg/m ³)	24 hrs. (150 µg/m ³)	24 hrs. (500 µg/m ³)	01 hr. (130µg/m ³)
WHO Limit	-	-	24 hrs. (25 µg/m ³)	24 hrs. (40 µg/m ³)	08 hrs. (4 mg/m ³)	24 hrs. (15 µg/m ³)	24 hrs. (45µg/m ³)	-	Peak Season (60µg/m ³)
Time	Results								
10:00AM	6°C	09.43	23.17	2.02		29.4	46.2	106.5	05
11:00AM	8°C	10.28	21.56	1.28	0.027	23.5	41.6	116.3	-
12:00PM	11°C	08.24	24.63	1.59		25.4	44.8	112.4	-
01:00PM	11°C	07.51	22.52	1.84		27.6	40.9	105.9	-
02:00PM	12°C	09.67	26.74	2.02	0.029	28.9	43.7	117.5	-
03:00PM	12°C	10.25	24.33	1.46		26.2	42.5	110.3	-
04:00PM	13°C	08.51	21.58	1.34		28.1	41.3	104.8	-
05:00PM	13°C	09.27	23.74	1.96	0.026	20.5	47.2	126.7	-
06:00PM	12°C	07.36	24.64	1.65		27.6	45.8	121.9	-
07:00PM	11°C	09.29	25.86	1.26		23.9	40.9	126.8	-
08:00PM	11°C	06.35	22.71	1.31	0.024	24.7	43.1	124.6	-
09:00PM	10°C	05.63	20.53	1.16		22.1	44.9	120.5	-
10:00PM	09°C	06.92	19.78	1.06		27.6	40.2	118.9	-
11:00PM	08 °C	05.01	18.26	1.28	0.022	29.5	39.6	112.2	-
12:00AM	08 °C	04.37	18.06	1.52		26.2	38.9	105.8	-
01:00AM	05°C	04.29	17.26	1.18		24.8	37.3	96.2	-
02:00AM	05 °C	04.32	17.08	1.27	0.023	21.6	35.4	99.1	-
03:00AM	04°C	04.22	17.65	1.02		20.9	33.7	94.6	-
04:00AM	03°C	03.91	16.37	0.96		21.7	31.5	95.9	-
05:00AM	03°C	03.98	16.58	1.13	0.021	19.2	30.8	93.5	-
06:00AM	02°C	04.16	17.39	1.05		18.3	31.9	97.9	-
07:00AM	02°C	04.58	17.44	1.29		19.6	29.5	92.2	-
08:00AM	03°C	05.05	18.28	1.21	0.019	20.8	33.4	93.4	-
09:00AM	04 °C	07.19	20.84	1.32		23.5	36.5	95.6	-
AVERAGE	7.7 °C	6.65	20.70	1.38	0.023	24.23	39.2	107.8	05



New Head Office: Plot No SC-46 Block Commercial Sector 31/D P&T Society Korangi, Karachi.
Mob: +92(0)346-2225261, 0333-2699016 Tel # 02135121125 E-mail: info@sespaklab.com Web: www.sespaklab.com



Sustainable Environmental Services SES

Analysis Report

Ref # SES/ENV/Mar/23/1651/1481-B

Date:20-March-2023

Description:

Job Location:	Camp and Project site.	Testing Instrument	24 Hours Air Monitoring Station
Job Performed By:	Mr. Mohsin	Job Date :	13-March-2023 to 14-March-2023
Monitoring Duration:	10:00AM to 09:00AM (24 Hrs.)		
Project Name :	Construction of Water Resource Building at Quetta (NCB-05)		
Client :	Balochistan Water Resources Development Sector (BWRDSP) ADB Loan no. 3700-PAK Irrigation Department Balochistan		
Consultants Name:	NESPAK, RHC, EGC (JV)		
Contractor Name :	HAJI ABDUL HAMEED BANGULZAI (JV) M.AKBAR SHAHWANI & BROTHERS		

