IRRIGATION DEPARTMENT
GOVERNMENT OF BALOCHISTAN

PROJECT DESIGN, CONSTRUCTION SUPERVISION AND IMPLEMENTATION SUPPORT FOR BALOCHISTAN WATER RESOURCES DEVELOPMENT SECTOR PROJECT

Initial Environmental Examination Report
Karakh-Subproject

MAY 2021

A Joint Venture of

National Engineering Services Pakistan (Pvt) Limited Lahore (Lead Partner)

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Engineering General Consultants EGC (Pvt) Limited (JV Partner)

in association with

Asian Advisory Services (Pvt) Limited

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ACRONYMS

AB	Acquiring Body
AP	Aggrieved Party
ADB	Asian Development Bank
AJK	Azad Jammu Kashmir
BBISE	Balochistan Board of Intermediate & Secondary Education
BCIAP	Balochistan Community Irrigation and Agriculture Project
BEPA	Balochistan Environmental Protection Agency
BHUs	Basic Health Units
BOD	Biochemical Oxygen Demands
BRSP	Balochistan Rural Support Program
BWRDP	Balochistan Water Resources Development Project
CCR	Community Complaint Register
CDs	Civil Dispensaries
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPC	Environmental Protection Council
EPI	Expanded Program on Immunization
EPRCP	Environmental Planning and Resource Conservation Project
FOs	Farmer Organizations
GIS	Geographic Information System
GoB	Government of Balochistan
GRC	Grievance Redress Committee
GRM	Grievance Redressal Mechanism
H_2S	Hydrogen Sulphide
IEE	Initial Environmental Examination
IFC	International Finance Corporation
EHS	Environment, Health and Safety
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
MCHC	Maternal & Child Health Center
MCM	Million Cubic Meter
MNCH	National Maternal, Newborn and Child Health
MSDS	Material Safety Data Sheet
NCS	National Conservation Strategy

NEC	NEC Consultants
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NOx	Oxides of Nitrogen
NTU	Nephelometric Turbidity Unit
PDEIP	Power Distribution Enhancement Investment Project
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
PPP	Public Private Partnership
PPTA	Project Preparatory Technical Assistance
PIU	Project Implementation Unit
BID	Balochistan Irrigation Department
QESCO	Quetta Electric Supply Company
RB	Requiring Body
RCC	Reinforced Cement Concrete
REA	Rapid Environmental Assessment
RHCs	Rural Health Centers
SIEE	Summary Initial Environmental Examination
SMART	Self-Monitoring and Reporting Tools
SOx	Oxides of Sulfur
SPS	Safeguard Policies
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. Balochistan Water Resources Development Sector Project consists of implementation of 11 sub-projects in two potential river basins namely Mula and Zhob in the Balochistan. The Karkh valley development Sub-projects is selected as the first sub-project of Mula River Basin for implementation[1]. Six (06) schemes namely Wanderi, Chutta, Khadri, Jhalaro, Acherwand and Sinjori are located on Karkh River. Feasibility study of the sub-project was prepared by the TA-Consultants (2017) under the ADB PPTA-8800 (PAK). This Initial Environmental Examination (IEE) has been updated in the light of available data at detailed design stage and following changes in the technical design of sub-project i) Length of Jhalaro Weir was increased from 106 m to 147m, ii) Length of lined Channel increased from 14.770 Km to 34 Km, and iii) number of Flood Protection bunds reduced from 9 to 8.

2. Karkh river core sub-project comprised of 2250 ha of culturable land, which will be brought under irrigated agriculture. It is estimated that around 20 MCM of water is available annually for developing agriculture in the command area on the both right and left banks of the river. Currently, cropping intensity in the core sub-project area is 89% and it will be increased to 120 percent after the completion of the core sub-project. There will be an appreciable socio-economic development as a result of the project.

3. The proposed Karkh valley development subproject consists of three parts: (a) general works – which relate to the Karkh Valley as a whole, (b) weir construction at Jhalaro, and (c) weir rehabilitation at Chutta. The design interventions for the subproject include; (a) guide bund / flood protection works, (b) construction of new Jhalaro weir, (c) weir rehabilitation at Chutta, (d) Rehabilitation of Chutta lift irrigation (pump house), and (e) lining of unlined existing channels.

4. The broader objective of the Irrigation Projects is aimed at:

- Increasing command area to cultivable command area,
- Sustained water supply to the present command area.

B. LEGISLATIVE FRAMEWORK

5. The proposed project is governed by a host of national and provincial statutes and regulations. Furthermore, as the Asian Development Bank (ADB) is involved as a donor / financier, its relevant policies and guidelines will also govern this project.

6. Amongst the various rules and statutes, as summarized in Chapter-2 of this IEE Report, the most pertinent from an environmental perspective are as follows:

[1] Asian Development Bank (ADB) Project review mission from 2 to 7 October 2019,

- National Policy on the Environment;
- National Biodiversity Strategy & Action Plan;
- The Land Acquisition (Balochistan Amendment) Act, 1985;
- National & Provincial Conservation Strategy;
- Pakistan Environmental Protection Act, 1997;
- Balochistan Environmental Protection Act, 2012;
- Pakistan EPA Review of IEE and EIA Regulations, 2000;
- Balochistan Forest Regulation 1890;
- The Balochistan Antiquities Act, 2014;
- The Balochistan Wildlife (Protection, Preservation, Conservation and Management) Act, 2014; and
- ADB's Safeguard Policy Statement (2009).

C. DESCRIPTION OF PROJECT

7. Karkh valley development subproject consists of three parts: (a) general works – which relate to the Karkh Valley as a whole, (b) weir construction at Jhalaro, and (c) weir rehabilitation at Chutta. Construction of this project will strengthen the existing irrigation system, ensuring availability of water for both cropping seasons.

8. The proposed the intervention for the subproject include; (a) guide bund / flood protection works, (b) construction of new Jhalaro weir, (c) weir rehabilitation at Chutta, (d) Rehabilitation of Chutta lift irrigation (pump house), and (e) lining of unlined existing channels.

9. Salient features of the Project are shown in below **Table A**.

Table A: Salient Features of Proposed Project at Karkh River

Irrigation System	
Length of canals to be lined	20,587 m
Length of proposed New canal	2,107 m
Design Capacity New canal	0.15 cumecs
Canal Section	Rectangular Section (concrete bed and stone masonry walls)
Flood Protection Embankments (bunds)	
Eight flood protection bunds	Total length = 4,617m

Construction of Jahlaro Weir and Rehabilitation of Chutta Weir

Weir	150 m long weir including 3m wide under sluice
Design specs	Weir is designed for a 50-year flood of 532.28 cumecs which corresponds to a design head of 2 m
Chutta weir rehabilitation	Re-construction of 15 m wide panel of damaged portion of Chutta weir (i.e. weir, chute and stilling basin including both upstream & downstream cut-off) is proposed

D. PROJECT ALTERNATIVES

a) No Project Alternative

10. The Project Area is considered as poor from an economic perspective. Subsistence farming is the economic mainstay. In case the proposed project is not implemented, the socio- economic conditions will not change as such. With the increasing population and scarcity of resources, residents are forced to abandon their homes in search of livelihood and grazing grounds for their cattle stock. Weirs at the Karkh river were constructed over 20 years ago and have been operating successfully over the passage of time. The lack of maintenance has damaged the existing infrastructure and have become useless for irrigation works. An intake structure and water channel has been constructed about 20 years ago with protection wall of gabion. The intake structure is damaged and not supplying water to the supply channel. Water availability is scarce in area hence the proposed project will contribute positively to the project area.

b) Subprojects Alternative

11. Weirs at the Karkh river were constructed over 20 years ago and have been operating successfully over the passage of time. The lack of maintenance has damaged the existing infrastructure and have become useless for irrigation works. The rehabilitation of existing structures with minor additional works and cleaning of weeds is proposed because of its success in the past. Therefore, alternative analysis of Karkh River interventions is not carried out. Minor additional works at all the six locations have been proposed as following:

- guide bund / flood protection works,
- construction of new Jhalaro weir,
- weir rehabilitation at Chutta,
- Rehabilitation of Chutta lift irrigation (pump house), and
- lining of unlined existing channels.

12. However, at Jhalaro a new weir is to be constructed consequently the alternative analysis for the same is required. **Table 11** in Chapter 4 provides comparison of alternatives with respect to design.

E. BASELINE CONDITIONS

a) Physical Environment

13. The geological features **of Karkh River Development subproject area** comprise of Oligocene and Eocene Sedimentary Rocks. Area adjacent to the subproject location, and also some part of the command area has underlying Eocene Sedimentary Rocks.

14. The seismic zoning map of Pakistan, indicates that the project area lies in the **zone 2B**.

This zone is liable to MSK VI or less and is classified as the Low Damage Risk Zone. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence.

15. **Karkh River subproject area** has high mountains having steep slopes are found in the upstream areas of the subproject. The terrain is generally flat in the subproject area and is suitable for command area development. The subprojects are constructed on narrow gorges having a river width varies from 100 m to 150 m. The Karkh River has a longitudinal slope of 1:175 in these reaches.

16. The hottest months are June and July while the coldest months are January and February. March received the maximum rainfall, while June, July and September received approximately same amount of rainfall (around 37 mm).

17. The soil type is very deep clay. The soil was moderately calcareous. No salinity and sodacity was encountered in soils

18. Ambient air and noise conditions in the Project Area, is generally clean and quiet, because only a few houses were visible in the project areas. There are no industrial setups within the area of influence of the Project Area. Vehicular traffic is absent as well as road infrastructure.

b) Biological and Natural Environment

19. The proposed project does not interfere with any ecological parameters, however, can be seen as a positive contributor in improving the carrying capacity and overall improvement of the ecosystem.

20. Vegetation zones of the ***Karkh Area*** consist mainly of following:

#	Taxon	Family	Life form	Vernacular name
01	Acacia nilotica	Fabaceae	Tree	Babbur
02	Acacia sengal	Fabaceae	Shrub	Babbur
03	Prosopis cineraria	Fabaceae	Tree	Kandi
04	Prosopis glandulosa	Fabaceae	Shrub	Kandi
05	Prosopis juliflora	Fabaceae	Shrub	Devi
06	Tamarix sultanii	Tamaricaceae	Shrub	Kirri
07	Zizyphus nummularia	Rhamnaceae	Shrub	Ber
08	Aerva javanica	Amarantheaceae	Shrub	Gujo
09	Periploca aphylla	Ascalpidaceae	Shrub	
10	Capparis decidua	Capparidiaceae	Shrub	
11	Haloxylon recurvum	Amarantheaceae	Shrub	
12	Suaeda fruiticosa	Amarantheaceae	Shrub	

#	Taxon	Family	Life form	Vernacular name
13	Suaeda ferinosa	Amarantheaceae	Shrub	
14	Grewia domaine	Malvaceae	Shrub	
15	Alhaji marorum	Fabaceae	Shrub	
16	Salvadora oleoides	Salvadoraceae	Shrub	
17	Salvadora persica	Salvadoraceae	Shrub	
18	Heliotropium sp	Boragenaceae	Shrub	Merin
19	Calligonum polygonoides	Polygonaceae	Shrub	
20	Rhazya stricta,	Apocynaceae	Shrub	
21	Euphorbia caducifolia	Euphorbiaceae	Shrub	
22	Commiphora mukal	Burseraceae	Shrub	Gugul
23	Inula montaine	Asteraceae	Herb	Kulumurak
24	Inula grantoides	Asteraceae	Herb	Kulumurak
25	Grewia tenex	Malvaceae	Shrub	Chill
26	Phoenix dyctylefera	Palmea	Tree	Khajoor
27	Cymbopogon sp	Poaceae	Grass	
28	Cenchrus sp	Poaceae	Grass	
29	Aristida sp	Poaceae	Grass	Nadak
30	Chrysopogon sp	Poaceae	Grass	
31	Sericostoma pauciflorum	Boraginaceae	herb	
32	Typha sp	Typhaceae	Shrub	
33	Convolvulus spinosus	Convulvolaceae	Twiner	
34	Fagonia indica	Zygophyllaceae	Shrub	
35	Salsola sp	Chenopodiaceae	Shrub	

21. Wildlife habitat type is Steppic Forest in Intermediate Latitude. There are no historical bench marks to determine the status of wildlife in the area. However, according to the community the number of wildlife species has declined; which could aptly be attributed to casual attitude for hunting and habitat degradation.

22. Cumulative faunal list of the ***Karkh Area*** consist mainly of following:

#	Taxon	Common name	Life form	Conservation status
01	Gazella bennettii	Chinkara	Mammals	Rare
02	Capra aegagrus	Sindh Wild Goat	Mammals	Occasional
03	Ovis orientalis blanfordi	Urial (Gut)	Mammals	Occasional
04	Vulpes grifithii	Hill fox	Mammals	Occasional

05	Hysrix indica	Porcupine	Mammals	Common
06	Felis libyca	Desert Cat	Mammals	Occasional
07	Hyaena	Striped Hyaena	Mammals	Occasional
08	Vulpes	Desert Fox	Mammals	Occasional
09	Canis aureus	Asiatic Jackal	Mammals	Occasional
10	Canis lupus	Wolf	Mammals	Occasional
11	Hemiechinus auritus	Hedgehog	Mammals	Common
12	Goluda ellioti	Bush rat	Mammals	Common
13	Lepus capensis	Cape hare	Mammals	Common
14	Chlamydotis undulata	Houbara	Bird	Migratory
15	Ammoperdix	See-see	Bird	Reported
16	Dupetor flavicollis	Black Bittern	Bird	Reported
17	Aquila heliaca	Imperial Eagle	Bird	Reported
18	Falco peregrinus	Peregrine	Bird	Reported
19	Pterocles coronatus	Crowned	Bird	Migratory
20	Falco naumanii	Lesser Kestrel	Bird	Reported
21	Falco concolor	Sooty Falcon	Bird	Reported
22	Pterocles lichtensteini	Close-barred/	Bird	Reported
23	Francolinus	Grey Partridge	Bird	
24	Pseudibis papillosa	Black Ibis	Bird	Reported
25	Corvus ruficollis	Brown-necked	Bird	
26	Varanus griseus	Indian desert	Reptile	
27	Naja	Indian Cobra	Reptile	Common
28	Ablepharus pannonicus	Easter dwarf	Reptile	
29	Eristicophis macmahonii	Leaf nose viper	Reptile	

23. There were some five areas initially documented in Khuzdar district, however after administrative adjustments, they were left over as follows:

#	Area & Status	Status	Distance from Karkh River Interventions
1	Kera Dhori 8,094 Wildlife Sanctuary hectares	Khuzdar	51 km away
2	Chorani (19,433) Notified forest hectare)	Khuzdar	88 km away

c) Demographic and Socio-economic Environment

24. Altogether residents of 5 villages would be part of the subproject. As Acherwand and Sinjori are two mouzas having same beneficiaries which are resident in Nokjo village. The land and water rights belong to different tribes resident. About 1200 Households were reported in the whole subproject area will be benefited from the subproject.

25. The major portion of the population earns their livelihood from Agriculture and livestock husbandry owing to diverse agro-climate. Agriculture Crops are sown both in Rabi and Kharif seasons. Crops cultivated during Rabi season include: Wheat, Barley, Vegetables and Fodder whereas in Kharif Sorghum, Maize, onion, potato vegetables and Fodder are sown. Besides the field crops, farmers in the district also grow fruit crops. Major fruits grown in the district include Apple, Almond, Apricot, pomegranates and grapes.

26. The land rights are equitable and all residents of five villages have share in land. The land of all six subprojects is reported in the cadastral record. While nearly all land in each subproject have been distributed by the shareholders after the construction of subprojects in 2001. While Jhalaro subproject is new subproject and lot of land is available for expansion, which would be distributed after development. The cultivated land reported and observed in all six subprojects altogether is about 2000 Ha, while the expandable land is about 250 Ha. Flood irrigation is not practiced in all of the six subprojects.

27. Houses are mainly constructed of locally available impermanent materials, typically mud or sub-baked bricks fused with baked mud strengthened with chopped straw. These materials make poorer households susceptible to invasion of vermin and seasonally unstable, needing reconstruction after heavy rainy season. The houses made of impermanent materials, generally do not have border walls.

28. There is no group of people that could be termed as “Indigenous Community”, under the definition of ADB.

29. No resettlement is envisioned, however, land distribution among the tribe members at individual basis of ownership need to be done.

F. ENVIRONMENTAL IMPACTS & MITIGATIONS

30. The project is expected to cause few environmental and social impacts, both positive and negative. Positive impacts due to project interventions are:

- Employment opportunities to some locals for design phase surveys.
- An anticipated positive impact on socio-economic conditions during construction phase is the creation of limited-time employment opportunity for the local population. Since the project interventions will require substantial input from manual labor, even people with relatively lower levels of education or skills could get short term employment.
- A substantial land will be irrigated under the proposed scheme.
- Household income will increase substantially with irrigation improvement measures owing to availability of water for irrigation, crop yields, increase in the number of animals, and availability of other occupational opportunities.
- The Project will positively contribute in improving the carrying capacity of biological environment and overall improvement of the ecosystem.
- Availability of irrigation and agriculture would support livestock growth and in due course of time would enable farmers to diversify in areas of dairy production.
- Availability of water for cultivation of crops will support cropping during Rabi as well as Kharif season over the entire command area. During due course of time, availability of water will support agriculture and other production system and will help in converging into an integrated system wherein all the components of the ecosystem will be producing at their optimal level including the human element.

31. Phase wise negative impacts due to Project interventions are provided below:

Karkh River Intervention: Irrigation Network Rehabilitation and Lining of Canals

a) Design & Planning Phase

- **Assessment of Water Availability:** Improper assessment of water availability and failure of design. This impact would be of moderate significance.
  Mitigation: Water availability has been properly assessed at design phase. Hydrological and flood management analysis has been done to ensure the feasibility of project success.
- **Water Right Issues:** Water being the most precious commodity in the area, its usage rights have been established traditionally. Any perceived or real disturbance to these water rights will almost certainly lead to social disturbance in the area. This impact would be of moderate significance.
  Mitigation: Acquire full information about traditional water rights and ensure that these are not disturbed.

- **Permanent Land Acquisition**: The project involves permanent acquisition of various

categories of land. This impact would be of moderate significance.

Mitigation: Irrigation Department and Land Revenue Department to ensure that the land acquisition act 1894 procedures are followed in a transparent manner. Complete records should be maintained, particularly for asset valuation and compensation payment.

The communities' grievances associated with the land acquisition and compensation should be addressed on priority basis, in order to avoid any unrest/mistrust among the communities towards the project.

b) Construction Phase

- **Changes in land use pattern, Loss of vegetation, Cultural conflict**

  Mitigation: Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD before establishment of campsite.

  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.

- **Influx of external work force**

  Mitigation: Residents of village shall be employed for the construction phase (mostly for unskilled jobs).

- **Workshop facilities may spread oils**

  Mitigation: Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. Good housekeeping practices shall be ensured at workshop areas.

- **Deterioration of air quality due to machinery & equipment**

  Mitigation: Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.

- **Noise**

  Mitigation: Equipment with high levels shall be fitted with noise reduction devices. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed. Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs

- **Land degradation due to solid waste disposal of camp site**

  Mitigation: Since landfill sites at Wandhri do not exist and the areas surrounding the intervention area are dedicated to irrigation practices such as cultivation, wheat thrashing etc., construction contractor shall not dispose of any solid waste in the area. Contractor shall collect in separate bins and segregate solid waste according to its type.

An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant.

The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.

- **Water - Feaces contamination**

  Mitigation: Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.

- **Loss of vegetation**

  Mitigation: The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed. Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.

- **Health & Safety issues**

  Mitigation: Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary firefighting equipment. The camp staff shall be provided firefighting training. All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel. Contractor shall prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks.

- **Delay in project execution**

  Mitigation: Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed.

- **Soil erosion and contamination**

  Mitigation: Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. Vehicles and equipment shall not be repaired in the field. Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. Lands used for agricultural purposed shall not be used borrowing material.

- **Air pollution**

  Mitigation: Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.