Ambient Air Quality Monitoring

Sr.	Measuring Parameters	Unit	WHO Limit	NEQS & BEQS Limits	Average Test Result	Remarks
1.	Oxide Of Nitrogen as (NO)	$\mu\text{g}/\text{m}^3$	-	40 (24 hrs.)	6.65	WL
2.	Oxide Of Nitrogen as (NO ₂)	$\mu\text{g}/\text{m}^3$	25(24 hrs.)	80 (24 hrs.)	20.70	WL
3.	Sulphur Dioxide (SO ₂)	$\mu\text{g}/\text{m}^3$	40(24 hrs.)	120 (24 hrs.)	1.38	WL
4.	Carbon Monoxide (CO)	mg/m^3	4(24 hrs.)	5 (08 hrs.)	0.023	WL
5.	Particulate Matter (PM 2.5)	$\mu\text{g}/\text{m}^3$	15(24 hrs.)	35 (24 hrs.)	24.23	WL
6.	Particulate Matter (PM 10)	$\mu\text{g}/\text{m}^3$	45(24 hrs.)	150 (24 hrs.)	39.2	WL
7.	SPM	$\mu\text{g}/\text{m}^3$		500 (24 hrs.)	107.8	WL
8.	Ozone (O ₃)	$\mu\text{g}/\text{m}^3$	60(Peek Season)	130 (01 hr.)	05	WL

Note:

BEQS=Baluchistan Environmental Quality Standards

The instruments used were dully calibrated.

The measurements were carried out on client's request.

The client is responsible for lawful usage of reported data in future.

This report is not valid for Court evidence/ Judicial knowledge

The measurement results based on the time of monitoring

WL= Within Limit

Field Analyst:



Chief Chemist:

Kashif Ahmed



New Head Office: Plot No SC-46 Block Commercial Sector 31/D P&T Society Korangi, Karachi.
Mob: +92(0)346-2225261,0333-2699016 Tel # 02135121125 E-mail: info@sescpaklab.com Web: www.sescpaklab.com

Noise Level Results



Sustainable Environmental Services | SES

Analysis Report

Ref # SES/ENV/Mar/23/1651/1481-D

Date: 20-March-2023

Description:

Job Location:	Camp and Project site.	Testing Instrument:	Noise Meter
Job Performed By:	Mr. Mohsin	Job Location :	13-March-2023 to 14-March-2023
Monitoring Duration:	10:00AM to 09:00AM (24 Hrs.)		
Project Name:	Construction of Water Resource Building at Quetta (NCB-05)		
Client:	Balochistan Water Resources Development Sector (BWRDSP) ADB Loan no. 3700-PAK Irrigation Department Balochistan		
Consultants:	NESPAK, RHC, EGC (JV)		
Contractor Name:	HAJI ABDUL HAMEED BANGULZAI (JV) M.AKBAR SHAHWANI & BROTHERS		

Noise Test Report

S. No	Measuring Parameter	Testing Instrument	WHO Limit	NEQS & BEQS Limits	TIME	Results
01	Noise Level	Noise Meter	65 dB(A) (Day time)	75 dB(A) (Day time)	10:00AM	58.4
02					11:00AM	56.6
03					12:00PM	57.5
04					01:00PM	55.1
05					02:00PM	53.4
06					03:00PM	56.7
07					04:00PM	55.2
08					05:00PM	54.8
09					06:00PM	56.3
10					07:00PM	55.4
11					08:00PM	53.9
12					09:00PM	52.7
13			10:00PM	51.8		
14			11:00PM	51.2		
15			12:00AM	50.3		
16			01:00AM	50.2		
17			02:00AM	47.8		
18			03:00AM	45.4		
19			04:00AM	43.9		
20			05:00AM	44.5		
21			06:00AM	46.8		
22			07:00AM	48.2		
23			08:00AM	49.6		
24			09:00AM	51.4		
Average Result						51.9



New Head Office: Plot No SC-46 Block Commercial Sector 31/D P&T Society Korangi, Karachi.
Mob: +92(0)346-2225261, 0333-2699016 Tel # 02135121125 E-mail: info@sespaklab.com Web: www.sespaklab.com

Wastewater Tests Results



Sustainable Environmental Services SES

Analysis Report

Ref # SES/ENV/Mar/23/1651/1481-E

Date: 20-March-2023

Description:

Quantity of sample	1.0 Liter	Sampling Methodology	Grab
Analysis Type	Chemical Analysis	Sampling Location	Construction Resource Building Quetta
Project Name:	Construction of Water Resource Building at Quetta (NCB-05)	Sampling Date	13-March-2023
Client :	Balochistan Water Resources Development Sector (RWRDSP)		
Consultants:	NESPAK, RHC, EGC (JV)		
Contractor Name :	HAJI ABDUL HAMEED BANGULZAI (JV) M.AKBAR SIAHWANI & BROTHERS		

Waste Water Test Report

S.No	Measuring Parameter	Units	Testing Method	NEQS Limits	WHO Limits	BEQS Limits	Results
1	Temperature AT 40 °C	°C	By Calibrated Thermometer	40 + ≤ 03 °C	40 + ≤ 03 °C	40 + ≤ 03 °C	31.2
2	pH @ 25 °C	pH	ASTM D-1293	6 to 9	6 to 9	6 to 9	7.45
3	Biological Oxygen Demand	BOD ₅ (mg/L)	APHA 5210	80	80	80	64.5
4	Chemical Oxygen Demand	COD (mg/L)	ASTM D-1252	150	150	150	129
5	Total Dissolved Solids	TDS (mg/L)	APHA 2540-C	3500	3500	3500	2210
6	Total Suspended Solids	TSS (mg/L)	APHA 2540-D	200	200	200	113
7	Oil & Grease	O.G (mg/L)	ASTM D-4281	10	10	10	0.09
8	Chloride	Cl ⁻ (mg/L)	ASTM D-512	1000	1000	1000	732
9	Phenolic compound	Phbl (mg/L)	ASTM D-1783	0.3	0.3	0.3	ND
10	Fluoride	F ⁻ (mg/L)	APHA 4500-F ⁻	10	10	10	5.6
11	Anionic Detergent	Det ⁻ (mg/L)	ASTM D-6173	20	20	20	3.4
12	Selenium	Se ²⁺ (mg/L)	APHA 4500-Se	0.5	0.5	0.5	ND
13	Sulfide	S ²⁻ (mg/L)	APHA 4500-S ²⁻	1.0	1.0	1.0	0.36
14	Ammonia	NH ₃ (mg/L)	ASTM D-1426	40	40	40	15.2
15	Cadmium	Cd ²⁺ (mg/L)	ASTM D-3557	0.1	0.1	0.1	<0.1
16	Chromium Trivalent	Cr ³⁺ (mg/L)	APHA 3500-Cr	1.0	1.0	1.0	ND
17	Chromium Hexavalent	Cr ⁶⁺ (mg/L)	APHA 3500-Cr	1.0	1.0	1.0	0.029
18	Lead	Pb ²⁺ (mg/L)	ASTM D-3559	0.5	0.5	0.5	0.3
19	Mercury	Hg ²⁺ (mg/L)	Kit Method	0.01	0.01	0.01	ND
20	Nickel	Ni ²⁺ (mg/L)	HACH Dimethylglyoxime Method	1.0	1.0	1.0	ND
21	Silver	Ag (mg/L)	ASTM D-3866	1.0	1.0	1.0	ND
22	Zinc	Zn ²⁺ (mg/L)	HACH Zincon Method	5.0	5.0	5.0	0.5
23	Total Iron	Fc2F (mg/L)	APHA 3500-Fe	8.0	8.0	8.0	0.7
24	Manganese	Mn ²⁺ (mg/L)	APHA 3500-Mn	1.5	1.5	1.5	0.06
25	Boron	B (mg/L)	APHA 4500-Mn	6.0	6.0	6.0	0.8
26	Sulfate	SO ₄ (mg/L)	APHA 4500-SO ₄	600	600	600	226
27	Arsenic	As (mg/L)	Palintest Kit	1.0	1.0	1.0	ND
28	Copper	Cu ²⁺ (mg/L)	HACH Biquinoline Method	1.0	1.0	1.0	0.04
29	Chlorine	Cl ₂ (mg/L)	HACH DPD Method	1.0	1.0	1.0	ND
30	Aluminum	Al (mg/L)	HACH Eriochrome Cyanine R	1.0	1.0	1.0	ND
31	Total Kjeldahl Nitrogen	(mg/L)	Kit Method	2.0	2.0	2.0	0.26
32	Barium	Ba (mg/L)	ASTM D-4382	1.5	1.5	1.5	0.35

Note:

- BEQS - Balochistan Environmental Quality Standards
- The instruments used were duly calibrated.
- The measurements were carried out on client's request.
- The client is responsible for lawful usage of reported data.
- This report is not valid for Court evidence/ Judicial knowledge.
- The measurement results based on the time of monitoring.
- WL - Within Limit

Field Analyst:

Mr. Mohsin

Chief Chemist:



New Head Office: Plot No SC-46 Block Commercial Sector 31/D P&T Society Korangi, Karachi.
 Mob: +92(0)346-2225261, 0333-2699016 Tel # 02135121125 E-mail: info@sespaklab.com Web: www.sespaklab.com

Pictorial Evidence of Environmental Monitoring

Picture Evidence

Project name:	Construction of Water Resource Building at Quetta (NCB-05)
Client Name:	Balochistan Water Resources Development Sector (BWRDSP) ADB Loan no. 3700-PAK Irrigation Department Balochistan
Consultants Name:	NESPAK, RHC, EGC (JV)
Contractor Name :	M/S HAJI ABDUL HAMEED BANGULZAI (JV) M.AKBAR SHAHWANI & BROTHE



Fig.1



Fig.2



Fig.3



Fig.4

Annexure 4: 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 11 dam 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	Spin Karez Dam Quetta	Quetta	30° 13'13.34" N 67° 08'20.03" E	Spilway Damaged
2	Mandoki Check Dam Quetta	Quetta	30° 08'34.72" N 66° 43'57.85" E	Dam Body Breached
3	Small Dam Aghberg	Quetta	30° 11'30.52" N 67° 47'45.54" E	Spilway Damaged
4	Ghundak Karez Check Dam	Quetta	30° 21'37.46" N 67° 08'11.05" E	Spilway Collapsed, Partial Damages in Dam Body
5	Khalaka Check Dam Jaloojer Kuchlak	Quetta	30° 26'25.81" N 66° 55'14.26" E	Spilway Damaged
6	Murghi Kotal Dam Kuchlak	Quetta	30° 19'04.39" N 66° 56'38.54" E	D/S Dam Body and Spilway Partial Damage
7	Shagai-I DAD	Quetta	30° 12'58.70" N 67° 04'20.66" E	Dam Body Settlement, Cracks, Excessive Seepage
8	Shagai-II DAD	Quetta	30° 12'44.60" N 67° 04'16.66" E	Dam Body Settlement, Cracks, Excessive Seepage
9	Habib Dara-II	Quetta	30° 11'35.32" N 67° 04'14.70" E	Breached
10	Barwery Delay Action Dam (Karkasha Dam)	Quetta	30°10'37.13" N 66°56'4.56" E	Partial Damage Spilway & Dam Body Cracks
11	Kach Delay Action Dam	Quetta	30°18'44.56" N 67°05'0.73" E	Dam Body Damaged

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

- c) Restoration of Water Conservation Structures (Small Dams, Check Dams, Delay Action Dams, Spillways, Outlet Works)
- d) Restoration of River Training / Flood Mitigation Structures

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) Quetta District
	Administration such as Assistant Commissioner (AC)	AC Quetta
Dam Level	Dam Operator	Sub Divisional Officer Irrigation

3. Provincial Disaster Management Authority and its field office in Quetta District Administration of the Quetta 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. Quetta 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 5: 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 6: 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 workPunjablace or worPunjablaces; 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 7: 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