- **Noise pollution**
  Mitigation: Vehicles shall have exhaust mufflers (silencers) to minimize noise generation. Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature. Equipment with high levels shall be fitted with noise reduction devices.
- **Damage to infrastructure**
  Mitigation: All damaged infrastructure shall be restored to original or better condition.
- **Sites of Historical, Cultural, Archeological or Religious Significance**
  Mitigation: In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites

c) Operation & Maintenance Phase

- **System sustainability**
  Mitigation: The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities. Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.
  Emergency Response Plan for Breaching of Canal will be followed which is attached as **Annexure 13** of this report.

- **Social issues and System sustainability**
  Mitigation: Agreements between different communities/tribes.
  Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal.
  Ensure community participation in management and operation of the irrigation system. Training of community.
- **Health issues**
  Mitigation: Proper treatment system shall be provided. Water quality will be tested as per WHO/ NEQS standards to ensure the integrity of the water supply system. Turbidity and free residual chlorine tests shall be regularly performed. Arsenic will be tested as per WHO standards.
- **Degradation of irrigation water and Health issues**
  Mitigation: Proper monitoring of canal alignment and disconnect all identified waste streams
- **Solid waste generation**

Mitigation: Ensure proper disposal of waste at designated landfill/disposal sites.

- **Loss of pastoral lands**
  Mitigation: Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals.
- **Conservation issues**
  Mitigation: Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures.
- **Banned fertilizer & pesticides will cause health issues, Contamination of fresh water through surface runoff**
  Mitigation: Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as **Annexure 17** of this report

Karkh River Intervention: Flood Protection Bund

a) Design & Planning Phase

- **In case of design failure system will be collapsed and Social issues**
  Mitigation: Review of engineering design works will ensure the proper design of the system. The system should be designed on proper engineering standards.
- **Social issues**
  Mitigation: Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions.

b) Construction Phase

- **Changes in land use pattern Loss of vegetation Cultural conflict**
  Mitigation: Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD before establishment of campsite.

  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.
- **Influx of external work force**
  Mitigation: Residents of Wandhri village shall be employed for the construction phase.
- **Workshop facilities may spread oils**

Mitigation: Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. Good housekeeping practices shall be ensured at workshop areas.

- **Deterioration of air quality due to machinery & equipment**

  Mitigation: Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.

- **Noise pollution**

  Mitigation: Equipment with high levels shall be fitted with noise reduction devices. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed. Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs.

  Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.

- **Land degradation due to solid waste disposal of camp site**

  Mitigation: Since landfill sites at Wandhri do not exist and the areas surrounding the intervention area are dedicated to irrigation practices such as cultivation, wheat thrashing etc., construction contractor shall not dispose of any solid waste in the area. Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant.

  The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.

- **Water - Feaces contamination**

  Mitigation: Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.

- **Loss of vegetation**

  Mitigation: The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.

  Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.

- **Health and Safety issues**

  Mitigation: Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary firefighting equipment. The camp staff shall be provided firefighting training. All safety precautions shall be taken to transport, handle and

store hazardous substances, such as fuel. Contractor shall prepare The contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks.

- **Soil erosion and contamination**
  Mitigation: Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. Vehicles and equipment shall not be repaired in the field.
  Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. Lands used for agricultural purposed shall not be used borrowing material. Written consent of the land owner should be obtained for material (soil) borrowing.
- **Air pollution due to vehicle fuel**
  Mitigation: Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions
- **Damage to infrastructure**
  Mitigation: All damaged infrastructure shall be restored to original or better condition.
- **Sites of Historical, Cultural, Archeological or Religious Significance**
  Mitigation: In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.

c) Operation & Maintenance Phase

- **Breaching of flood protection bund (System sustainability)**
  Mitigation: The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities. Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.
- **Risk due to Natural Hazard i.e., Flooding and Earthquakes (System sustainability)**
  Mitigation: Emergency Response Plan for Flood Protection Bund will be followed which is attached as **Annexure – 14** of this report.

Karkh River Intervention: Construction of New Weir at Jhalaro and Repair of Cutoff Wall of Chutta Weir

a) Design & Planning Phase

- **Assessment of Water Availability:** Improper assessment of water availability and failure of design. This impact would be of moderate significance.
  Mitigation: Water availability has been properly assessed at design phase. Hydrological and flood management analysis has been done to ensure the feasibility of project success.
- **Water Right Issues:** Water being the most precious commodity in the area, its usage rights have been established traditionally. Any perceived or real disturbance to these water rights will almost certainly lead to social disturbance in the area. This impact would be of moderate significance.
  Mitigation: Acquire full information about traditional water rights and ensure that these are not disturbed.
- **Public disclosure of final design (Social issues)**
  Mitigation: Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions
- **Risk due to Natural Hazard i.e. flooding and earthquakes** The Project area lies in zone 2B as per seismic map of Pakistan which clearly shows that the area is in moderate risk zone. So due to earthquake the breaching weir, canal and other irrigation structures can be possible. This impact would be of moderate significance. The other natural hazard which affect the area is flood which would also be of moderate significance.
  Mitigation: Seismic design of weir and other allied and irrigation structures has been be carried out on international engineering standards. By adopting the above measure, the impact is of low significance.
  Flood protection bunds has been included as an integral component of the project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.

b) Construction Phase

- **Establishment of fuel depot / Workshop facilities may spread oils**
  Mitigation: In order to avoid spread of oil by virtue of establishment of fuel depot / Workshop facilities, the contractor should avoid it altogether. Incase, it cannot be avoided, the contractor must house it and underlay the area with proper liner. Dispensing pumps should be used. Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. Good housekeeping practices shall be ensured at workshop areas.
- **Loss of vegetation**
  Mitigation: The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations

within the project area.

- **Influx of external work force**

  Mitigation: Farmer's Organization will be contacted by the contractor and with their assistance, the contractor will get a tentative list of workers for employment. Residents of Jhalaro village shall be employed for the construction phase.

- **Land degradation due to solid waste disposal of camp site**

  Mitigation: Construction contractor shall not dispose of any solid waste in the area. The construction Contractor may dump solid waste with proper lining material in depressions and have a daily and monthly cover on it. Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.

- **Changes in land use pattern**

  Mitigation: Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD 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.

- **Health and Safety issues**

  Mitigation: Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary firefighting equipment. The camp staff shall be provided firefighting training. All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel. The contractor will prepare Site-specific EMP (SSEMP) and Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks for approval by Supervision consultant.

- **Deterioration of air quality due to machinery & equipment**

  Mitigation: Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.

- **Noise pollution**

  Mitigation: Equipment with high levels shall be fitted with noise reduction devices. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed. Use of PPEs such as ear plugs and ear muffs by the workers shall be

ensured. Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs.

Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.

- **Water - Feaces contamination**

  Mitigation: sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.

- **Delay in project execution**

  Mitigation: Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites

- **Soil erosion and contamination**

  Mitigation: Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. Vehicles and equipment shall not be repaired in the field.

  Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. Lands used for agricultural purposed shall not be used borrowing material. Written consent of the land owner should be obtained for material (soil) borrowing. Photographic record (before and after) should be kept for the borrow and disposal areas. Leveling of borrow sites shall be done by contractor on his own expense.

- **Air pollution**

  Mitigation: Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.

  Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.

- **Damage to infrastructure**

  Mitigation: All damaged infrastructure shall be restored to original or better condition.

- **Sites of Historical, Cultural, Archeological or Religious Significance**

  Mitigation: In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant

and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.

c) Operation & Maintenance Phase

- **Breaching of Weir, Risk due to Natural Hazard i.e., Flooding and Earthquakes (System sustainability)**

  Mitigation: The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities. Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.

  Emergency Response Plan for Breaching of Weir will be followed which is attached as **Annexure – 15** of this report.
- **Social issues and System sustainability**

  Mitigation: Agreements between different communities/tribes. Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. Ensure community participation in management and operation of the irrigation system. Training of community
- **Health issues**

  Mitigation: Proper treatment system shall be provided. Water quality will be tested as per WHO/ GOP standards to ensure the integrity of the water supply system. Turbidity and free residual chlorine tests shall be regularly performed. Arsenic will be tested as per WHO standards.

  Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as **Annexure 17** of this report
- **Solid waste generation**

  Mitigation: Ensure proper disposal of waste at designated landfill/disposal sites.
- **Loss of pastoral lands**

  Mitigation: Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals.
- **Conservation issues**

  Mitigation: Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.

EMP Budget

32. The EMP budget for construction and operations period of Project is as follows:

Table B: Cost for Contractor

Sr. #	Description	Unit Cost* PKR / Month
1	Laboratory Analysis Cost	200,000
2	Contractor Environmental Engineer (each contractor)	80,000
3	Health & safety measures to manage COVID-19	1000,000 for whole project period

* based on unit parameter testing and sampling cost for air, water and noise.

Table C: Cost for Proponent

Sr. #	Description	Amount (PKR)*
A	**During Construction Period**	
1	Third Party Monitoring through EPA registered Environmental lab	500,000/Quarter
2	Tree Plantation/Compensation Cost	300000
3	Training on EMP	100,000
B	**During Operation & Maintenance Period (for one year)**	
1	Laboratory Analysis Cost	61,000/Six Months
5	Training & Community Engagement Cost	200,000

* based on unit parameter testing and sampling cost for air, water and noise.

G. CONCLUSION

33. The report provides conclusion based on the impacts assessed and the mitigation measures suggested. It is recommended that EMP 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.

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

35. Environmental impacts during the construction phase are related to the establishment of campsite which are temporary and can be minimized with better management. Construction 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.

36. Construction of subproject is going to bring positive changes in the area in terms of availability of water, cultivation of crops, establishment of new settlements and improvement in the standard of life of the inhabitants of the area. Land which is lying barren at present would change to lush green valley through provision of irrigation water. Availability of irrigation and agriculture would support livestock growth and in due course of time would enable farmers to diversify in areas of diary production.

37. 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.

1. INTRODUCTION

38. In the water starved, land rich Province of Balochistan, any and all initiatives for development of water resources certainly deserve top priority. Government of Balochistan (GoB) in collaboration with Asian Development Bank (ADB) has envisioned a Balochistan Water Resources Development Project (BWRDP) comprising rapid assessment of five river basins namely, Dasht, Hingol, Mula, Pishin and Zhob and selecting two river basins for further detailed study. Based on the pre-feasibility study and initial engineering design subprojects shall be proposed, and out of these two core subprojects will be selected for Feasibility and Engineering design. ADB selected the Techno-Consult International Pvt. Ltd. to provide consultancy services for the Project Preparatory Technical Assistance (PPTA) to facilitate the GoB.

39. Initially, four river basins of Balochistan, namely, Dasht, Hingol, Kacchi, and Zhob were indicated. During the tripartite deliberations held on 7-8 March 2016; Quetta, it was decided to replace Kacchi by Mula River Basin; and add Pishin River Basin for a rapid assessment. Accordingly, the PPTA comprised of Dasht, Hingol, Mula, Pishin, and Zhob River Basins.

40. After the rapid assessment of above-mentioned four (04) river basins on the basis of following criteria, two river basins Zhob and Mula has been selected for detailed feasibility:

- Population;
- Cultivated Area;
- Non-Utilized Water Potential;
- Completed Projects in Basins;
- Proposed Projects in Basins;
- Social Acceptance;
- Security;
- Growth Pattern.

41. The assignment under consideration involves conducting an Initial Environmental Examination of the core project on Karakh River. Following are the important parties involved:

Proponent & Execution Agency	Irrigation Department, Government of Balochistan
Design Consultants	NESPAK/RHC/EGC
Financiers	Asian Development Bank (ADB)

1.1 Karkh River Development Scheme

42. In Karkh area, six (06) schemes namely Wanderi, Chutta, Khadri, Jhalaro, Acherwand and Sinjori are located on Karkh River. The schemes are located at a few kilometers from each other and are therefore being bundled. The location of the schemes is given in Table 1.

43. These schemes are located on bents (small flat patches) at both left and right banks of Karkh River surrounded by high mountains having a large area on flat terrain. These are using perennial surface flow for irrigation. These schemes will bring 2250 hectares under cultivation out of which 2000 (88.9%) hectares are already under cultivation, while an additional 250 hectares will be added to the command area.

Table 1: Karkh River Development Schemes

S. No.	Name	Location	Northing UTM	Easting UTM
1	Wanderi PIS	Union Council Abad, Tehsil Karkh, District Khuzdar	3067666.38	318230.36
2	Chutta PIS	42 km from Khuzdar in Union Council Abad	3068483.89	318183.44
3	Khadri PIS	72 km from Khuzdar in Union Council Abad	3069147.25	318735.75
4	Jhalaro PIS	75 km from Khuzdar in Union Council Abad	3069450.82	318965.12
5	Acherwand PIS	77 km from Khuzdar in Union Council Abad	3071029.12	319626.61
6	Sinjori PIS	79 km from Khuzdar in Union Council Abad	3073729.22	320874.34

44. Each weir diverts river water to a gated underground conduit that connects to a lined or unlined channel leading to command area. The heights of all weirs vary from 2-3 m. Several ancillary structures exist on the irrigation channels from the weirs which include super passages, road culverts, aqueduct, manhole along conduits and fall structures. At the location of Jhalaro that lies between Khadri and Acherwand weir, water is being diverted through locally constructed diversion bunds with presently no proper diversion structure. The layout of the project is shown in the Figure 1.

45. The mean Latitude of the sub-project command area is 770 m above mean sea level. The catchment area of this sub-project is about 635 km2. The annual average availability of water is around 20 MCM.

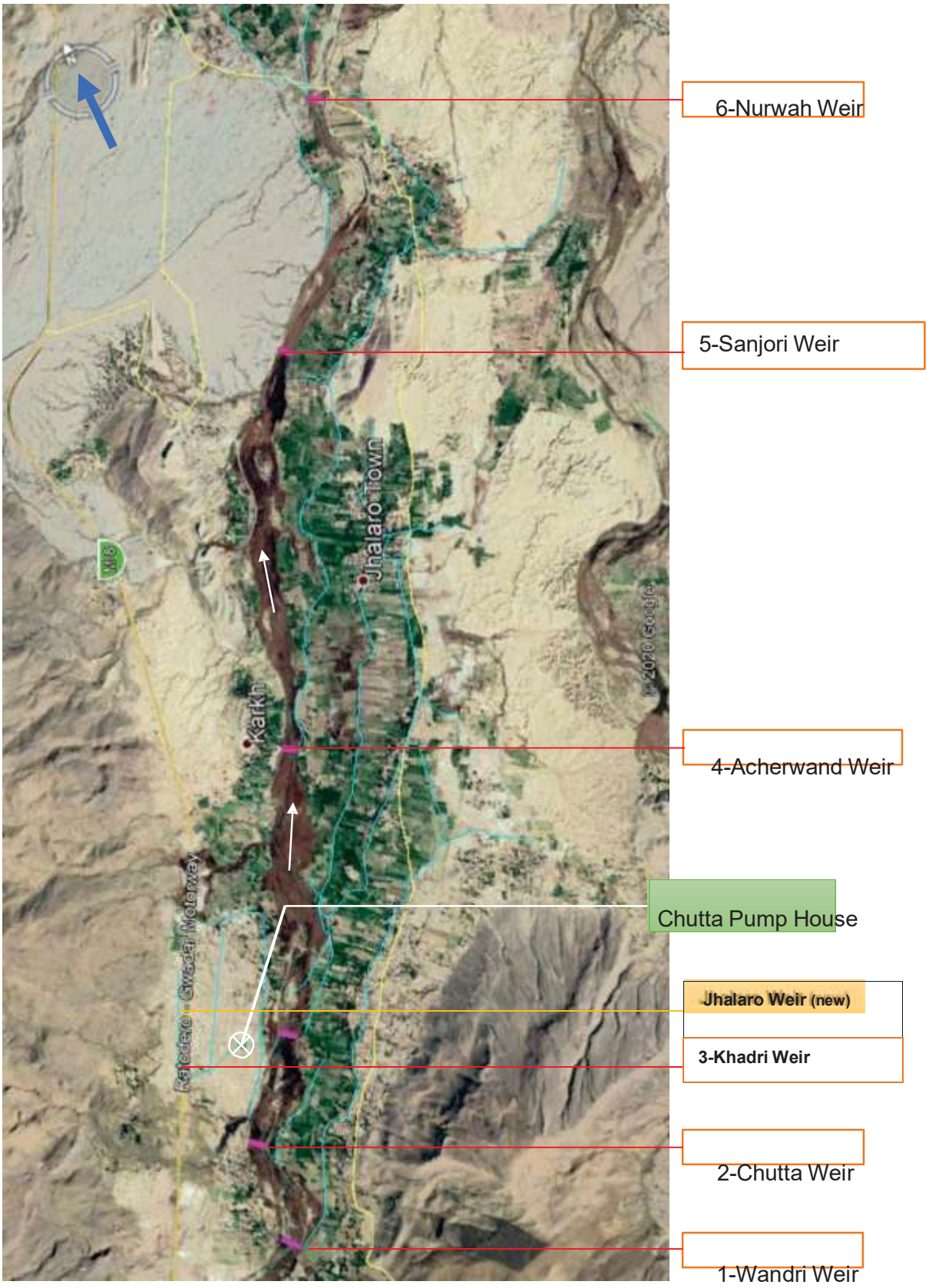


Figure 1: Layout of weir cascade and irrigation network

1.2 Proposed Karkh River Interventions

1.2.1 Proposed Interventions at Karkh River

46. The proposed intervention for the subproject consists of five parts: (a) guide bund / flood protection works – which relate to the Karkh river core sub-project as a whole, (b) construction of new Jhalaro weir, (c) weir rehabilitation at Chutta, (d) Rehabilitation of Chutta lift irrigation (pump house), and (e) lining of unlined existing channels. Construction of this sub-project will strengthen the existing irrigation system, ensuring availability of water for both cropping seasons.

1.3 Environmental Assessment

47. 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.

48. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the rehabilitation of 06 Weirs in Karkh area at district Khuzdar, 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.

49. 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.

50. 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 has been conducted and attached as Annexure – 1.

[1] The Act defines a Project as: *“Any activity, plan, scheme, proposal or understanding involving any change in the environment and includes:*
- *Construction or use of buildings or other works;*
- *Construction or use of roads or other transport systems;*
- *Construction or operation of factories or other installations;*
- *Mineral prospecting, mining, quarrying, stone-crushing, drilling, and the like;*
- *Any change of land use or water use; and*
- *Alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations.”*

51. Accordingly, a 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 it's 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.

52. 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.

53. 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.

54. 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.

55. 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 Karkh River sub-project.

56. 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.

57. 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 More Specific Objectives of IEE Report

58. 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

59. The scope of the assignment will consist of the following sections:

- Description of the Project:

60. Complete description of the relevant parts of the project will be provided, using appropriate visual aids (maps, photographs, satellite imageries etc.) where necessary.

- Analysis of Project Alternatives:

61. Alternatives of the project will be examined including no-action option.

- Legislative and Regulatory Considerations:

62. A comparison of national and international standards (such as International Finance Corporation (IFC)'s Environment, Health & Safety (EHS) requirements) will be conducted in the IEEs to identify most stringent standards, applicable to this project and will be included in the IEE report. The appropriate authority jurisdictions that will specifically apply to the project will also be identified.

- Description of the Environment:

63. The baseline data on the relevant environmental characteristics of the Study Area will be assembled, evaluated and presented. This section includes the detailed description of the following environmental attributes within the project area. The 'Project Area' is defined as the area within which the impact of the project may be expected. In Karkh area, six subprojects namely Wanderi, Chutta, Khadri, Jhalaro, Acherwand and Sinjori are located on Karkh river. The subprojects are few kms from each other and are therefore being bundled. The details of proposed projects in Table 2 as follows:

Table 2: Location of Karkh River Interventions

#	Intervention Description	Coordinates
1	Wanderi perennial irrigation subproject is proposed on Karkh River in Karkh. It is located in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3067666.38 Northing and 318230.36 Easting
2	Chutta perennial irrigation subproject is proposed on left bank of Karkh River. It is located 42 kms from Khuzdar in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3068483.89 Northing and 318183.44 Easting
3	Khadri perennial irrigation subproject is proposed on right bank of Karkh River upstream of Karkh Bazar. It is located 72 kms from Khuzdar in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3069147.25 Northing and 318735.75 Easting
4	Jhalaro perennial irrigation subproject is proposed on left bank of Karkh river upstream of Karkh Bazar. It is located 75 kms from Khuzdar in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3069450.82 Northing and 318965.12 Easting
5	Acherwand perennial irrigation subproject is proposed on right bank of Karkh river upstream of Karkh Bazar. It is located 77 km from Khuzdar in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3071029.12 Northing and 319626.61 Easting
6	Sinjori perennial irrigation subproject is proposed on right bank of Karkh river upstream of Karkh Bazar. It is located 79 kms from Khuzdar in Union Council Abad, tehsil Karkh, district Khuzdar, Balochistan	UTM Zone 42R at 3073729.22 Northing and 320874.34 Easting

- Physical Environment:

64. Locations and surroundings, site plans and layout, geography, polar coordinates, soils and geology, topography and drainage system, seismic zone, water resources, air and water quality, public water supplies, climate and ambient noise.

65. Most of this information is available through reliable secondary data sources. The IEE team has mostly used this data in the report after validation. All such data is properly referenced in this report at relevant locations. Monitoring and testing of major environmental parameters have been conducted in the field as described in the report.

- Biotic and Natural Environment:

66. Data pertaining to Flora and fauna of the terrestrial ecosystems, rare or endangered species and sensitive habitat will be collected and assessed from relevant department and local community. A list of fauna and flora has been given with conservation status and local information. This list has been prepared by ecologist through field observations and

secondary data from the Forest & Wildlife Department of Government of Balochistan.

- Socio-economic Environment:

67. Demographics, employment, land use, community structure, public health, communal facilities or services, sites affected by the project and community perceptions about the project.

68. Primary data from the project feasibility report prepared by the Social team has been used. Secondary data has also been added at relevant sections and properly referenced. Validation of available information will be done by characterizing the extent and quality of collected data. This will help in indicating the significant information deficiencies and any uncertainties associated with the prediction of impacts.

- Potential Impacts of the Project:

69. Impacts related to the project will be identified and distinction for significant impacts will be made between positive and negative, direct and indirect, short and long term, during different phases of the project implementation. Cumulative impacts will also be identified. Special attention will be paid to:

- Impacts of the project on the ecology;
- Impacts of the project on the existing socio-economic conditions;
- Impacts of the project on ambient noise levels;
- Impacts of the project on the ambient air quality;
- Impacts of the project on water quality;
- Impacts of the project on soil characteristics; and
- Impacts of the project on health and safety.

70. “Impact prediction" basically refers to the quantification, where possible (or, at least, the qualitative description) of the anticipated impacts of the proposed project on various environmental factors. It is desirable to quantify as many impacts as possible, because in so doing, it has been frequently determined that the concerns related to anticipated changes are not as great as would be supposed, in the event of non-quantification.

71. The next stage of the IEE process is a detailed assessment to forecast the characteristics of the main potential impacts. Known as impact analysis. Impact identification and prediction are undertaken against an environmental baseline, often through indicators e.g. air/water, noise, ecological sensitivity, biodiversity. The aim is to take account of all of the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are taken into consideration.

72. Environmental impact studies represent a blend of technical information and analysis along with value judgments. To assess an environmental threat posed by an aspect, the

principal factors to be considered are:

- the likelihood that the threat may be realized; and
- in the event of realization of the threat, the nature and extent of the consequences.

73. A qualitative risk assessment methodology has been adopted for this project, comprising the Likelihood and Consequence values detailed in **Table 3** and **Table 4.**

Table 3: Qualitative Likelihood Values

Likelihood Indicator	Likelihood Description	Explanation
A	Almost Certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances
C	Possible	Might occur at some time
D	Unlikely	Could occur at some time
E	Rare	May only occur in exceptional circumstances

Table 4: Qualitative Consequence Values

Consequence Indicator	Consequence Description	
1	Insignificant	Negligible, reversible, requires very minor or no remediation / minor injury with slight negative health impact
2	Minor	Reversible, requires minor remediation / major, non-fatal health impact to one or more individuals
3	Moderate	Reversible, short-term effect, requires moderate remediation / severe, non-fatal health impact to one or more individuals
4	Major	Serious impact, medium term effect, requires significant remediation / single fatality or severe irreversible disability or impairment
5	Catastrophic	Disastrous impact, long term effect, requires major remediation / multiple fatalities, major permanent health impacts on a large number of individuals

74. On the basis of a likelihood and consequence matrix (Table 5), each hazard may be categorized into broad 'risk categories' and the required management approach for each risk category can be defined.

Table 5: Risk Matrix – Risk Categories and Management Response

		Consequence				
		1	**2**	**3**	**4**	**5**
Likelihood	**A**	M	M	H	H	H
	B	L	M	H	H	H
	C	L	L	M	H	H
	D	L	L	L	M	H
	E	L	L	L	M	M

H = High Risk – Proposed works methods not acceptable and must be altered.

M = Moderate Risk – Detailed management action plan to be prepared, including monitoring program.

L = Low Risk – Routine management procedures to be defined and monitoring requirements

75. Residual impacts after implementation of mitigation measures have also been provided.

- Mitigation measures for Adverse Impacts:

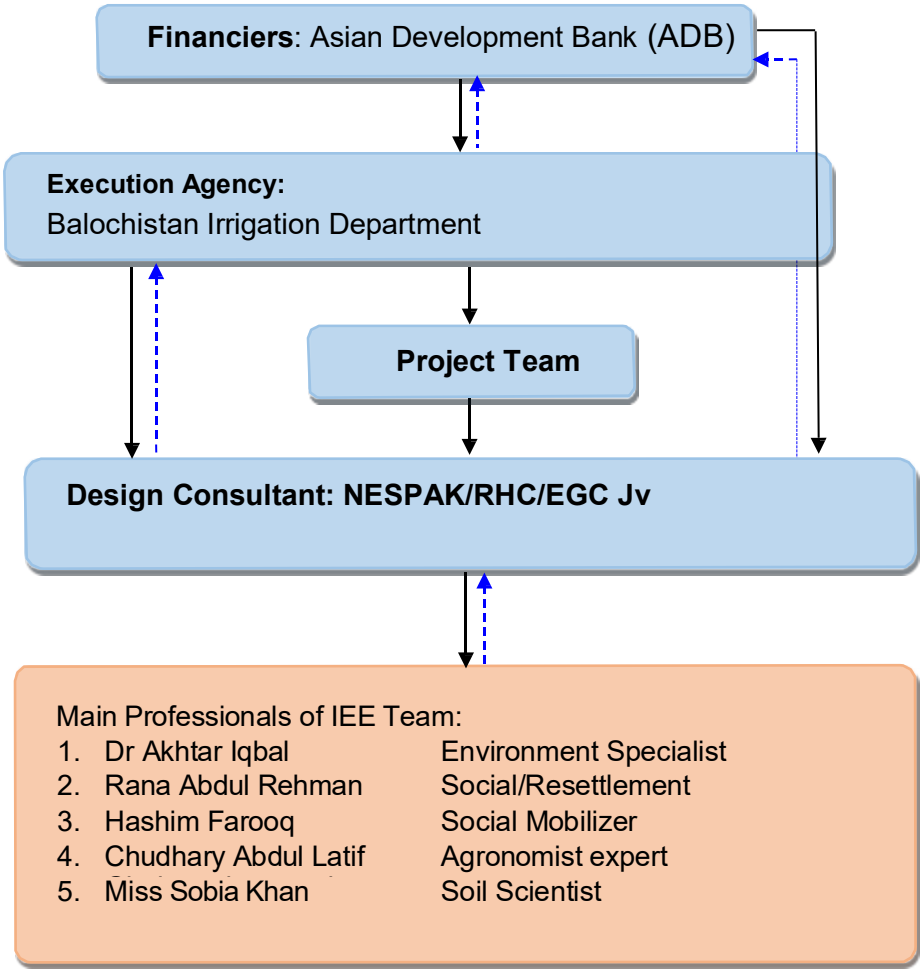
76. Possible measures to prevent or reduce significant negative impacts to acceptable levels will be identified. Recommendations to adopt feasible mitigation measures will be included in the report.

- Development of an Environmental Monitoring and Management Plan:

77. The critical issues requiring monitoring to ensure compliance to mitigation measures will be identified. Impact management and monitoring plan for operations will be presented.

78. Besides the above-mentioned professionals from NEC, its other staff members based in offices located in Karachi will provide logistics and professional support to the IEE team as and when required.

1.6 IEE Team Arrangement



2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 General

70. 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 The IEE report also conforms with the guidelines as provided in ADB's Safeguard Policy Statement (SPS) 2009.

2.1 Background

71. 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 policies2. 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.

72. 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[3]. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP)[4].

73. 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[5]. NEQS for municipal and liquid industrial effluent, industrial

[2] *"Industrial policy and the Environment in Pakistan":* United Nations industrial development organization*;*

[3] "*A model process to develop a National Agenda*": Pakistan National Conservation Strategy; pg1.

[4] *"Industrial policy and the Environment in Pakistan":* United Nations industrial development organization*;* 11 December, 2000; pg.9.

[5] *"Industrial policy and the Environment in Pakistan":* United Nations industrial development organization*;* 11 December, 2000; pg.9

gaseous emissions and motor vehicle exhaust and noise, were issued by Pakistan EPA in 1994.

74. 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.

2.2 National Environmental Policy

75. 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.

76. 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.

2.3 IWRM Policy

77. 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.

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

79. "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 establishment of Drip Irrigation Manufacturing Plants in the province under PPP mode for providing either front- end or back- end subsidy to get a system introduced with full institutional support. There is emphasis that water supply and sanitation require a dedicated attention and given the massive gap, it is planned to undertake integrated water supply and sanitation system in partnership with the local communities especially women through a community

infrastructure program for a minimum of 5000 settlements.

2.4 Balochistan Acquisition of Land Act 1974 & (Amendment) Ordinance 1976

80. 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.

81. The Balochistan Acquisition of Land Act allows the government to acquire private land for housing or development schemes. Initially, the law specifically mentioned “in rural areas”, but this was deleted subsequently through the Ordinance in 1976. “Land Acquisition” literally means acquiring of land for some public purpose by government/government agency, as authorized by the law, from the individual landowner(s) after paying a government fixed compensation in lieu of losses incurred by land owner(s) due to surrendering of his/their land to the concerned government agency. The laws essentially are developments on the land acquisition act of 1894 which was created with the purpose of facilitating acquisition by the government of privately held land for public purposes. The word "public purpose", as defined in the act, refers to the acquisition of land for constructing educational institutions or schemes such as housing, health or slum clearance, as well as for projects concerned with rural planning or formation of sites. It is not necessary that all the acquisition has to be initiated by the government alone. Local authorities, societies registered under the societies registration act, 1860 and co-operative societies established under the co-operative societies act can also acquire the land for developmental activities through the government.

82. Land acquisition requires interaction between the Requiring Body (RB), which is normally a government agency that requires the land for certain national development project, and the Acquiring Body (AB), which is normally the Provincial Revenue Board, since land is a provincial subject according to the Constitution. The division of responsibility between the Requiring Body and the Acquiring Body in broad terms is that the Requiring Body provides the technical input and the Acquiring Body provides the legal input in the land acquisition process. It is the Requiring Body which must ensure that the project, for which the acquisition of land is required, is approved by the authorities and that funds are available. The Requiring Body must also justify the need for land and other property on the basis of field surveys including detailed engineering design and prepare all necessary documents required for decision making.

83. It is to be noted here that no acquisition of privately held land is envisaged for the said project.

2.5 Environmental Legislations

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

2.6.1 National Regulations

85. 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

86. 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

87. 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[6].

2.6.2 Pakistan Environmental Protection Act, 1997

88. 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[7] to execute the IEE and / or EIA (where warranted), and get the approval from provincial EPA. A copy of PEPA 1997 is attached as **Annexure – 2** of this report.

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[6] Qadar S., and Dogar A. R., *Pakistan's Environmental Laws & Their Compliance*, Lahore Law Times Publications, 2002.

[7] The Act defines a Project as: *"Any activity, plan, scheme, proposal or understanding involving any change in the environment and includes:*

- *Construction or use of buildings or other works;*
- *Construction or use of roads or other transport systems;*
- *Construction or operation of factories or other installations;*
- *Mineral prospecting, mining, quarrying, stone-crushing, drilling, and the like;*
- *Any change of land use or water use; and*
- *Alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations."*

89. 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.

2.6.3 Balochistan Environmental Protection Act, 2012

90. 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.

91. 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.

92. 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). This IEE report will need to be submitted to EPA (B) for grant of environmental NOC.

93. 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.

2.6.4 Pakistan EPA Review of IEE and EIA Regulations, 2000

94. 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.

95. 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, respectively8. The proposed interventions under Karakh-Mula River 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, attached as Annexure – 3. According to these guidelines, the proposed project would require an IEE to be conducted.

96. 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. A project is categorized as requiring an IEE or EIA using the two schedules attached to the regulations i.e. Schedule I and II attached as **(Annexure – 3)** at the end of this report.
b. An EIA or IEE is conducted as required and following the Pak-EPA guidelines.
c. 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.
d. 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.
e. The submittal is also accompanied by an application in the format prescribed in Schedule IV of the regulations.

[8] "PEPA Review of IEE and EIA Regulations, 2000", pg-2

f. 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.
g. 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.
h. When the EPA accord their approval subject to certain conditions:
i. Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
j. 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.
k. An environmental management plan (EMP) is to be submitted with a request for obtaining confirmation of compliance.
l. The EPA is required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
m. 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.

2.6.5 Forest Act 1927

97. 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.

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

2.6.6 The Antiquities Act, 1975

99. 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.

2.6.7 Pakistan Penal Code 1860

100. 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.

Government of Pakistan Guidance on Managing COVID-19 Risks

101. Government of Pakistan issued Guidelines "Health & Safety of Building and Construction Workers during COVID-19 outbreak" to Managing COVID-19 Risks while Commencing Work in Construction Project, on 11 April 2020 (Annexure-20). Taking into account these guidelines, the contractor will prepare The contractor will prepare Site-specific EMP (SSEMP) , , Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant

2.6.8 The Balochistan Wildlife Protection (Amendment) Ordinance, 2001

102. 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.

2.6.9 Balochistan Goats (Restriction) Ordinance 1959

103. 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.

2.6.10 Balochistan Ground Water Rights Administration Ordinance 1978

104. 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.

2.6.11 The Canal and Drainage Act, 1873

105. 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.

2.7 Institutional Setup for Environmental Management

106. 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.

2.7.1 Provincial Environmental Protection Council (Provincial EPC) and the Balochistan Environmental Protection Agency (BEPA)

107. 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, non- governmental 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. The NEQS for effluent discharge standards, gaseous emissions, vehicular emissions, drinking water and ambient air quality is attached as Annexure 2 of this report.

108. Another function of the provincial EPA are the review and approval of environmental assessment reports.

2.8 Asian Development Bank Safeguard Policies

2.8.1 ADB Requirements for Preparation of Environmental Assessments of Projects

109. Asian Development Bank in its Safeguard Policy Statement (June 2009) affirms that “environmental and social sustainability is a cornerstone of economic growth and poverty reduction in Asia and the Pacific” (p 14). Furthermore, the document underlines the ADB’s Strategy 2020, promoting the “sustainability of project outcomes by protecting the environment and people from project’s potential adverse impacts”.

110. The Initial Environmental Examination in hand is fully committed to the requirements

determined in the "ADB Safeguard Policy Statement". The environmental works have been essentially guided by these rules as enunciated in the "Outline of an Initial Environmental Examination Report".

111. 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.

112. 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, (as given in Annexure-1), was conducted 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.

113. 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.

2.8.2 ADB Safeguard Policy 2009

114. 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 safeguard policy (2009) framework 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

- AP are informed and consulted during project preparation and implementation.

115. 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 6.

Table 6: ADB Safeguard Policy 2009 Relevant to Project Safeguard

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 this 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-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	As of now, no involuntary resettlement is envisaged for the proposed project.
3.	Indigenous Peoples	Measures to avoid potentially adverse effects on the Indigenous Peoples' communities; and when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and intergenerationally inclusive.	There are no groups of people in the project area who could be categorized as indigenous people, therefore this policy does not apply to the proposed project.

2.8.3 ADB's Accountability Mechanism Policy 2012

116. 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.

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

2.8.4 ADB's Access to Information Policy 2018 (AIP)

118. 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.

119. 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.

2.8.5 Relevant International Treaties

- Convention on Biological Diversity

120. 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 28thof November – 9th of December 1994 in the Bahamas.

121. 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

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

2.9 Comparison of International and Local Environmental Legislations

123. 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.

124. In order to select the most stringent standards applicable, a comparison of local (PEQS) 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 7 below. For air quality, comparison was only possible for pollutants having same averaging periods in PEQS, IFC and WHO. PEQS for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards, in the case of most pollutants. The applicable and most stringent parameters for each respective pollutant are highlighted in yellow.

125. Similar to the standards for air quality, the comparison of noise standards provided in Table 8 clearly shows that PEQS for noise are more stringent in comparison to the WHO/IFC standards. 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 PEQS (75 dB (A)) and so for this particular parameter, the WHO/IFC standard will be used.

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

127. Similar to the standards for air and Noise quality, the comparison of Water quality standards provided in Table 9 clearly shows that PEQS for biological and physical parameters of drinking water quality are same as for WHO standards except for Total hardness as CaCO3. PEQS 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.

Table 7: Comparison of International and Local Air Quality Standards

Pollutants	USEPA		WHO/IFC		PEQS	
	Avg.Time	Standard	Avg.Time	Standard	Avg.Time	Standard
SO_2	3 hrs	0.5 ppm	24 hr	125 µg/m^3 (IT-1*)	Annual Mean	80 µg/m^3
	1 hr	75 ppb	10 min	500 µg/m^3	24 hr	120 µg/m^3
CO	8 hrs	9 ppm (11 mg/m^3)	-	-	8 hrs	5 mg/m^3
	1 hr	35 ppm (43 mg/m^3)			1 hr	10 mg/m^3
NO_2	Annual Mean	100 µg/m^3 (53 ppb)	1 yr	40 µg/m^3	Annual Mean	40 µg/m^3
	1 hr	(100 ppb)	1 hr	200 µg/m^3	24 hrs	80 µg/m^3
O_3	8 hrs	0.07 ppm (148 40 µg/m^3)	8 hrs	100 µg/m^3	1 hr	130 µg/m^3
PM_{10}	24 hrs	150 µg/m^3	1 yr	70 µg/m^3 (IT-1*)	Annual Mean	120 µg/m^3
			24 hr	150 µg/m^3 (IT-1*)	24 hrs	150 µg/m^3
PM_{25}	Annual Mean	15 µg/m^3	1 yr	35 µg/m^3	Annual Average (IT-1*)	15 µg/m^3
	24 hrs	35 µg/m^3	24 hr	75 µg/m^3	24 hrs (IT-1*)	35 µg/m3
					1 hr	15 µg/m^3

*IT- 1 as specified by WHO=AQG, 2005

Table 8: Comparison of International and Local Noise Standards

Category of Area/Zone	Limit in dB(A) Leq			
	PEQS		WHO/IFC	
	Day Time	Night Time	Day Time	Night Time
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

128. 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 at this dilution is taken as an indicator of acceptable surface water quality.