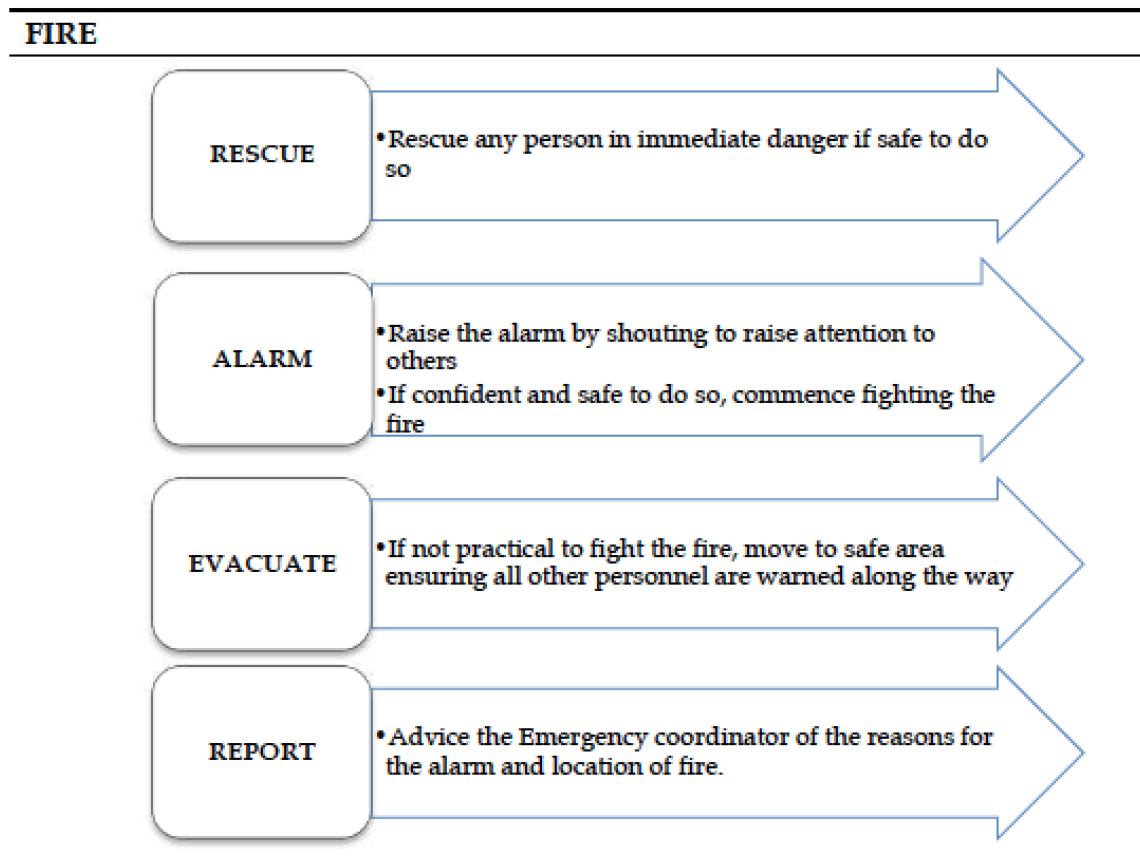
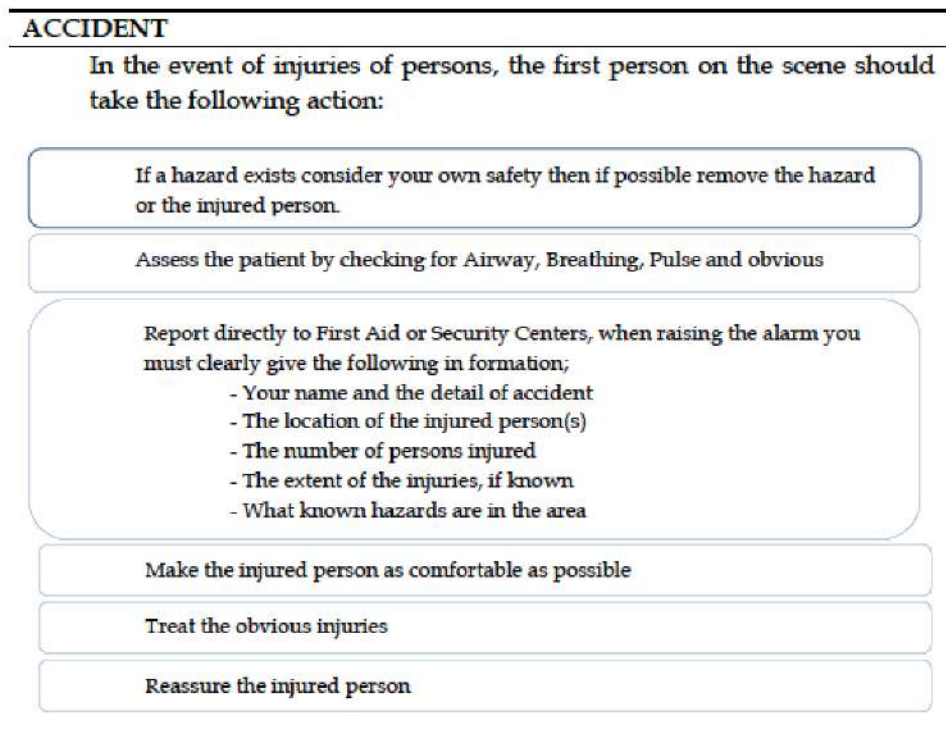