Table 9: Comparison of National and WHO Environmental Quality Standards for Drinking Water

Properties/Parameters	Standard values	WHO standards	Remarks
Biological			
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤15TCU	≤15TCU	
Taste	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Odour	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Turbidity	<5NTU	<5NTU	
Total hardness as CaCO3	<500mg/l	---	
TDS	<1000	<1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	mg/Litre	mg/Litre	
Aluminum (Al) mg/l	≤0.2	0.2	
Antimony (Sb)	≤0.005 (P)	0.02	
Arsenic (As)	≤0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl-)	<250	250	
Chromium (Cr)	≤0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	mg/l	mg/l	
Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing countries
Fluoride (F)*	≤1.5	1.5	
Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian

Properties/Parameters	Standard values	WHO standards	Remarks
			developing countries
Manganese (Mn)	≤0.5	0.5	
Mercury (Hg)	≤0.001	0.001	
Nickel (Ni)	≤0.02	0.02	
Nitrate (NO3)*	≤50	50	
Nitrite (NO2)*	≤3 (P)	3	
Selenium (Se)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source		
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries
Organic			
Pesticides mg/l			PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted. **
Phenolic compounds (as Phenols) mg/l		0.002	
Poly-nuclear aromatic hydrocarbons (as PAHs) g/l		0.01 (By GC/MS methods)	
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

129. National Environmental Quality Standards for vehicular emissions and wastewater are given in Table 9 and 10 respectively.

Table 10: National Environmental Quality Standards for Motor Vehicle Exhaust And Noise

#	Parameter	Standards (maximum permissible limit)	Measuring method
1	Smoke	40% or 2 on the Ringelmann Scale during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more.
2	Carbon Monoxide	Emission Standards: New Used Vehicles 4.5% 6%	Under idling conditions: Non-depressive infrared detection through gas analyzer
3	Noise	85 db (A)	Sound-meter at 7.5 meters from the source

Table 11: National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (Mg/L, Unless Otherwise Defined)

S. 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 (asCN^{-})	2mg/L
12.	An-ionic detergents (2) (as MBAS) (5)	20mg/L
13.	Sulphate($SO4^{2-}$)	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. DESCRIPTION OF SUBPROJECT

130. The subprojects are located in Union Council Abad, Tehsil Mula, District Khuzdar in the Balochistan province of Pakistan. Its capital is the city of Khuzdar. Khuzdar district was establishment as a district in 1974. The city of Khuzdar is situated on National Highway linking Pakistan, Iran and Turkey. It is about 400 km from Karachi and 300 km from Quetta. The subprojects are located on Karkh River in Karkh Area.

131. This chapter intends to present the present conditions at the proposed intervention locations along Karkh River and also present the proposed interventions.

3.1 Interventions at Karkh River (6 Weirs)

3.1.1 Current Status

132. Salient features of existing infrastructures are discussed below:

- **Wanderi PIS**

133. Wanderi PIS provides water supply to different villages in its command area.

- A diversion weir 130 m in length & about 2 m in height from river bed (see **Figure 2**).
- Lined Channel of 5,500 m.
- 3,000 m from existing weir through gated regulator under Balochistan Community Irrigation and Agriculture Project (BCIAP)
- 1,500 m along with other hydraulic structures under Balochistan Rural Support Program (BRSP).
- 1,000 m along with other hydraulic structures by Irrigation Dept.

Figure 2: View of Wanderi Weir

❑ Chutta PIS

134. A diversion weir 135 m in length & about 1.8 m in height from river bed (see Figure 4).

135. Lined covered channel from existing weir through gated regulator followed by open lined channel having total length of 600 m (Totally chocked & silted up with pan grass & weed even on top covered slab of the channel, require to be rehabilitated/restored.

136. An earthen escape channel in a length of 50 m was constructed to divert the flood water back into the river at downstream side was also found chocked with pan grass & weed which also need to be restored with stone pitching as shown in attached cross section as Annexure 4.

137. An inlet lined channel portion leading to the existing circular water storage reservoir having internal dia. of about 30 m along with a pump station of 3 No. pumps & delivery pipes of 6 inches dia. (MS Pipe) connected with collector pipe of 0.304 m dia. (MS Pipe) discharging into an existing trifurcation structure was found abandoned due to following facts.

- All the pumps are out of order and are to be replaced by new one.
- Some lengths of delivery pipe (MS) and main collector pipe (MS) need to be replaced for proper functioning to command vast cultivable command area of about 225 hectares fertile land in the vicinity & behind Chutta Village which are high lands can't be commanded by gravity.

Figure 3: View of damage portion of Chutta Weir

❑ Khadri PIS

138. A 2 m high vertical drop weir having a top width of 2.3 m was constructed under BCIAP (see Figure 4). The weir is functional and has no significant issue but only needs cleaning. However, sometimes water overtops the flood protection bund.

Figure 4: View of Khadri Weir

- **Jhalaro PIS**

139. There is no proper head works at the source (see Figure 5). Presently, 3.3 cusecs water is diverted to the command area by a local weir called “ganda”. There is an existing earthen channel which is in deep cut (about 3m). During floods, this channel is choked and silted up. The pH of the perennial flow is 7.95 and Total Dissolved Solids (TDS) is 415 ppm.

Figure 5: Location of proposed Infiltration gallery at Jhalaro PIS

- **Acherwand PIS**

140. A weir was constructed under BCIAP (see Figure 6). Channel and under sluice gates are not functional (see Figure 7). 2.5 km channel length is lined. Grass and weeds are grown in the upstream and downstream of the weir.

Figure 6: View of Acherwand Weir

Figure 7: View of Channel Off-take point of Acherwand Weir

- **Sinjori PIS**

141. A weir was constructed under BCIAP (see Figure 8). Under sluice gate is not functional. 2.5 km channel length is lined. Grass and weeds are grown in the upstream and downstream of the weir.

Figure 8: View of Sinjori Weir

3.1.2 Proposed Project

142. The Consultants have proposed the intervention for the subproject based on the field investigations, consultation with the stakeholders, review of feasibility and desk studies. The interventions include ; (a) guide bund / flood protection works – which relate to the Karkh river core sub-project as a whole, (b) construction of new Jhalaro weir, (c) weir rehabilitation at Chutta, (d) Rehabilitation of Chutta lift irrigation (pump house), and (e) lining of unlined existing channels.

3.1.3 Irrigation Network –Lining

143. Existing canal alignments are followed for the lining. Salient features of canal length and related structures provided on main canal are given in Table 12.

144. Although existing alignment of canals followed however to irrigate further command area existing canals are extended and aligned according to following considerations.

- The channel must command the entire possible command area.
- All the settlements must be avoided in order to economize the land acquisition and resettlement cost.
- Channel alignment should be modified to avoid built-up areas, places of worship and historical importance.
- Channel alignment should avoid all religious places and graveyards.
- Cost of construction including cross drainage works is minimized.
- Acute curves be minimized to achieve smooth flow.
- Excessive sinuosity was avoided to minimize channel lengths.
- Wherever possible, the channel should cross the roads, railways lines and nullahs at 90o angle in order to avoid skew bridges which are costly.
- To balance and to minimize cut and fill quantities

Table 12: Structures on Channels

Channel Name and length	Culvert	Super passage	Time Division structure	Washing & Wuzu Structure	Aque duct	Siphon	Sump	Fall Structure
Wandri Channel 1.148 Km	1	1	6	-	-	-		
Chutta Channels 3.916 Km	-	-	24	-	2	1	3	5
Khadri Channels 3.223 Km	7	-	36	2	-	-		1
Jhalaro Channel 2.906 Km	-	-	15	-	-	-		
Acharwan Channel 1.995 Km	2	-	11	-	-	*		2
Sanjari Channel 3.901 Km	1	1	31	-	-	-		1
Norwah Channel 3.407 Km	3	1	31	-	-	-		-

3.1.4 Construction of Jahlaro Weir and Rehabilitation of Chutta Weir

- **Jhalaro Weir**

145. At Jhalaro, a weir on Karkh River is proposed to divert the flow to the command area with proper designing and lining of 5 km channel. Karkh River at this section is wider as compared to 109 m mentioned in Feasibility Study Report. Keeping in view the crest length of all existing weir ranging from 135m to 145 m, crest length of Jhalaro weir has been increased in order to avoid the generation of afflux at upstream side of the weir and back water effect up to Khadri weir which is already constructed at about 460m at upstream side of the proposed Jhalaro weir. For the design of side walls and protection bunds, freeboard is adopted as 1m. Presently at this location flow is being diverted for irrigation by a locally constructed diversion embankment. Design Parameters of Jhalaro Weir are given in Table 13.

Table 13: Design Parameters for Jhalaro Weir with Undersluice

Sr. #	Description	Proposed Weir	Undersluice
1	Weir Crest Length (m)	147	3
2	Crest Width (m)	2	2
3	Crest El. (m asl)	781.50	780.50
4	Undersluice Gate Top Level (m asl)	-	781.50
5	Undersluice Gate Size (HxW) m	-	1 x 3
6	Design Flood 50 yr R.P (cumecs)	532.28	532.28
7	Check Flood 100 yr R.P (cumecs)	605.89	605.89
8	HFL 50 Years	783.14	783.14
9	HFL 100 Years	783.28	783.28
10	Side Wall Top El. (m asl)	784.30	784.30
11	Stilling Basin Length (m)	15	15
12	Stilling Basin Width (m)	147	3
13	Stilling Basin El. (m asl)	778.75	778.75
14	End Sill Level (M asl)	779.25	779.25
15	Tail Water Level (m asl)	781.24	781.24
16	U/S Cutoff Depth (m)	1.5	1.5
17	D/S Cutoff Depth (m)	4	4
18	D/S Stone Apron Length (m)	7	7

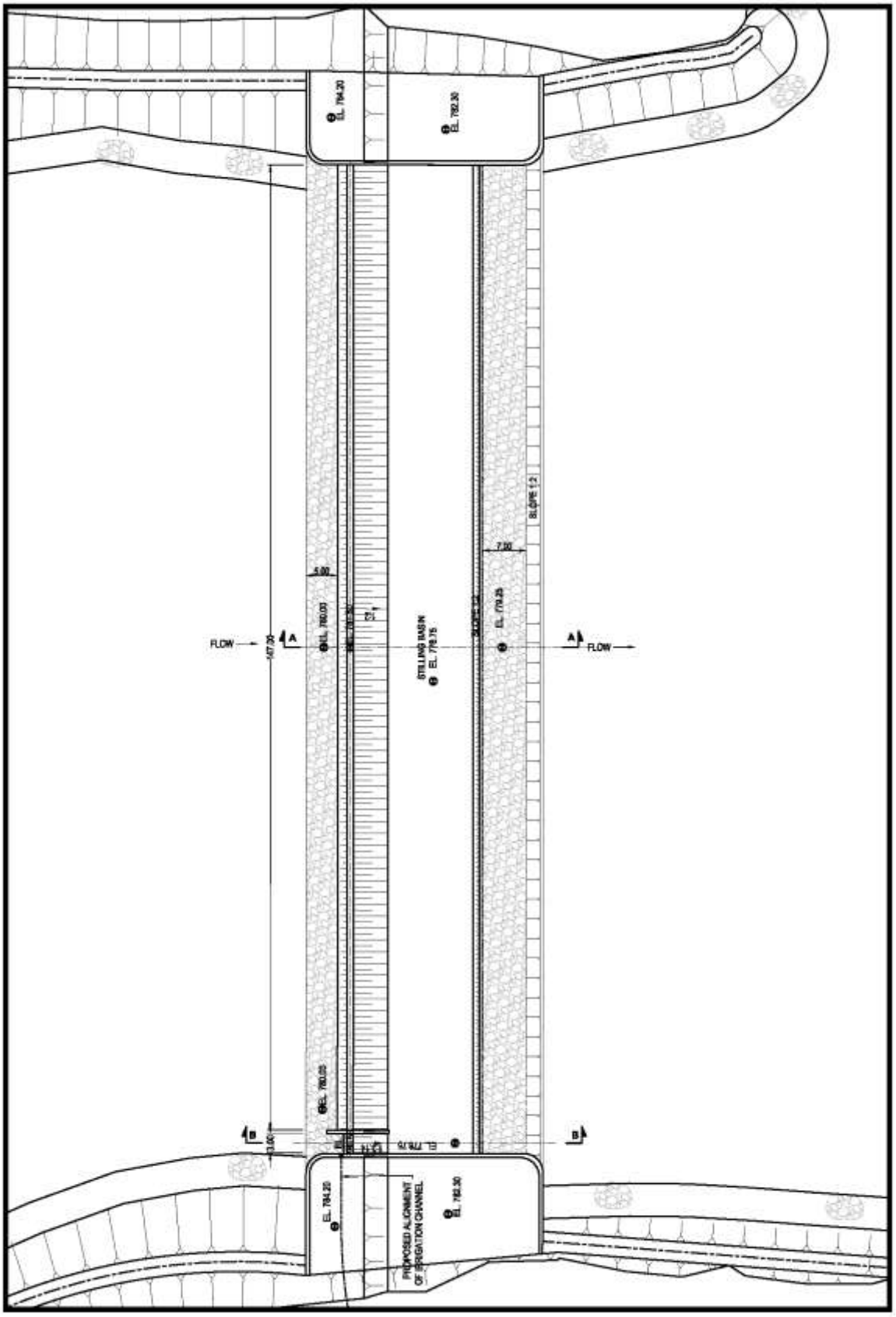


Figure 9: Plan of Jhalaro Weir

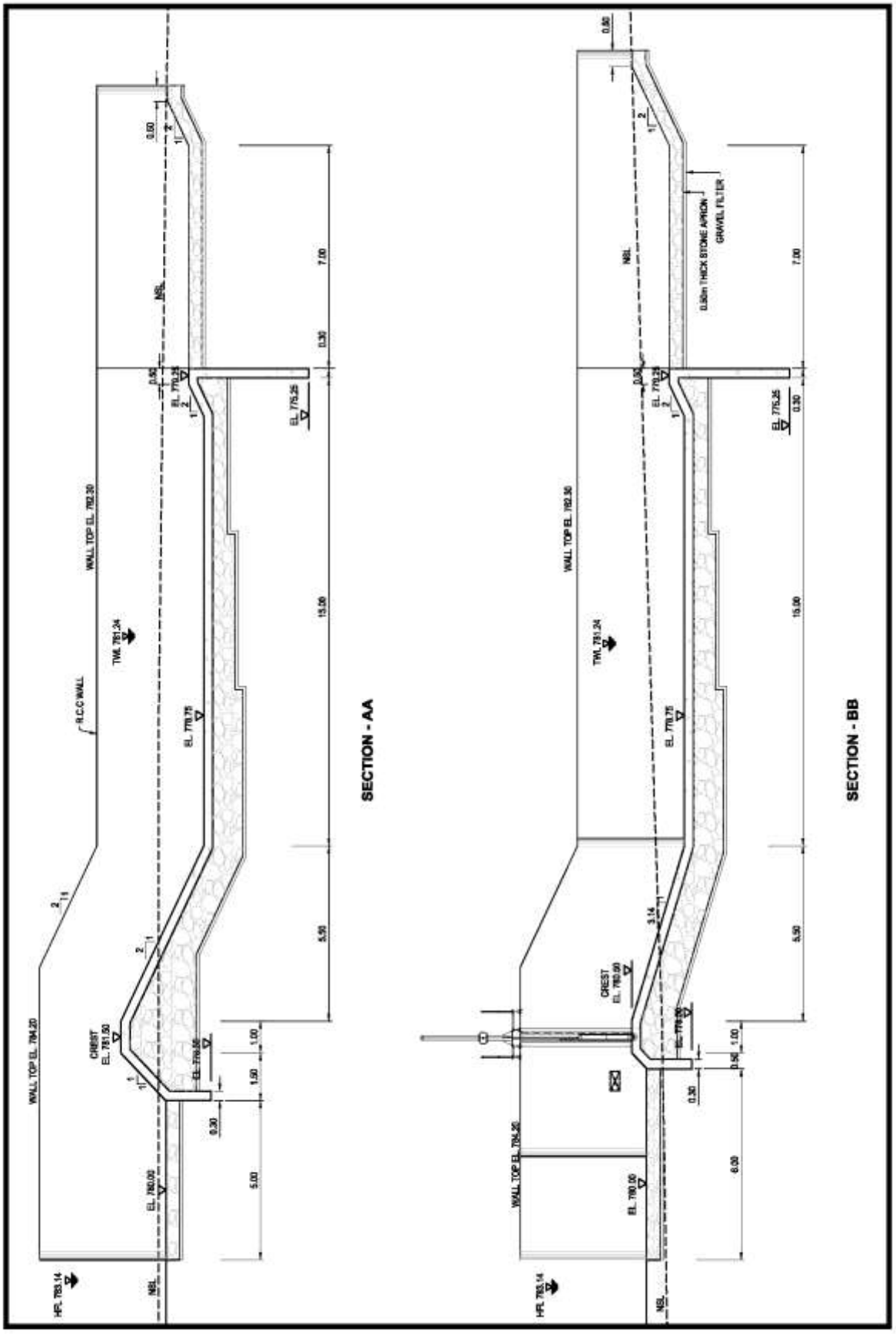


Figure 10: Longitudinal sections of of Jhalaro Weir

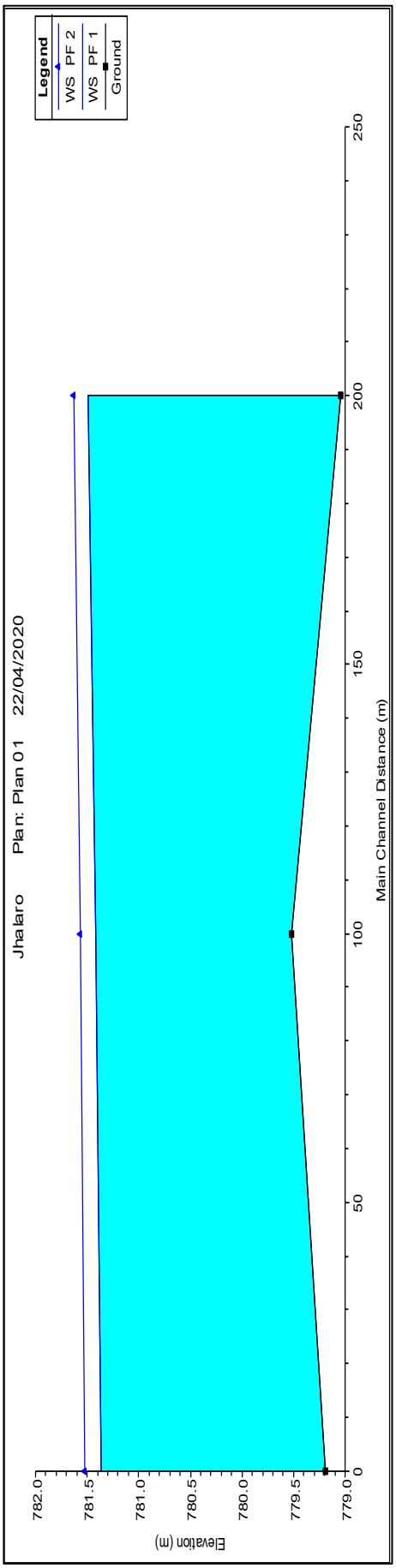


Figure11: water surface profile of river at downstream of Jhalaro Weir

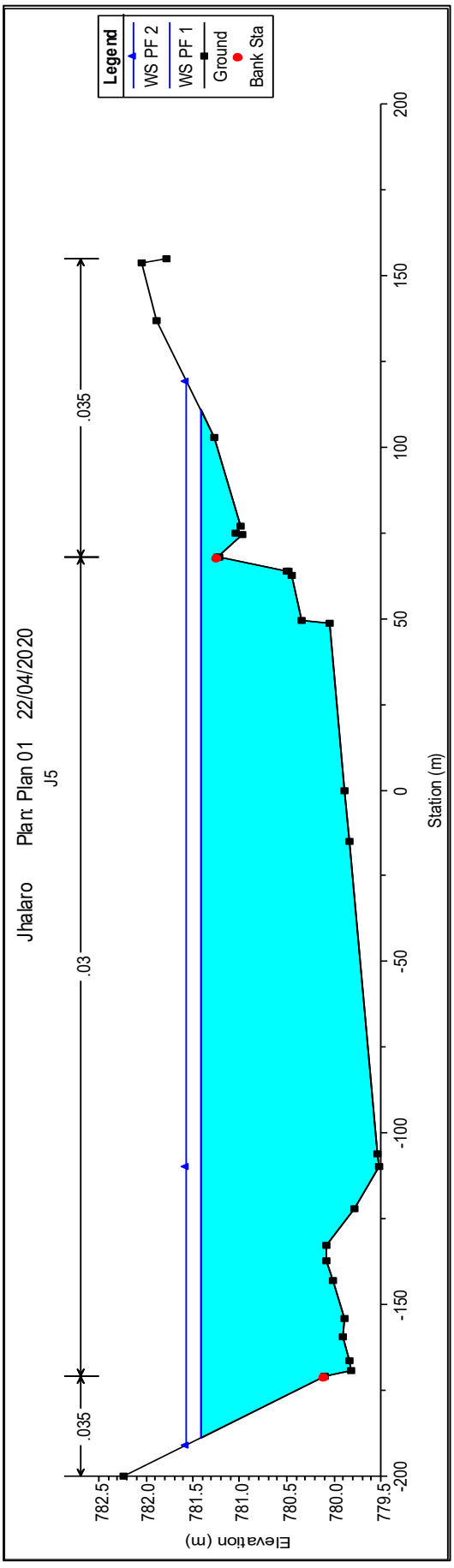


Figure12: Cross Section showing tail water levels at downstream of weir

- **Chutta Weir**

146. Re-construction of 15 m wide panel of damaged portion of Chutta weir (i.e. weir, chute and stilling basin including both upstream & downstream cut-off) is proposed. Due to storage of water, extent of damages could not be quantified precisely. Therefore, it is proposed that during the construction phase, the Contractor shall construct a coffer dam for the reconstruction of the weir as shown in Figure 13 below to cordon off the damaged part of the weir. Dewatering will be done by the Contractor in this area and then Consultants' engineers at site carry out damage assessment and quantify the rehabilitation works and construction drawings will be finalized.