Figure 7.3 Emergency Procedure for Serious



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

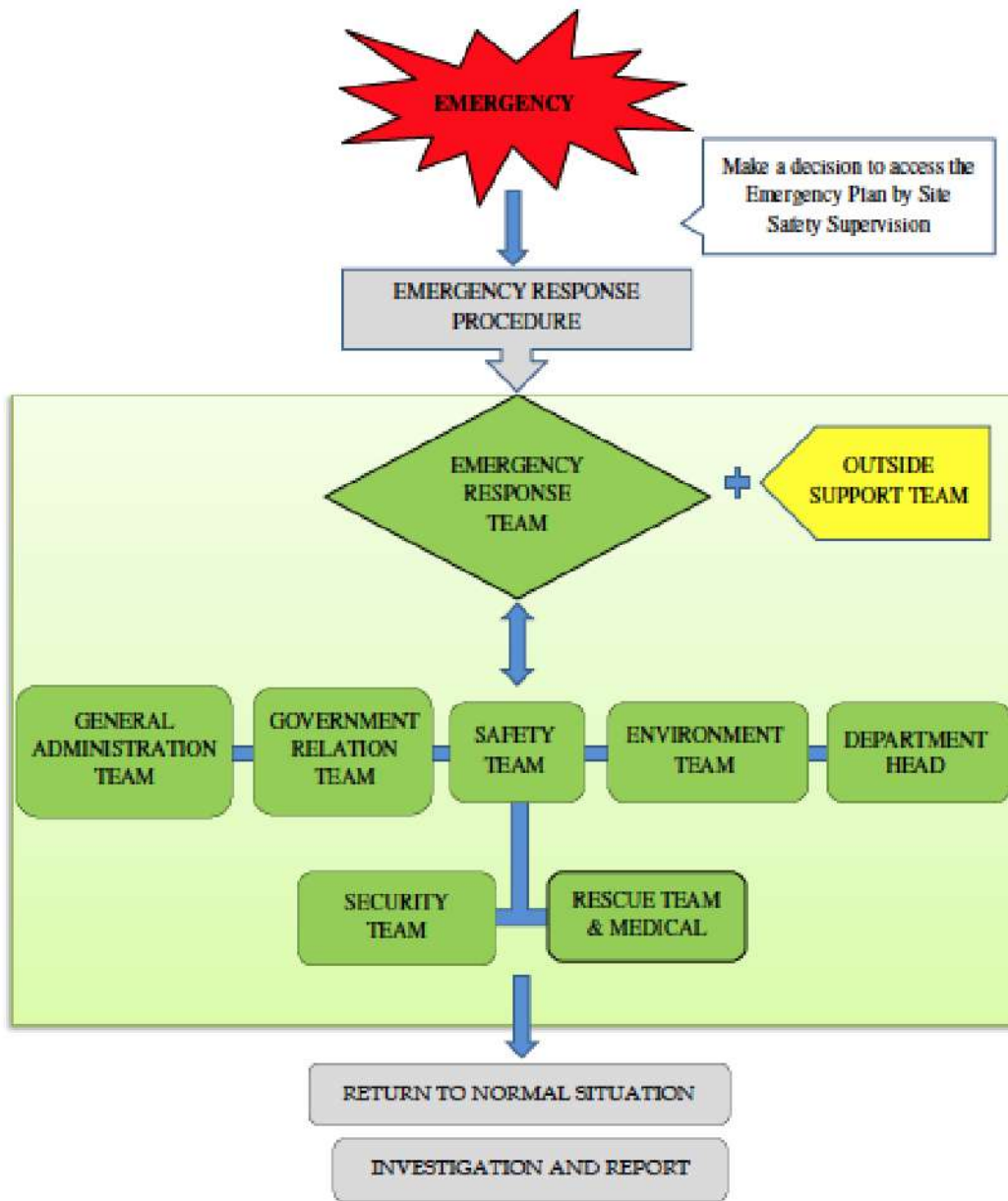
- Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

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.

Figure 7.1 INCIDENT AND ACCIDENT REPORT

Section A: Identification Data										
Report No:		Date of Reported:			Reporter:			Sign:		
Job Title:					Company Name:					
Section B: Violence Rate										
Accident Violence: <input type="checkbox"/> 01-Death <input type="checkbox"/> 02-Serious Injury <input type="checkbox"/> 03-Lost Time Injury <input type="checkbox"/> 04-First Aid <input type="checkbox"/> 05- Not Injury <input type="checkbox"/> 06-Near Miss										
Property Damage Cost: <input type="checkbox"/> 1-2,000 USD <input type="checkbox"/> 2,001-10,000 USD <input type="checkbox"/> 10,001-50,000 <input type="checkbox"/> > 50,001										
Section C: Environmental Impact										
Affected area		<input type="checkbox"/> Construction area			<input type="checkbox"/> Public area					
Receptor		<input type="checkbox"/> None			<input type="checkbox"/> Workers			<input type="checkbox"/> Community		
Type of pollution		<input type="checkbox"/> Physical			<input type="checkbox"/> Chemical			<input type="checkbox"/> Biological		
Toxicity		<input type="checkbox"/> Non-toxic			<input type="checkbox"/> Low - toxic			<input type="checkbox"/> High - toxic		
Return to Normal		<input type="checkbox"/> 1 day			<input type="checkbox"/> 1 day to 1 week			<input type="checkbox"/> ≥ 1 week		
Cumulative impact		<input type="checkbox"/> Non-cumulative			<input type="checkbox"/> Cumulative					
Section D: Injured/Illness Employee										
1.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:		Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year				In this job title	In this Project
								Years	Weeks	Years
	Site:	Company:		Reference:			Phone No:		Social Security Number:	
Part of Body Injured or Affected:					Nature of Injury or Illness:					
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture			
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction			
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hernia	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Chemical	<input type="checkbox"/> Contamination			
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupationnel)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation				
<input type="checkbox"/> Arms	<input type="checkbox"/> Thump	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal							
Remark:					Remark:					
2.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:		Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year				In this job title	In this Project
								Years	Weeks	Years
	Site:	Company:		Reference:			Phone No:		Social Security Number:	
Part of Body Injured or Affected:					Nature of Injury or Illness:					
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture			
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction			
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hernia	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Contamination	<input type="checkbox"/> Chemical			
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupationnel)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation				
<input type="checkbox"/> Arms	<input type="checkbox"/> Thump	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal							
Remark:					Remark:					
Section E: Accidents/Incident Details										
Date Accident/Incident Occurred:				Time Accident/Incident Occurred:				Exact Location of the Accident / Incident:		