Figure 13: Coffer dam for the construction of damaged weir portion

3.1.5 Flood Protection Bunds

147. Natural floodplains have reported to be affected frequently during high floods due to persistent damage to levees and flood protection structure located at right bank of Karkh river. The rehabilitation work under this sub-project entails rising of existing flood protection bunds and construction of new flood protection bunds where required.

148. Earthen embankments / protection bunds are included in the design adjacent to upstream river banks for protection of natural floodplains for 50-year return period. With provision of these bunds, discharge carrying capacity of Karkh river would be increased providing protection to area adjacent to river. There is already flood protection bund constructed at left side of Karkh river from Wanderi to Jhalaro to protect the adjacent land

from inundation. It is proposed to raise this existing protection bund at locations where flood water overtops the protection bund. New protection bunds various locations from Wanderi to Nurwah weir have been proposed in order to protect the nearby command area from flood inundation.

149. After construction of protection bunds, an additional area would be made available on right over bank that will be included as new command area

150. A total of 8 protection bunds have been provided. Details of the bunds are given in as follows:

Table 14: Details of Protection Bunds

Protection Bund No.	Location	Proposed Intervention
1	From upstream side of Wanderi weir up to Khadri weir at right bank.	There is already constructed protection bund. It has been raised up to the required level to avoid overtopping due to floods. Total length of proposed protection bund is 1097m.
2	From upstream of Khadri up to Jhalaro weir at left bank.	Already constructed protection bund is raised to avoid overtopping due to flood. The length of the protection bund is 625m.
3	From upstream of Khadri up to Jhalaro weir at right bank.	This is new protection bund having a length of 665m.
4	Acherwand weir at left bank	These protection bunds are provided to safeguard the Acherwand weir by guiding the water towards the weir and avoid entry of flood in to adjacent land. Length of these protection bunds are 400m and 675m respectively.
5	Acherwand weir at right bank	
6	Sanjori weir at right bank.	This protection bund is provided to safeguard the Sanjori weir by guiding the water towards the weir and avoid entry of flood in to nearby agricultural land. Length of this protection bund is 550m.
7	Nurwah weir at left bank	These two protection bunds are proposed to safeguard the weir and guide the water in to weir and to avoid the entry of flood water in to nearby agricultural land. Lengths of these protection bunds are 325m and 280m respectively.
8	Nurwah weir at right bank	

151. A typical drawing and cross-section of the rehabilitation at Karkh river is given as Annexure - 4. Table 15 below provides the cost estimates of Mula River interventions.

Table 15: Karakh Valley Development Proposed Works

No.	Components	Unit	Quantity
1.	Jhalaro Weir	m	150
2.	Chutta Weir Rehabilitation Works	-	-
3.	Irrigation Channel	m	20,587
4.	Covered Channel	m	639
5.	Steep Pipe/HDPE Pipe	m	296
6.	Fall Structure	Nr.	8
7.	Channel Crossing	Nr.	2
8.	Super -Passage	Nr.	2
9.	Culvert	Nr.	16
10.	Siphon	Nr.	1
11.	Washing Structure	Nr.	2
12.	Sumps	Nr.	3
13.	Time Diversion Structures/ Tail Structures	Nr.	143
14.	Protection Works (Flood and Guide Bund)	Nr.	8

Source: Design Report

3.2 Design Revision and its Impacts

152. At detail design phase, following changes were made in feasibility design

- Length of Jhalaro Weir was increased from 106 m to 147m after field investigations that will have positive impact in terms of pooling sufficient water behind it to fulfill requirement of designed command area.

- Length of lined Channel increased from 14.770 Km to 34 Km. it will have positive impact in terms of more water conservation through reducing seepage losses, increase in channel capacity and hence increased water availability.

- Number of Flood Protection bunds reduced from 9 to 8 as one bund has been constructed after feasibility study by local government /an NGO. It has positive impact in terms of making project cost effective.

153. Layout plans of Karakh Valley development sub-project are given in Figure 14 and 15.

Figure 14: Layout Plan of the Subproject (Detail Design Stage)

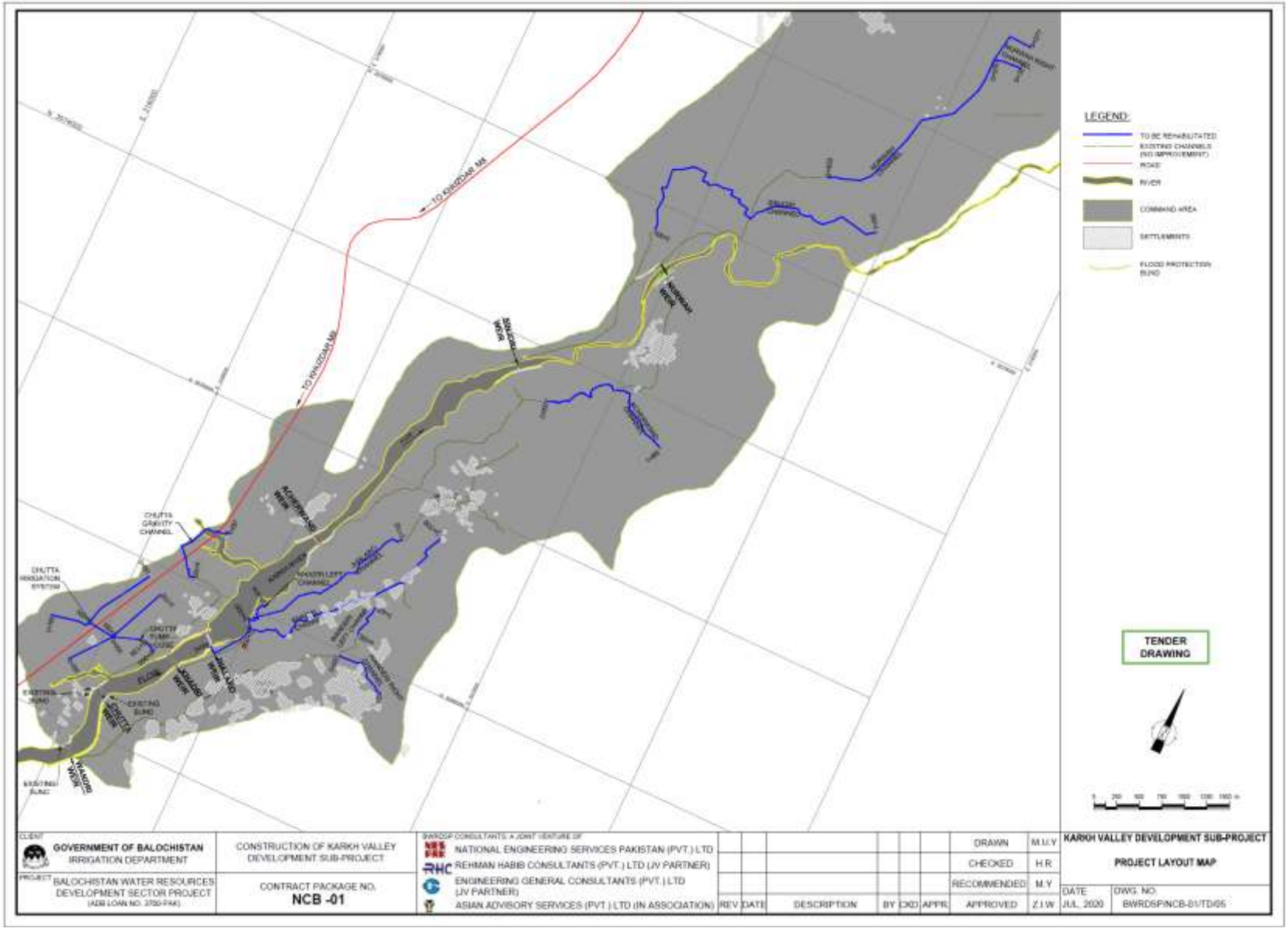
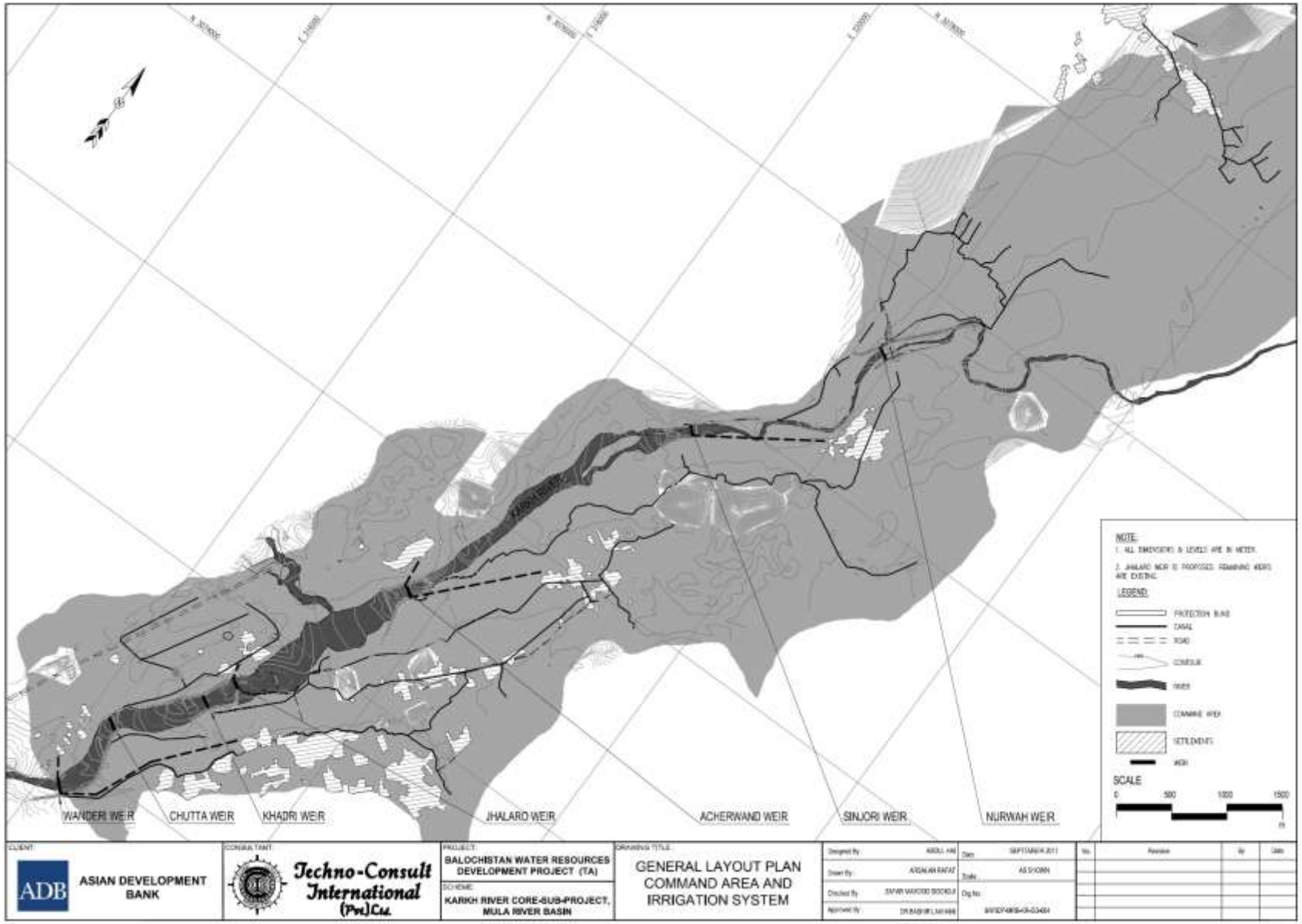


Figure 15: Layout Plan of the Subproject (Feasibility Stage)



4. ALTERNATE ANALYSIS

4.1 Project Need and Justification

4.1.1 Karkh

154. Karkh Subproject includes the lining of unlined channels, construction as well as rehabilitation of weirs, construction of guide/flood protection bunds to protect a command area of 2,250 ha.

155. This subproject will help to meet the project target for improvement of 20,000 ha existing irrigation lands. All of the six selected schemes are located on main Karkh River.

156. Owing to the above argument, conceptual plans was developed for determining the feasibility of the subproject. During the pre-feasibility stage phase in the project cycle several alternatives were evaluated. Following alternatives were discussed to finalize the conceptual design of the subproject.

4.2 No Project Alternative

4.2.1 Six weirs at Karkh River

157. Weirs at the Karkh River were constructed over 20 years ago and have been operating successfully over the passage of time. The lack of maintenance has damaged the existing infrastructure and have become useless for irrigation works.

158. Due to this reason, the existing command area will reduce and cause a decline in the socio-economic aspect of the 6 villages at Karkh River.

4.3 Alternatives Interventions at Karkh River

159. Weirs at the Karkh River were constructed over 20 years ago and have been operating successfully over the passage of time. The lack of maintenance has damaged the existing infrastructure and have become useless for irrigation works. The rehabilitation of existing structures with minor additional works and cleaning of weeds is proposed because of its success in the past. Therefore, alternative analysis of Karkh River interventions is not carried out. Minor additional works at all the six locations have been proposed as following:

- Irrigation network rehabilitation and lining
- Extension of flood protection bund
- Rehabilitation of Chutta weir i.e. The upstream cutoff wall of the existing weir at Chutta is damaged. The computed upstream and downstream cutoff wall is 2 m deep from the structure's base which will be rehabilitated.
- Construction of weir at Jhalaro

160. As discussed in para 122 that Karkh River intervention mainly focused on rehabilitation works therefore alternative analysis is not required. However, at Jhalaro a new weir is to be constructed consequently the alternative analysis for the same is required. Table 14 below provides comparison of alternatives with respect to design:

Table 16: Comparison of Alternatives for Jhalaro

S.No	Option	Reasons for selection/Rejection
1	Offtake well	Since, the perennial flow is available at Jhalaro, offtake well is considered as the most economical option. However, the river axis is very wide and the active streams change their path after every flood. It was assumed that the offtake well would be left abandoned after one of two years. Therefore, this option was not selected.
2	Infiltration Gallery	As a second design estimate, infiltration gallery was considered as most economical head regulator to irrigate the command area of Jhalaro Village. But the topography of the area is very mild. The conveyance conduit from the infiltration gallery would lost a huge patch of cultivable land till the daylight point. Therefore, this option was also not selected.
3	Weir	The surface flow is available at Jhalaro. Therefore, construction of weir was considered as the best option. The weir would create the required head which can divert the water to the command area. To save the cost, the material of the weir is replaced from concrete to gabion.

5. ENVIRONMENTAL & SOCIAL BASELINE CONDITIONS

161. 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. The area of influence around the proposed subproject interventions are attached Annexure - 5. 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. This chapter describes the environmental setting of the proposed interventions.

162. The data presented in the following sections has been collected from both secondary and primary sources. For secondary data acquisition, the project team contacted the relevant departments and gathered the required information. Primary data was collected during reconnaissance surveys and detailed visits during May 2017 and December 2019. The secondary data was also verified, and visual observations were made during these visits.

5.1 Physical Resources

5.1.1 Geography

163. Balochistan is situated in the southwest of Pakistan and covers an area of 347,190 square kilometers (134,050 sq. mi). It is Pakistan's largest province by area, constituting 44% of Pakistan's total land mass. The province is bordered by Afghanistan to the north and north- west, Iran to the south-west, Punjab and Sindh, and Khyber Pakhtunkhwa and the Federally Administered Tribal Areas to the north-east. To the south lies the Arabian Sea. Balochistan is located on the south-eastern part of the Iranian plateau. It borders the geopolitical regions of the Middle East and Southwest Asia, Central Asia and South Asia. Balochistan lies at the mouth of the Strait of Hormuz and provides the shortest route from seaports to Central Asia. Its geographical location has placed the otherwise desolate region in the scope of competing global interests for all of recorded history.[9]

164. Balochistan is rich in exhaustible and renewable resources; it is the second major supplier of natural gas in Pakistan. The province's renewable and human resource potential has not been systematically measured or exploited due to pressures from within and without Pakistan. Local inhabitants have chosen to live in towns and have relied on sustainable water sources for thousands of years.[10]

[9] https://en.wikipedia.org/wiki/Balochistan,_Pakistan#Geography
[10] https://en.wikipedia.org/wiki/Balochistan,_Pakistan#Geography

165. The capital city Quetta is located in a densely populated portion of the Sulaiman Mountains in the north-east of the province. It is situated in a river valley near the Bolan Pass, which has been used as the route of choice from the coast to Central Asia, entering through Afghanistan's Kandahar region. The British and other historic empires have crossed the region to invade Afghanistan by this route.[11]

5.1.2 Topography

166. High mountains surround the project area which lies in Karkh valley. The terrain is generally flat in the core sub-project area and it is for command area development. The Karkh River core sub-project is located in the south eastern part of the Mula River basin having coordinates 27° 45' 30.41" N and 67° 10' 30.35" E. It is located in an environment of degraded rangelands. The average altitude of the core sub-project command area is 770 m above mean sea level. Karkh river core sub-project is a cascade of six sub-projects namely Wanderi, Chutta, Khadri, Acherwand, Sinjori and Nurwah. Each sub-project consists of an existing weir along the Karkh River. Each weir lies in close proximity to others, therefore all sub-projects have been bundled into a core sub-project

5.1.3 Soil

167. Soils of the project area have variable textures which ranges from fine to coarse grained. The medium textured extent comprises clay loam, loam, silt loam and sandy loam which occupy the maximum content in the area. The other least classed textures observed in the project are is loam gravel and sandy loam gravel.