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 2 <input type="checkbox"/> Unguarded 3 <input type="checkbox"/> Defective Tools, Equipment, or Substance 4 <input type="checkbox"/> Unsafe Design or Construction 5 <input type="checkbox"/> Hazardous Arrangement 6 <input type="checkbox"/> Unsafe Illumination 7 <input type="checkbox"/> Unsafe Ventilation 8 <input type="checkbox"/> Unsafe Clothing 9 <input type="checkbox"/> Insufficient Instruction 10 <input type="checkbox"/> Lack of system of work	1 <input type="checkbox"/> Operating Without Authority / Training 2 <input type="checkbox"/> Operating at Unsafe Speed 3 <input type="checkbox"/> Marking SHE Device Inoperative 4 <input type="checkbox"/> Using Unsafe Equipment or Equipment Unwisely 5 <input type="checkbox"/> Unsafe Loading, Placing, Mixing 6 <input type="checkbox"/> Taking Unsafe Position 7 <input type="checkbox"/> Working on Moving or Dangerous Equipment 8 <input type="checkbox"/> Distraction, Teasing, Horse Play 9 <input type="checkbox"/> Failure to use Personal Protective Devices 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 <input type="checkbox"/> Stop the Behaviour <input type="checkbox"/> Study the job <input type="checkbox"/> Instruct (tell-show-try-check) <input type="checkbox"/> Follow Up <input type="checkbox"/> Enforce	UNSAFE CONDITION <input type="checkbox"/> Remove <input type="checkbox"/> Guard <input type="checkbox"/> Warn <input type="checkbox"/> Supervisory Training	If Supervisor can't handle, then recommend to <input type="checkbox"/> Site Engineer, or <input type="checkbox"/> Site Manager, or <input type="checkbox"/> Project Manager, or <input type="checkbox"/> Safety Committee
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

Section H: Witness Statement			
Witness Name		Interviewer Name	
Section I: Reviewed & Recommend by			
Recommendation:			
Reviewed By:	Position:	Signature:	Date:
Remarks : If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department; : First Aid Cases will not applicable to this form; : The accident report shall submit to Safety Department within 3 days : Attached the photograph or sketch the location of accident / incident;			

Annexure 8: 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 9: 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.
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.
Storage of Materials	
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.
Storage of Stockpiles	
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 dampened down. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Large and long term stockpiles	Long-term stockpiles will be vegetated and stabilized as soon as possible. Stockpiles will be dampened down until stabilized, where necessary. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Waste Material from Construction	
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.
Site Preparation and Restoration	
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy

Dust Source	Dust Control Methods
	periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
Construction and Fabrication Process	
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, planing, 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 10: 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 sites Occurrence will almost certainly result in the work being halted and a	5

	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				
		StocPunjabile 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				
v	Asphalting	Noise and vibration				
		Dust generation				
		Traffic Congestion				
		Community safety				
		Labor safety (PPEs)				
vi	Landscaping	Dust generation				
		Sediment runoff				
		Failure of vegetation to take root				

Step 6: The Site plans are a critical part of the SSEMP 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)⁹: The completed SSEMP 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 and 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 SSEMP

- Introduction
- Project Overview
- Scope of SSEMP
- Objectives of SSEMP
- 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

⁹ ADB, Safeguards Unit for Central & West Asia Department, *Environmental Management for Construction Handbook*.

Annexure 11: Accident and Incident Investigation Procedure

INCIDENT / NEAR MISS REPORT	QUALITY RECORDS / FORMS	
	Doc. Level:	Doc. Version:1
	Doc. No	

HS.T.02	INCIDENT / NEAR MISS REPORT	
Title of Project:		
Location:		Date:

Objective(s)
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: <input type="checkbox"/> Male <input type="checkbox"/> Female
Please select one: <input type="checkbox"/> Member <input type="checkbox"/> Client Member <input type="checkbox"/> Sub Contractor <input type="checkbox"/> Visitor/Other	
Details of the: <input type="checkbox"/> Incident <input type="checkbox"/> Near miss <input type="checkbox"/> Medical	
Date:	Time: A.M /P.M
City:	Location:
Was the incident/near miss reported to your supervisor, immediately: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Part of the body injured	
Head <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	Trunk <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
Internal <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> systemic	Arm <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
Hand <input type="checkbox"/> left <input type="checkbox"/> right <input type="checkbox"/> thumb <input type="checkbox"/> fingers <input type="checkbox"/> palm	Leg <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
Foot eye <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
<input type="checkbox"/> 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	

Annexure 12: 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 ESMP. 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 contractor's 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 minimise 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 13: 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 14: WHO advice on Use of Masks for the COVID-19 Virus

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.

Decisions 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.⁷

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.³

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-19.²⁴ 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.²⁵ 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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