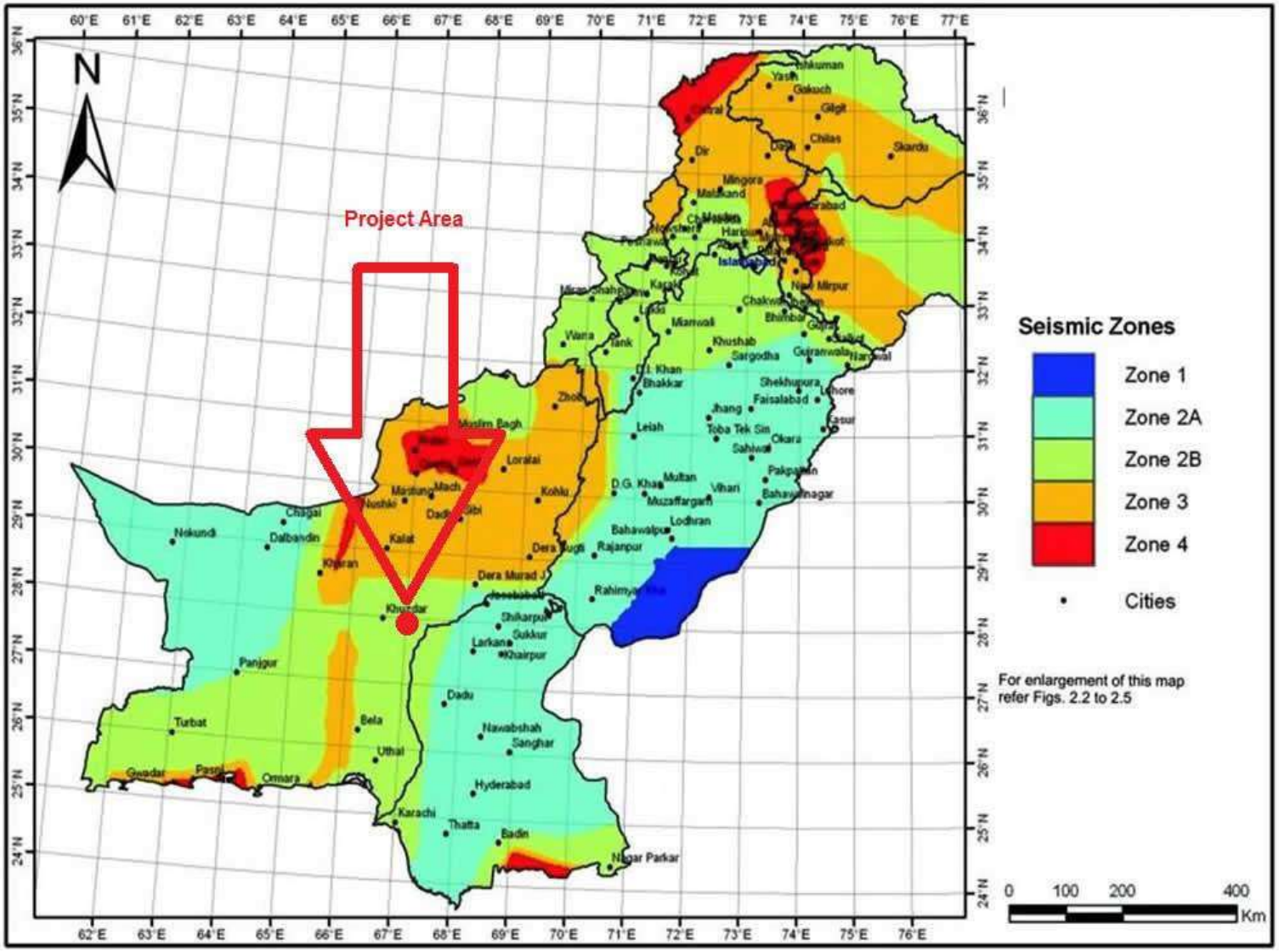
5.1.4 Seismicity

168. The entire province of Balochistan lies in a seismically active region. The province has experienced devastating earthquakes in the past. A powerful earthquake with a magnitude of 7.0 on the Richter scale was recorded on May 31, 1935 and devastated Quetta town and resulting in 35,000 fatalities. Again, on the Nov 28th, 1945, an earthquake measuring 8.6 on the Richter scale hit Balochistan killing almost 4,000 people. A history of recorded earthquakes is attached as Annexure - 6.

169. The seismic zoning map of Pakistan, indicates that the project area lies in the zone 2B. This zone is liable to MSK VI or less and is classified as the Low Damage Risk Zone. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macroseismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence. The updated Seismic Zoning Map of Pakistan is shown below as Figure 16.

[11] Bolan Pass – Encyclopædia Britannica Eleventh Edition
[12] Standard interpretation of Geological map of Pakistan by Geological Survey of Pakistan
[13] Standard interpretation of Geological map of Pakistan by Geological Survey of Pakistan

Figure 16: Seismic Zoning Map of Pakistan



Source: Geological Survey of Pakistan

5.1.5 Project Site Geology

170. The core sub project site is bounded by mountain ranges as Gindari in the Noth, Siah Na Latt in the South, Kirthar in the East and Pab in the West as shown in the Regional Geological Map prepared by government of Canada for government of Pakistan under Colombo Plan on scale 1:253,440 (Map No 15, Khuzdar 35 I.M.)

171. Karkh river core sub-project area comprise of complex geological features of recent age material and showing erosional pattern to form a syncline structure. The area has minor faults that observed in the map of Geological Survey of Pakistan. The area is having rocks of cretaceous, tertiary and mostly recent deposits in age (see Table 17).

Table 17: Stratigraphic succession of Karkh river core sub-project

Age	Formation	Lithology
Recent	Recent Deposits	Fine to Coarse materials sand, silt, clay and pebbles
Eocene	Brahui Limestone(member of Khirthar)	Limestone
	Ghazij Formation	Shale
Paleocene	Karkh Group	sandstone, limestone, shale and conglomerate
Cretaceous	Pab Formation	Sandstone

172. The Karkh river bed consists of mostly boulders, gravel and sand formation in different layers. Sand and conglomerate layers are also seen at places however; rock mounds are outcropped in river bed at several places which consists of mostly recent materials. The thickness of gravel formation may be up to several meters with finer material mixed with clay and sand or silty sand is located in deeper location in the river. The upper layers of river are generally filled with gravel.

Figure 17: Erosion phenomena was observed on left bank of Chutta Weir

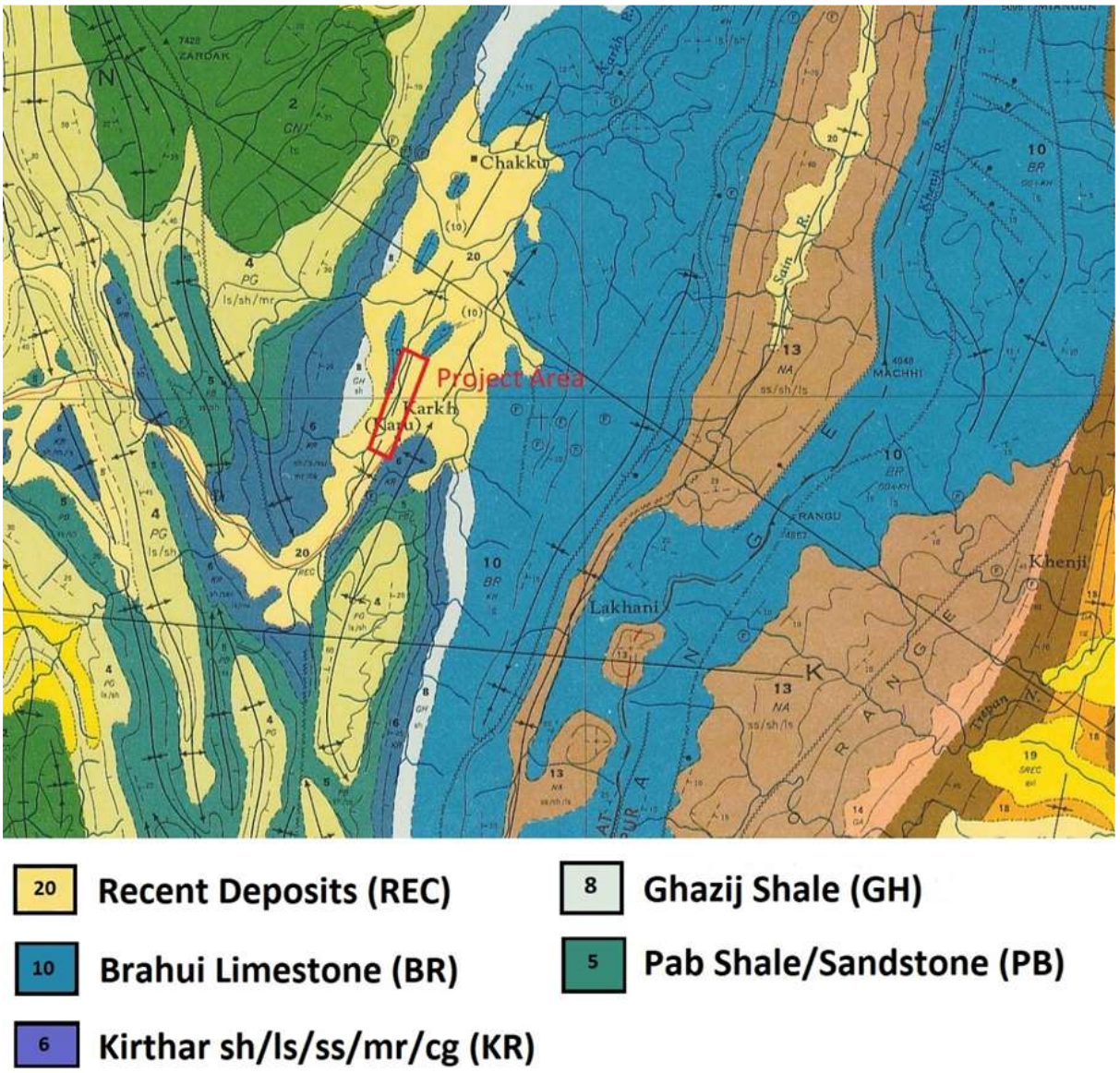


Figure 18: Geological Map of Karkh River Core Sub-Project Area

(Source: Regional Geological Map prepared by government of Canada for government of Pakistan under Colombo Plan on scale 1:253,440, Map No 15, Khuzdar 35 I.M)

5.1.6 Construction Material

Sand

173. Natural Sand is available in the river bed of project area that can be used as filter material as well as for concrete work after screening. Other source of Sand Material is available at Khuzdar at 75-80km (Wadh Source) that can fulfill the project requirements in term of quantity.

Sandy Gravel

174. Sandy Gravel Material is available in River Bed and in the adjacent area that can be used for the construction purpose.

Figure 19: Construction Material: Sandy Gravel was available in the river bed of project area that can be used as construction material as well as for concrete work after screening.

Rocks / Masonry Work Source

175. Strong rocks of limestone and sandstone are exposed at about 3km from the project site, these high grade rocks can be used for masonry works and for other relevant purposes.

Crush Stone

176. This is one of essential requirement of any construction project. It is better to produce crush locally at site by using Limestone / sandstone ridges which are available within 3km of project area. Otherwise, crush stone can be transported from Khuzdar (Wadh Source) which is 75km-80km from the project site.

Water

177. Karkh River core sub-project is perennial and substantial water is available throughout the year for construction. The water quality seems good for construction use however, lab testing of the water is nevertheless required to confirm the above assumption.

Figure 20: Water for construction: Perennial water is available in the project area for construction activity throughout the year.

Cement and Steel

178. Cement and steel can be acquired from Khuzdar city 80km or from Karachi that is about 430 km away from site depending upon the quantity.

Logistics

179. Minor logistics support can be availed from Khuzdar city that is 80 km approximately from the project area of Karakh River core sub-project. Some heavy construction equipment and machinery including excavators, shovels dumpers are available in Khuzdar and more can be procured from Karachi.

5.1.7 Climate of the Project Area

180. Khuzdar is at the apex of a narrow valley at an elevation of 1,237 metres (4,058 ft). Despite this altitude, Khuzdar like most of Balochistan has an arid climate with very low and erratic rainfall. Unlike most parts of the province, the heaviest average rainfall comes from the Asian monsoon in July and August, though this rainfall tends to be very erratic and, in many summers, there is no significant rain at all.

181. The general climate of Mula is mildly cold in winter as compared to some other basins of Balochistan that experience intense winter. The core sub-project site is located at the south eastern part of Mula basin. The coldest months are generally January, February and December. The summer in general is warm to hot with the average maximum temperature reaching up to 37-38 ºC in June and July.

5.1.8 Precipitation

182. Mean monthly rainfall data and the number of rainy days recorded at the Khuzdar Met Station are given in Table 18. The average annual rainfall of the area is about 267.9 mm (10.54 inches) (Ref. 1), while on the average the maximum monthly rainfall is 59.9 mm during the month of July and a minimum of 3.7 mm in October. The maximum rainfall occurs during the months of May to August, which is about 55% of the annual rainfall. Winter rains generally occur during the months of January and February, whereas, October is normally the months with least precipitation. The distribution of average monthly rainfall is shown in Fig. 19 below.

Table 18: Mean Monthly Rainfall in Khuzdar

Month	Mean Monthly Rainfall (mm)	Rainy Days (No.)
January	18.4	1.6
February	28.2	2.3
March	22.3	1.9
April	16.2	1.7
May	14.7	1.7
June	13.5	1.5
July	58.3	5.5
August	59.9	3.9
September	8.0	1.5
October	7.0	0.2
November	3.7	0.2
December	17.7	1.4
Annual	**267.9**	**23.4**

Source (Pakistan Meteorological Department)

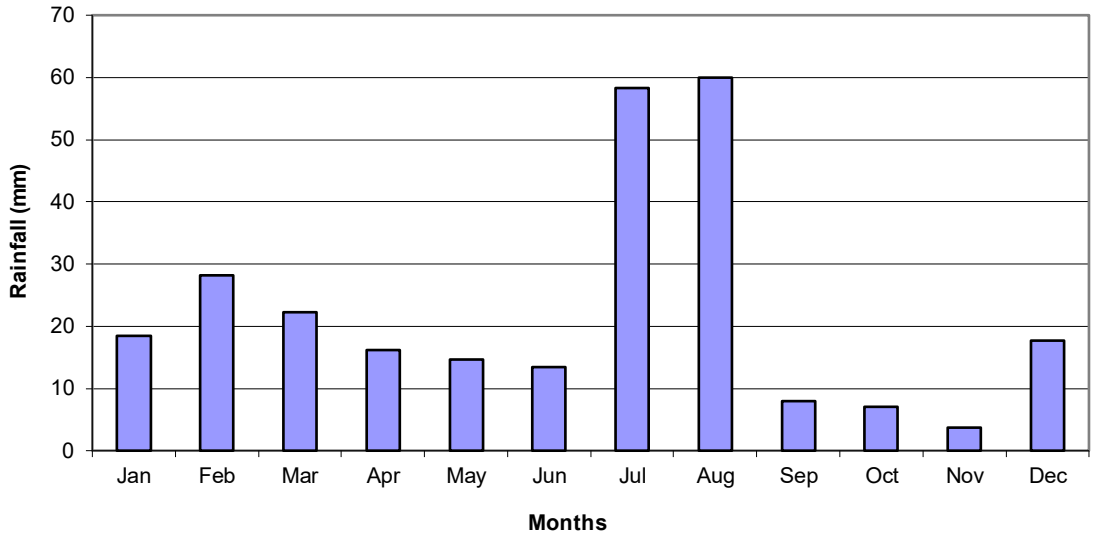


Figure 21: Monthly Distribution of Rainfall at Khuzdar

5.1.9 Temperature

183. The mean daily temperature ranges from (June being the hottest month) 27.1°C to 31.1°C in the summer season (May to September) and 10.6°C to 13.0°C in winter season (December to February). Mean monthly temperature in June rises to a highest value of 31.1°C and falls to the lowest value of 10.6°C in January. June, July and August are the hottest months in summer season. December, January and February are the coldest months in winter season. The monthly averages of minimum, maximum and mean daily temperatures are given in Table 19 and shown graphically in Fig. 20.

Table 19: Mean Monthly Temperature in Khuzdar

Month	Temperature (°C)		
	Min	Max	Mean
January	3.7	17.6	10.6
February	6.1	19.7	13.0
March	11.0	24.5	17.8
April	16.4	30.4	23.2
May	21.2	35.3	28.3
June	24.3	38	31.1
July	24.2	37.1	30.5
August	23.1	35.7	30.4
September	20.5	34.5	27.1
October	14.4	30.1	22.2
November	8.9	25.2	17.0
December	5.0	20	12.4

Source (Pakistan Meteorological Department)

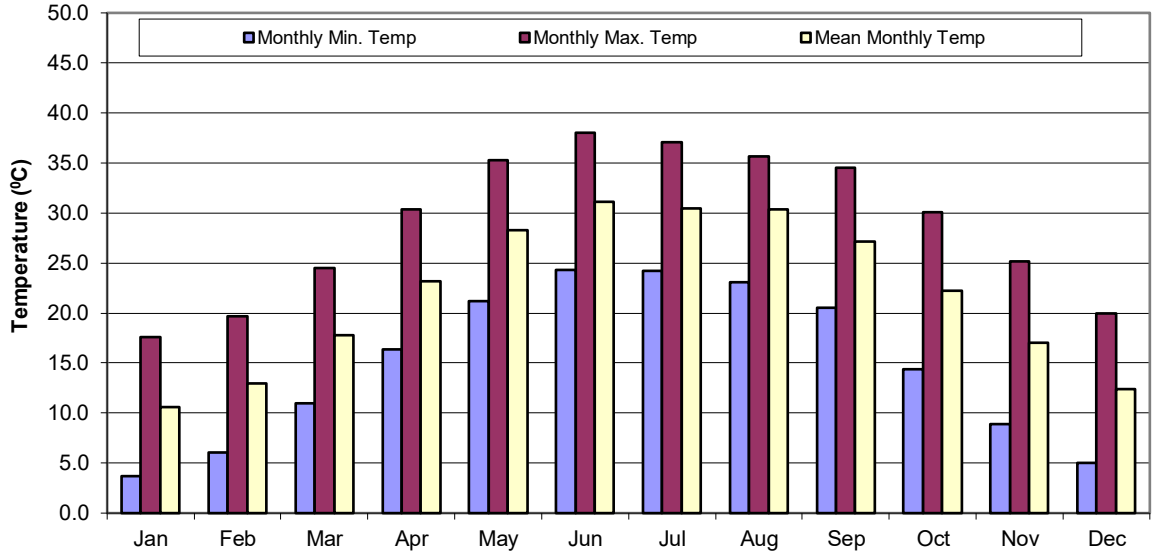


Figure 22: Mean Monthly Temperatures in Khuzdar

5.1.10 Relative Humidity

184. The relative humidity data at 00:00, 03:00 and 12:00 hours was collected from PMD. Mean monthly relative humidity is given in Table 18. At 00:00 hr the relative humidity varies from lowest value of 39.7 % in May to highest value of 65.9 % in August. At 12:00 hr the lowest value is 15.6 % in May to highest value of 30.8 % in August (see Table 20).

185.

Table 20: Mean Monthly Relative Humidity in Khuzdar

Month	Relative Humidity (%)		
	00:00 hr	03:00 hr	12:00 hr
January	59.6	59.2	27.3
February	57.1	54.5	25.5
March	50.3	47.5	21.9
April	43.3	39.1	17.8
May	39.7	33.8	15.6
June	46.2	41.6	18.5
July	61.9	57.4	28.2
August	65.9	60.7	30.8
September	52.0	46.5	19.5
October	42.3	37.6	17.5
November	49.5	45.7	20.3
December	57.6	54.2	25.4

Source (Pakistan Meteorological Department)

5.1.11 Wind Speed

186. The mean monthly wind speed in knots is given in Table 21. The data reveals that at 00:00 hours, the wind speeds are generally lower while higher wind speeds are recorded at 03:00 and 12:00 hours. During summers wind speeds are generally higher than wind speeds in winters.

Table 21: Mean Wind Speed Synoptic Hours in Khuzdar

Month	Mean Wind at Synoptic Hours (Knots)		
	00:00	03:00	12:00
January	1.9	1.6	4.6
February	1.9	1.8	5.3
March	2.1	1.8	5.7
April	2.0	1.8	5.8
May	2.0	2.1	6.6
June	1.9	2.0	6.1
July	2.2	2.1	6.4
August	2.0	1.8	5.4
September	1.6	1.3	4.8
October	1.5	1.0	4.2
November	1.0	0.9	3.6
December	1.4	1.2	3.9

5.1.12 Hydrology and Floods

187. In order to estimate the safe yield of water availability at the weir site, it may be concluded that average runoff factor in Zhob and Gomal basin (being adjacent basins) is in the order of 0.10-0.12 (10-12%) and considering average annual rainfall of the catchment as 218 mm based on available Khuzdar rainfall data, it may be concluded that average annual runoff volume at weir site will be about 13.68 MCM (FIS) from rainfall-runoff and 4.78 MCM (PIS) as baseflow which results an average annual estimated availability of 18.46 MCM.

188. Using the rainfall depth for various return periods, its temporal distribution over the catchment areas and on the basis of Synthetic Unit Hydrograph technique, estimation of design discharges has been made at Karkh Irrigation scheme site and is presented in Table 22. The 50-year and 100-year floods at Chutta, Khadri, Acherwand, Sinjori and Nurwah weir sites have been summarized in Table 23.

Table 22: Estimated Peak Discharges of Various Return Period at Karkh

Return Period	Estimated Peak Floods	
(Years)	(ft^3/s)	(m^3/s)
25	16,300	462
50	18,800	532
100	21,400	606

Table 23: Estimated Peak Discharges at Various Weir Locations in Karkh Valley

S. No.	Location	Design Flood (ft^3/s)		Design Flood (m^3/s)	
		Q_{50Y}	Q_{100Y}	Q_{50Y}	Q_{100Y}
1	Wanderi Weir	18,800	21,400	532	606
2	Chutta Weir	18,800	21,400	532	606
3	Khaderi Weir	18,800	21,400	532	606
4	Jhalaro Weir	18,600	21,100	527	597
5	Acherwand Weir	18,300	20,800	518	589
6	Sinjori Weir	17,800	20,200	504	572
7	Nurwah Weir	17,400	19,700	493	558

5.1.13 Water Quality

189. Water samples at weirs were tested and presented in the Table 24. The coordinates of these samples are given in the following table along with laboratory analysis. The analytical methods used for the analysis of these sample are given and can be referred from the Laboratory reports attached Annexure- 7 and Location Map of sampling points are attached as Annexure – 8 of this report

Table 24: River water analysis at Karkh River Development project area

#	Parameter	UoM	Weir – Surface Water						NEQS	WHO
			Chutta	Wandari	Khadri	Jhalaro	Acharwand	Sinjhvari		
		UTM Coordinates	3068483.89 N 318183.44 E	3067656.38 N 318230.36 E	3069147.25 N318735.75 E	3069450.82 N 318965.12 E	3071029.12 N 319626.61 E	3073729.22 N 320874.34 E		
1	Turbidity	NTU	BDL	1	1	BDL	1	BDL	<5	<5
2	TSS	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	<1000	<1000
3	TDS	mg/L	540	542	588	600	1,099	1,050	<1000	<1000
4	pH		7.87	7.89	7.97	7.91	7.87	8.30	6.5-8.5	6.5-8.5
5	Aluminum	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.2	0.2
6	Antimony	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤0.005	0.02
7	Arsenic	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤0.005	0.01
8	Barium	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.7	0.7
9	Boron	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.3	0.3
10	Cadmium	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.003
11	Chromium	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.05	0.05
12	Copper	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	2	2
13	Lead	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.05	0.01
14	Manganese	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.5	0.5
15	Nickel	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.02	0.02
16	Mercury	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	≤ 0.001	0.001
17	Selenium	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.01
17	Zinc	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	5.0	3

BDL: Below Detection Limit

5.1.14 Ambient Air Quality

190. Ambient air in the Project Area, in general, is apparently clean, because no major industrial activity exists in the immediate surroundings of the Project Area and vehicular traffic.

191. Ambient air quality parameter as per site conditions only includes Suspended Particulate Matters was spot monitored for on all seven interventions (Chutta, Wandari, Khadri, Jhalaro, Acharwand, Sinjhvari). Table 25 below shows average 2 hours results. The equipment used for air monitoring is Hazdust EPAM 5000 and test method is USEPA PM10, 2.5 method 201a. The results range from 0 to 15 µg/m3 details are presented in Annexure – 7 of this report.

Table 25: Ambient Air Quality Results (Suspended Particulate Matters)

S. No.	Location	Test Results (µg/Nm^3)	NEQS /WHO(avg. 24 hrs. µg/m^3)
1	Chutta	12	500
2	Wandari	14	500
3	Khadri	15	500
4	Jhalaro	11	500
5	Acharwand	BDL	500
6	Sinjori	4	500

5.1.15 Ambient Noise

192. Under this assignment, ambient noise levels were measured at all seven locations (Chutta, Wandari, Khadri, Jhalaro, Acharwand, Sinjhvari), which range between 32-41 dB(A). This range corresponds to a low-level noise atmosphere of the rural areas, associated with some of vehicular traffic. The details of the analysis are presented in Annexure – 7 of this report.

193. Ambient noise levels were measured and the average 2 hours monitoring results are given as following in Table 26. Noise monitoring was done with a type 1 noise meter.

Table 26: Summarized Results of Noise Monitoring

Sr No.	Location	Noise LeveldB (A)	NEQS/WHO Day Time	NEQS/WHO Night Time
1.	Chutta	38	55	45
2.	Wandari	41	55	45
3.	Khadri	35	55	45
4.	Jhalaro	36.2	55	45
5.	Acharwand	37	55	45
6.	Sinjori	36	55	45

Source: Monitored in the Project Area by Laboratory Team.

194. Sensitive receptors are people or other organisms that may have a significantly increased sensitivity or exposure to contaminants by virtue of their age and health (e.g. schools, day care centers, hospitals, nursing homes), status (e.g. sensitive or endangered species), proximity to the contamination, dwelling construction (e.g. basement), or the facilities they use (e.g. water supply well). The location of sensitive receptors must be identified in order to evaluate the potential impact18. There are no sensitive receptors within the area. The nearest villages around the SubProject are about 3-5 kms away.

Ecological Resources[19,20,21,22]

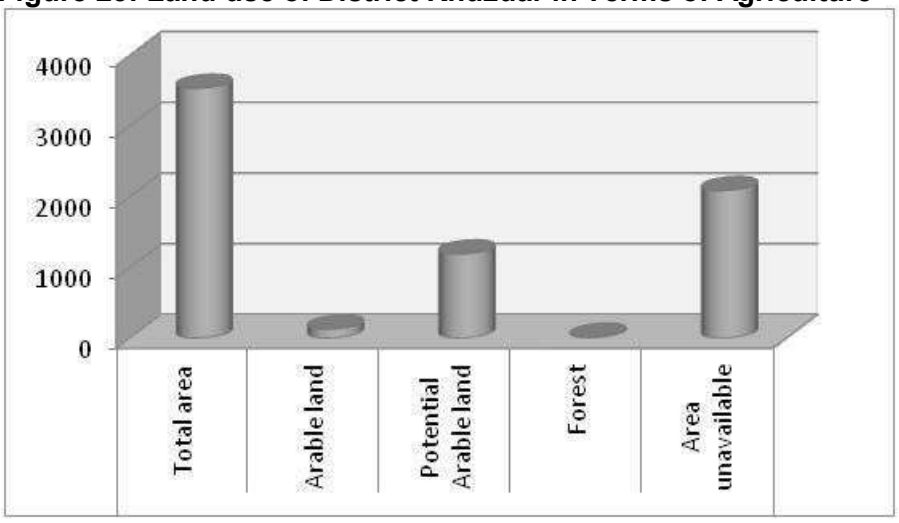
5.1.16 Ecology

195. Khuzdar is recognized as "Dry sub-tropical and temperate semi-evergreen scrub" zone of the province. The region from 7,430 feet above sea level and lower, accommodates a variety of scrub vegetation.

- **Topographic and administrative divide in Khuzdar** (Development profile of Khuzdar-2011)

196. Edaphically they are uphill steep slopes and Foot hills, Piedmont plains and stream beds, represented by a range of floristics and faunal composition. The uphill steep slopes represent a less diverse composition due to limited availability of associated factors supporting to establish an ecosystem; whereas the Piedmont plains and stream beds were seen with more diverse representation.

Figure 23: Land use of District Khuzdar in Terms of Agriculture[23]



- **Landuse pattern in Khuzdar district** (Development profile of Khuzdar-2011)

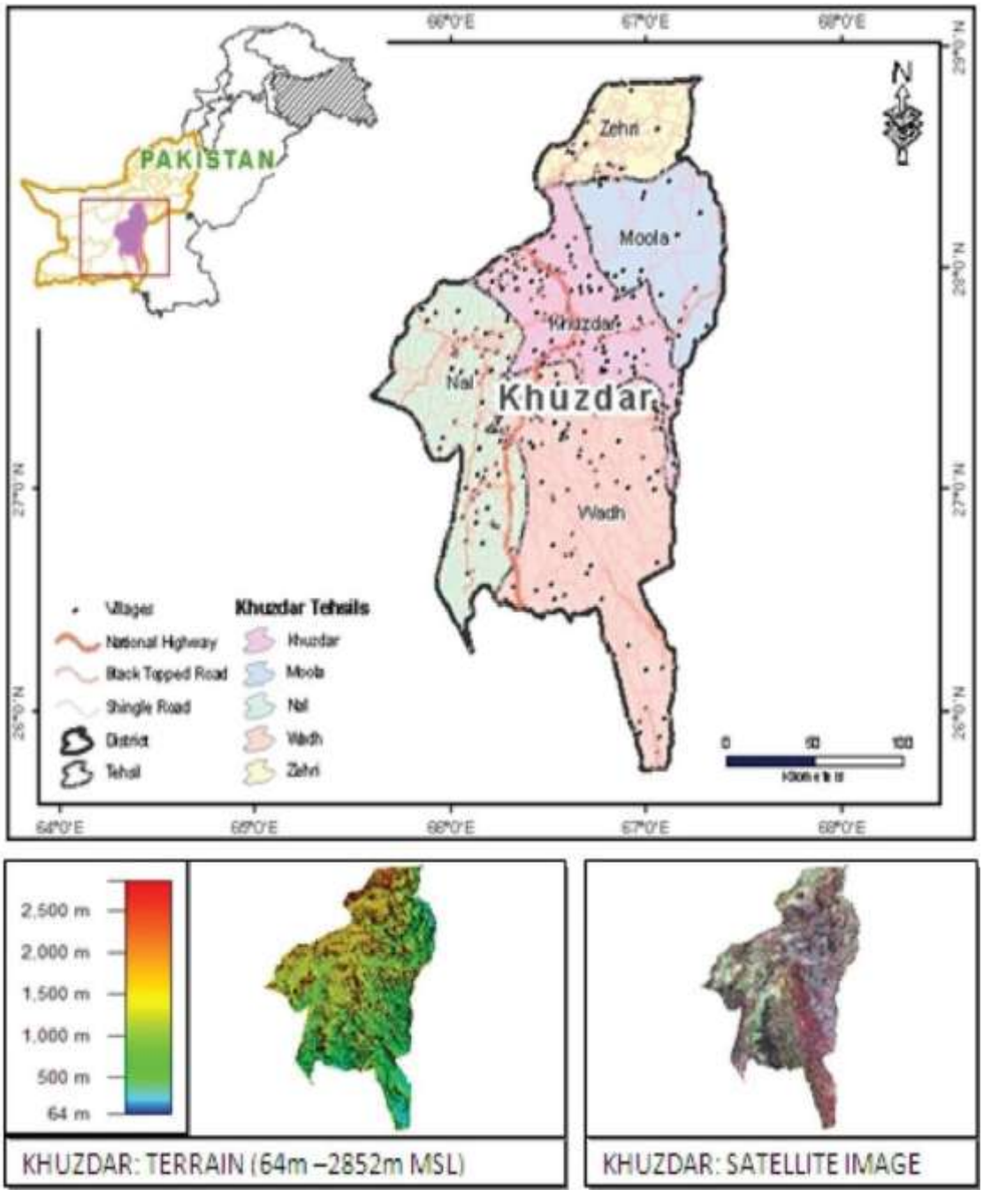
197. Mula tehsil is sparsely populated area, located in the north eastern corner of

[18] http://www.smchealth.org/sites/main/files/file-attachments/651311584receptor_survey.pdf
[19] UNESCO- 2011- Developmental Profile of Khuzdar,
[20] IUCN- 2005- Balochistan Conservation Strategy,
[21] GEF- 2006- Protected areas of Pakistan.
[22] Balochistan Forest and Wildlife Department- Government of Balochistan.

[23] UNESCO- 2011- Developmental Profile of Khuzdar,

198. Khuzdar district, specifically characterized as alpine desert formations, Karakh represents the Piedmont plains and stream beds of Karkh river, which ultimately pours in Mula river, here the stream flows were wisely used for agricultural purpose, though the system has not a reliable flow system to called as obligatory perineal system, it faces stress time in hot weathers and when the natural downpour is inadequate. This has been pretty much reflected by the surrounding vegetation types, with compound leaves, thorny formations and dominated by xeric shrubs. The land use pattern is almost identical to the overall pattern for district, the natural forest representation is minimal and dominated by Kandi, Procopis cinererila and Acacia nilotica, and Tamatix sp. The stream bed has been seen dominated by Typha sp and Cyprus sp.

Figure 24: Administrative Profile of Khuzdar District



199. It has moderately dense forests and a negligible area has been conserved as state forest, overall natural vegetation, including shrubs, bushes and grasses can be aptly termed as rangelands. These rangelands are substantially contributing to the ecological stability of important ecosystems and economic uplift of people in the district.

Table 27: Cumulative Floristic List of Karkh

#	Taxon	Family	Life form	Vernacular name
01	Acacia nilotica	Fabaceae	Tree	Babbur
02	Acacia sengal	Fabaceae	Shrub	Babbur
03	Prosopis cineraria	Fabaceae	Tree	Kandi
04	Prosopis glandulosa	Fabaceae	Shrub	Kandi
05	Prosopis juliflora	Fabaceae	Shrub	Devi
06	Tamarix sultanii	Tamaricaceae	Shrub	Kirri
07	Zizyphus nummularia	Rhamnaceae	Shrub	Ber
08	Aerva javanica	Amarantheaceae	Shrub	Gujo
09	Periploca aphylla	Ascalpidaceae	Shrub	
10	Capparis decidua	Capparidiaceae	Shrub	
11	Haloxylon recurvum	Amarantheaceae	Shrub	
12	Suaeda fruiticosa	Amarantheaceae	Shrub	
13	Suaeda ferinosa	Amarantheaceae	Shrub	
14	Grewia domaine	Malvaceae	Shrub	
15	Alhaji marorum	Fabaceae	Shrub	
16	Salvadora oleoides	Salvadoraceae	Shrub	
17	Salvadora persica	Salvadoraceae	Shrub	
18	Heliotropium sp	Boragenaceae	Shrub	Merin
19	Calligonum polygonoides	Polygonaceae	Shrub	
20	Rhazya stricta,	Apocynaceae	Shrub	
21	Euphorbia caducifolia	Euphorbiaceae	Shrub	
22	Commiphora mukal	Burseraceae	Shrub	Gugul
23	Inula montaine	Asteraceae	Herb	Kulumurak
24	Inula grantoides	Asteraceae	Herb	Kulumurak
25	Grewia tenex	Malvaceae	Shrub	Chill
26	Phoenix dyctylefera	Palmea	Tree	Khajoor
27	Cymbopogon sp	Poaceae	Grass	
28	Cenchrus sp	Poaceae	Grass	
29	Aristida sp	Poaceae	Grass	Nadak
30	Chrysopogon sp	Poaceae	Grass	
31	Sericostoma	Boraginaceae	herb	
32	Typha sp	Typhaceae	Shrub	
33	Convolvulus spinosus	Convulvolaceae	Twiner	
34	Fagonia indica	Zygophyllaceae	Shrub	

#	Taxon	Family	Life form	Vernacular name
35	Salsola sp	Chenopodiaceae	Shrub	

200. The majority of area does offer much of the conducive condition to grow, except for the river beds and its surroundings, one can have the extent of such habitat by looking at the following image;

Karkh

Table 28: Faunal list of Karkh area

#	Taxon	Common name	Life form	Conservation status
01	Gazella bennettii	Chinkara	Mammals	Rare
02	Capra aegagrus	Sindh Wild Goat	Mammals	Occasional
03	Ovis orientalis blanfordi	Urial (Gut)	Mammals	Occasional
04	Vulpes grifithii	Hill fox	Mammals	Occasional
05	Hysrix indica	Porcupine	Mammals	Common
06	Felis libyca	Desert Cat	Mammals	Occasional
07	Hyaena	Striped Hyaena	Mammals	Occasional
08	Vulpes	Desert Fox	Mammals	Occasional
09	Canis aureus	Asiatic Jackal	Mammals	Occasional
10	Canis lupus	Wolf	Mammals	Occasional
11	Hemiechinus auritus megalotis	Hedgehog	Mammals	Common
12	Goluda ellioti	Bush rat	Mammals	Common
13	Lepus capensis	Cape hare	Mammals	Common
14	Chlamydotis undulata	Houbara Bustard	Bird	Migratory
15	Ammoperdix griseogularis	See-see Partridge	Bird	Reported
16	Dupetor flavicollis	Black Bittern	Bird	Reported
17	Aquila heliaca	Imperial Eagle	Bird	Reported
18	Falco peregrinus	Peregrine Falcon	Bird	Reported
19	Pterocles coronatus	Crowned Sandgrouse	Bird	Migratory

#	Taxon	Common name	Life form	Conservation status
20	Falco naumanii	Lesser Kestrel	Bird	Reported
21	Falco concolor	Sooty Falcon	Bird	Reported
22	Pterocles lichtensteini	Close-barred/ Lichtenstein Sandgrouse	Bird	Reported
23	Francolinus pondicerianus	Grey Partridge	Bird	
24	Pseudibis papillosa	Black Ibis	Bird	Reported
25	Corvus ruficollis	Brown-necked Raven	Bird	
26	Varanus griseus knoiecznyi	Indian desert monitor	Reptile	
27	Naja	Indian Cobra	Reptile	Common
28	Ablepharus pannonicus	Easter dwarf skink	Reptile	
29	Eristicophis macmahonii	Leaf nose viper	Reptile	

5.1.17 Protcted areas / National Sanctuaries

201. There were some five areas initially documented in Khuzdar district, however after administrative adjustments, they were left over as follows:

Table 29: Protected Areas in Khuzdar

#	Area & Status	Status	Distance from Karkh River Interventions
1	Kera Dhori 8,094 Wildlife Sanctuary hectares	Khuzdar	51 km away
2	Chorani (19,433) Notified forest hectare)	Khuzdar	88 km away

202. Mula tehsil of Khuzdar district, does not have any of the listed protected sites, neither has any wetlands of national and international importance. Therefore, its ecological sensitivity has been found at lower risk or the proposed project activities do not have any significant impact on the existing natural ecosystem.

203. A combined map showing protected area and project area is given as Annexure 9.

5.2 Economic Development

5.2.1 Land Use and Economic Activities

204. Khuzdar district falls in the dry temperate ecological zone with a total potential agriculture area of 1,195,494 ha (Agriculture Statistics, 2008 – 09) which is about 33.8% of the total area of the district. Land use of district Khuzdar in terms of agriculture is as follows[24]:

Table 30: Land use of District Khuzdar in Terms of Agriculture

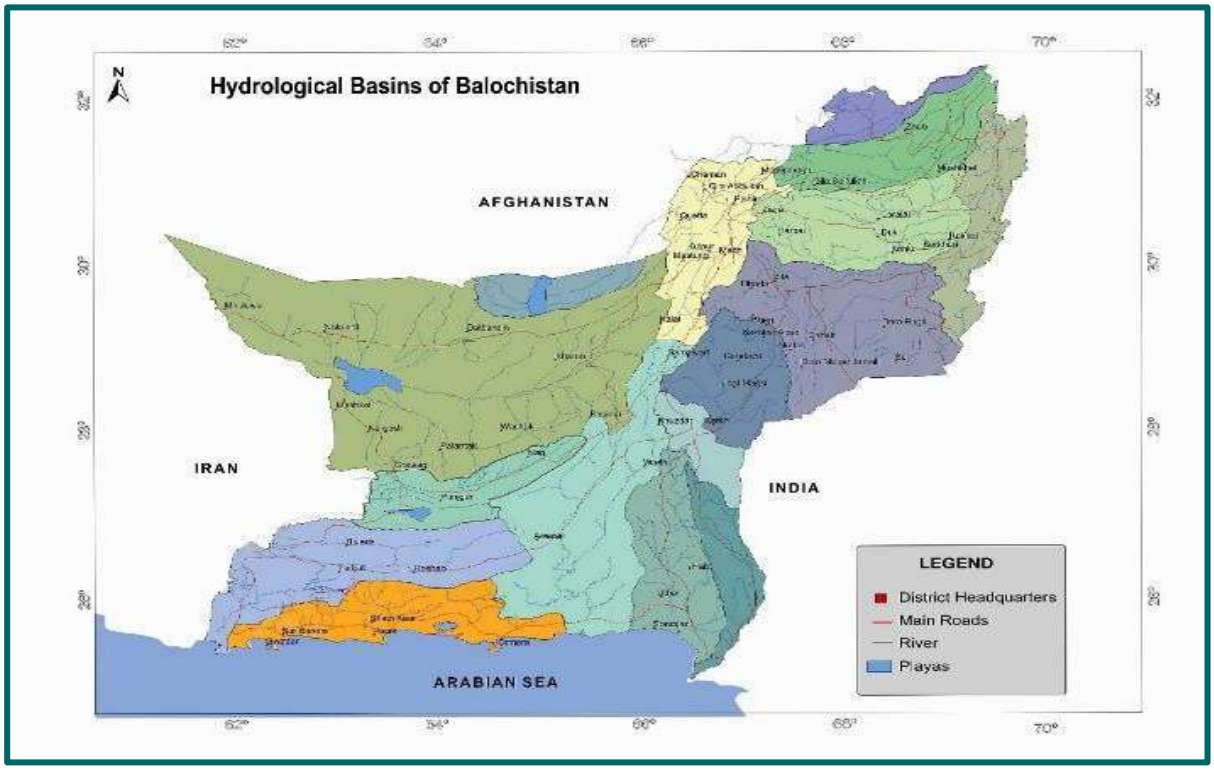
S. No:	Category	Area (Hectares)
1.	Current fallow	55,838
2.	Net sown	76, 211
3.	Arable land	132,049
4.	Culturable waste	1,063,445
5.	Potential area	1,195,494
Source: (Agriculture Statistics 2008-09)		

205. During 2005 to 2009, the current fallow land increased from 35% to 42%, this indicates that more area was made available for cultivation and new sown area decreased from 65% to 58%. In the district major Rabi season crops are wheat followed by fodder. It has been observed that wheat is grown on 81% of the area, while fodder crops occupy 8% of the total area. During Kharif season, mostly vegetables are grown in the district. However, cotton and melon are considered as major crops. Cottons is grown over 23.6% of the area, while melon is own on 15.7% of the total land sown during Kharif season. Among fruit crops pomegranate occupies the top position with a production of 14,505 kg per ha. Other major fruits produced in the district include: almond, apples, apricot, grapes, peach, plum, pistachio dates, citrus, banana, and guava[25].

5.2.2 Settlement Patterns

206. The current population of Balochistan province, of around 10.5 million in 2016, lives in the 18 river basins (See Figure 25) and is largely rural.

Figure 25: Major River Basins of Balochistan



[24] Planning & Development Department, Government of Balochistan – UNICEF, "District Development Profile 2011", Khuzdar,
[25] Ibid, et el.

5.2.3 Agriculture and Irrigation

- **Karkh River Development subproject area**

207. Karkh is located in the east of Khuzdar town at a distance of the 72 Km. Unlike Khuzdar town, ecologically the area falls in the Hot Arid Lowland Plain. Since irrigated water through construction of Perennial Irrigation Schemes (PIS) has been made available in the Karkh, therefore, the general cropping pattern in such area with proportion include:

Table 31: General cropping pattern at Karkh area[26]

Crop	Cropping area (approx.)
Wheat – Barley	44%,
Oilseeds	5%,
Fodder	8%,
Vegetable	5%,
Cotton	9%
Rice	5%,
Fruits	4%,
Sorghum	5%
Onion	15%.

208. In Karkh river area, crops are cultivated both during Rabi season as well as during Kharif. During Rabi, the crops grown include: wheat, cauliflower, onion, tomatoes, while during Kharif following crops are sown: Onion, tomatoes, cucumber, water melon, melon, rice, cotton. In addition to the field crops, the farmers in the communities also have grown horticulture/fruit crops. Fruit crops grown in the area included: mangoes, grapes, apple, pomegranate, pistachio date palm, chiko, orange, banana and guava. The ratio between field and horticulture crops ranges from 90:10 to 80:20 in the entire area of Karkh. The major reason for the low horticulture crop production is the lack of knowledge/information and technical knowhow on the horticulture crop production. Besides, the communities informed that availability of good varieties of seedling of trees is also a major issue in promotion of horticulture crop production in the area. In the past that is before the construction of irrigation weirs/perennial irrigation schemes, the farmers in the communities used to divert water from river through kutcha/earthen dikes/bunds. However, these structures did not have enough strength to face the high intensity flood during the monsoon and spring season. Most often these structures were breached, which not only deprived the farmers from precious flood water but also damaged/eroded the valuable agriculture land.

[26] UNESCO- 2011- Developmental Profile of Khuzdar,

- **Resource Base for Agriculture in Karkh area**

a. Land:

209. At present only about 2000 ha (1000 acres) is being cultivated in the Karkh area. All of this cultivated area is perennially irrigated through the PIS. Besides, this 2000 ha (1000 acres) under-cultivation, an additional area of 250 ha (6000 acres) of land in the shape of cultivable wasteland is still available, which can be developed for crop production if water resources for irrigation are made available. Irrigated agriculture over 2000 ha (1000 acres) has played a very important role in providing the livelihood opportunities to the resident community members of Karkh valley. Agriculture is thus playing a pivotal role in the local economy of Karkh area. Majority of the population living in the area is dependent upon agriculture and related disciplines for their livelihoods. Bringing another 250 ha (600 acres) would further help in increasing the agriculture crop production in the area and providing extra income earning opportunities to the population of the area.

b. Water:

210. The major water resource in the Karkh area is the water diverted through construction of diversion weirs under the PIS. The level of water flowing in the Mula river as sub-surface flow has been raised through construction of diversion weirs and diverted for crop production. A total of 6-weirs namely: Wandri PIS, Chutta PIS, Kadari PIS, Jhalaro PIS, Acherwand PIS and Sinjori PIS, have been constructed under the PIS, the detail of which has been mentioned in Table – 1.

211. These diversion weirs have been placed strategically in the Mula River at suitable distances. From each of these diversion Weirs a channel takes water to the cropland, where it is distributed through an established traditional system. All these water channels, emanating from these PIS, put together supplies water for cultivable command area of 2,250 ha. Here it is important to mention that the water secured and diverted through these diversion weirs from the Mula River is available 24 hours for crop irrigation. During monsoon season i.e. from July to August/September, water level in the river rises, making extra water available for crop production during this season. This allows farmers of the community for brining extra land under cultivation that helps in increasing the agriculture crop production in the area. However, from March to June/July, the water level decreases in the river, which affects irrigation of crops and therefore production is low. Water distribution is managed by the Farmers Organization. The communities have a traditional system of water distribution in place, which is just managed by the members of Farmer Organization. The disputes/conflicts that may arise on water distribution or related matters are also resolved by the Farmer Organization through traditional norms.

c. Land Tenure System:

212. Following tribes are resident of the area: Mosiyanini, Akhund, Chutta, Notani, Mengal, Jamot, Chandia, Rind and Jathak. In Karkh Brahvi and Sindhi languages are spoken by the resident community members. Agriculture land is mostly cultivated by the owners;

however, the tenancy is also prevalent. Three main types of tenancy arrangements, viz: owner operators, tenants and owner-cum-tenants are prevalent in the Karkh area of Mula River. However, it was observed that majority of the cases it was mostly the owner operators who cultivate their lands themselves. Like other areas of district Khuzdar, the tenants are of three kinds viz: occupancy tenants, who have permanent and hereditary occupancy rights, tenants- at-will are without any permanent rights and can be ejected at any time from the land they cultivate, contractors who lease the land from owners on fixed cash rent for a fixed period. The owner-cum-tenants are usually small farmers who in addition to cultivating their own land, take land on share basis from other owners in the area.

d. Level of Technology and Productivity:

213. In the Karkh area of Mula River, the farmers in the communities after the construction of Diversion Weirs through PIS have started a progressive increase in the use of various components of improved production technologies such as improved varieties, fertilizer, pesticides and farm machinery, has occurred over the years. This has resulted in a substantial increase in productivity and total production of major field and horticultural

crops. However, there are a number of gaps which, if filled, can lead to a further sustainable growth in productivity. Such gaps are attributable to non-availability of appropriate technology/input, farmers' ignorance of the modern technology, farmers' inability to adopt technology because of lack of resources or simply due to an indifferent attitude of the farmers. Major technology gaps that were observed are as follows:

- Farmers in the Karak area have adopted the use of improved varieties of wheat and other crops under irrigated condition. However, the changeover is not being adequately supported through a regular supply of quality/certified seed to ensure a reasonable rate of replacement.
- The use of fertiliser has consistently increased, concentrated more on irrigated high value crops. However, it was observed that the use is still far below the recommended doze and is highly imbalanced. Thus, the production potential of this known technology has not been fully realised, particularly under irrigated crop production.
- Although Karak area has now been connected with Khuzdar and Shahdad Kot towns through Khuzdar – Ratho Dairo Road, still the availability of fertiliser and other farm inputs is still a problem. Furthermore, technical advice for soil nutrition management, based on soil analysis, is not available. Here it is pertinent to mention that a Soil Analysis Laboratory has been established in the Agriculture Office Khuzdar, which can provide valuable services to the community farmers on soil nutrition management.
- The ratio of orchard to field crops is very low. Community farmers are gradually getting inclined towards planting fruit trees, however, this shift of cropping from field to orchards is very slow. This can be boosted up through the availability of quality plants of recommended varieties. Similarly improving some vital management practices such as

pruning, and training of trees, irrigation and plant nutrition management can also help in promoting horticultural crops in the area. Major deficiencies in this context are adapted

varieties, quality seed, and pest and disease control.

- Technological support, from public sector institutions, for shift towards high value crops (e.g. horticulture and floriculture), is lacking. This is adversely affecting the overall agriculture crop production in the area.
- Apart from ecological constraints, productivity of irrigated farming system is low due to lack of improved technologies for on farm water management, moisture conservation and crop production management.
- The harvest and post-harvest management in both field as well as horticultural crops is still mostly traditional and due to this very reason, a sizeable portion of field and horticultural products are wasted. It was observed that due to lack of knowhow among community farmers, major lapses occur during harvest, grading, packing, on-farm storage, transportation and marketing.
- Community farmers have though adopted the pesticide sprays for the control of insect pests and diseases in orchards and vegetables, the effectiveness is constrained by the relevance and quality of material available in the market and by the total lack of any advisory service on the timing and quantity of spray based on pest assessment.
- Although community farmers in Karkh area are using farm machinery to bring efficiency and productivity to the farm, still information on appropriate use in relevance to soil conditions and cropping system is totally lacking. This improper use of machinery is hampering the production of agriculture crops.
- In Karkh area, where the PIS have been implemented, agriculture land is located on both sides of the Mula River. During monsoon and spring season, when high floods occur, the agriculture lands located along the river banks is eroded, which leads to reduction in the land area. A strong need has been felt for construction of protection bund/gabion structure to protect valuable agriculture land from erosion.

❑ Karkh River Development subproject area

a. Existing and Projected Agriculture

214. At present, there is fair agricultural productivity is in the subproject. The existing cropped area is 2,000 ha with 89% cropping intensity followed by annual cropping pattern wheat – Kharif vegetables – melon – fodder.

215. The projection of agriculture for the subproject has been made keeping in view the current irrigated cropped area, cropping intensity, yield and production in the subproject through findings of the agronomic field survey in and around the subproject area. Development in the subproject area will enrich the cropped area from 2,000 ha to 2,250 ha and the cropping intensity will be enhanced from 89% to 120%. The detailed existing and proposed / projected agriculture analysis and gross irrigation requirement area are given in Annexure – 10.

b. Irrigation Water Right

216. They have equal water rights without any confliction in terms of water distribution /

rights. The available water is being diverted to cultivated land / field as per land capacity / farm size according to the time division rule and they ensured that they will follow this current rule of water distribution / right in the future as well.

c. Proposed Agricultural Development

217. It is expected that the cropping intensity would be completed within 2 to 3 years after commencement of the project. The cropping pattern will be change with high yield and profitable crops. Efficient crop management can increase the profits of local farmers and decrease their costs involved in fruit production.

5.2.4 Proposed agricultural development

218. It is expected that the design cropping intensity 120 percent would be completed within three years after commencement the project. The cropping pattern will be change with high yield and profitable crops such as cotton.

5.2.5 Livestock[27]

219. Livestock census of 2006 has data for 26 districts as districts like Washuk. Nushki, Harnai and Sherani were part of other districts. General categories of livestock for which data was collected comprised cattle, buffalo, sheep, goat, camel, horses, mules, asses and poultry. Situation of Khuzdar is ranked (based on sorting order largest to the smallest) below among the then 26 districts. In total livestock population ranking, Khuzdar district has the largest population.

Table 32: Livestock Population

Livestock Category	Cattle	Buffalo	Sheep	Goats	Camel	Horse	Mule	Asses	Poultry
Khuzdar District Ran	10	7	4	1	6	14	8	3	4

220. The above ranking shows that in case of small ruminants, Khuzdar large population as compared to other districts while in case of large ruminants too population is substantial. Area wise Khuzdar is second largest district and human population wise it ranks third largest (among 30 districts) while population density per square kilometer in only 15 (on project population, 2010).

221. District Khuzdar has enormous potential in livestock sector which provides livelihood to many poor families. The areas of Nal, Zehri, Wadh and Moola are suitable for livestock development, especially for raising cattle, as fodder grows in large quantity in these areas. The nomadic population depends on livestock. Livestock farming is a traditional activity in the district and comprises mostly Goats, Sheep, Cows, Buffaloes, Cattle, Camels and Asses. Goat constitutes the major portion of the livestock population in District Khuzdar.

222. Livestock Department, headed by the Deputy Director along with its staff, manages and controls all the activities pertaining to livestock including animal health coverage and husbandry. Vaccination is being carried out free of cost whereas the treatment is provided at 50% subsidized rates.

5.2.6 Power

223. Electricity at subproject areas is supplied by Quetta Electric Supply Company (QESCO). Quetta Electric Supply Company (QESCO) is a Public Limited Utility Company, established in 1998 under Companies Ordinance 1984 and is responsible for distribution of Electric Power to the entire province of Baluchistan excluding Lasbela district under a Distribution Electric Power within its territorial jurisdiction and presently serving approximately over 0.5 Million Customers (Domestic, Commercial, Agricultural, Industrial and others) in the thirty districts of Balochistan province.

224. Recently QESCO has undertaken the ADB's power distribution enhancement investment project PDEIP Tranche III to enhance the capacity of its power distribution system. This project covers construction work of two 2 Nos. of new double circuit 132KV Transmission line in jurisdiction of Quetta Electric Supply Company (QESCO) across 08 Districts of Balochistan i.e. Quetta, Mastung Khuzdar, Kalat, Loralai, Qila saifullah, Muslim Bagh, and Pashin districts.[28]

5.2.7 Water Supply Service

225. The task of water supply and sanitation at the subproject area lies with the Public Health Engineering (PHE) department for domestic uses. The residents of Khuzdar city have protested against the shortage of water supply by the PHE department29. Alternately the residents of subproject area use the canal water supply for their daily chores. No incidents of gestro-intestinal diseases have been reported during discussions with the community.

5.2.8 Transport

226. The subproject areas are well connected to surrounding cities of Balochistan and Sindh. The RCD highway connects Khuzdar to Karkh area with a travel time of 1.5 and 4 hours respectively. The Khuzdar – Shahdadkot Road (M-8, 58 Km long Project) is also widely used by traders and agriculturist of Karkh area to transport their produce to market at Shahdadkot.

[27] Planning & Development Department, Government of Balochistan – UNICEF, "District Development Profile 2011", Khuzdar,

5.3 Social and Cultural Resources

5.3.1 Population and Community Structures

227. The current population of Balochistan province, of around 10.5 million in 2016, lives in the 18 river basins and is largely rural.

228. Altogether residents of 5 villages would be part of the subproject. As Acherwand and Sinjori are two mouzas having same beneficiaries which are resident in Nokjo village. The land and water rights belong to different tribes resident in five villages including Akhundani, Karela, Chutta Botani, Chandio, Rind, Sasoli, Jamot.

229. About 1200 Households were reported in the whole subproject area will be benefited from the subproject, the detail of which is shown in Table 33.

Table 33: Demography of Karakh River Subproject Area[30]

No.	Village Name	Estimated No of Households
1	Wandri	256
2	Chutta	130
3	Khadri	259
4	Jhalaro	325
5	Nokjo (Sinjori, Acherwand)	230
	Total	1200

5.3.2 Involuntary Resettlement and Indigenous People

230. No involuntary resettlement and indigenous people issue is anticipated on the subproject.

5.3.3 Community Consultation

231. The community was very much willing to participate in the subproject development. While no dispute was reported on land and water rights.

232. The demand of beneficiaries of five subprojects already constructed was repair in the weirs headwork, repair in the lined channels, lining of new channels for new command areas, protection bunds for command areas of each subproject. While the beneficiaries of the new subproject Jhalaro demanded for construction of new headwork, lining of channel up to last command areas and protection bund for the command area.

[28] http://www.qesco.com.pk/PDF/EMReport%20T-3.pdf
[29] https://www.dawn.com/news/1298685
[30] Social Survey Report TCI

5.3.4 Land Availability, Ownership Land Tenure

233. The land rights are equitable and all residents of five villages have share in land. The land of all six subprojects is reported in the cadastral record. While nearly all land in each subproject have been distributed by the shareholders after the construction of subprojects in 2001. While Jhalaro subproject is new subproject and lot of land is available for expansion, which would be distributed after development. The cultivated land reported and observed in all six subprojects altogether is about 2000 Ha, while the expandable land is about 250 Ha. Flood irrigation is not practiced in all of the six subprojects.

5.3.5 Water Rights, Allocation of Water and Warabandi

234. The source of all six Subprojects is the Karkh River water. While out of six, five subprojects were constructed by GoB under BCIAP project funded by World Bank in 2001 and water is diverted through five weirs built in series. While one of the subprojects Jhalaro is completely a new subproject and water is diverted by kacha traditional diversion bund. The water rights in all of the six subprojects are equitable and well established.

235. The water rights of the water source are of the Sardar family having about 4-6 shareholders.

5.3.6 Education

236. Primary schools both government and private run are well established in the subproject area in Karkh as well as Moola Tehsil.

237. Chutta, Jhalaro and Hatachi are largely populated areas and have primary as well as secondary schools. There are degree colleges separate for boys (2Nos) and girls (1Nos.) at Khuzdar that are affiliated with the Balochistan Board of Intermediate & Secondary Education (BBISE).

238. Religious schools (or Madersas) are also well established in the subproject areas and Madersa Darul Toheed at Jhalaro Karkh is one the largest among them. There are several other madersa also in the surrounding areas such as Wadh and Naal etc.

5.3.7 Health[31]

239. The highly subsidized public healthcare system is the major provider of curative and preventive care services to the local population. The health facility infrastructure includes: 1 Hospital, 6 Rural Health Centers (RHCs), 34 Basic Health Units (BHUs), 31 Civil Dispensaries (CDs), 1 Maternal & Child Health Center (MCHC) and 1 TB Clinic. There are 190 beds, out of which 100 are situated in RHCs. Apart from these health facilities, there are two leprosy clinics and two private hospitals with 30 beds.

- National Program for Family Planning & Primary Health Care
- National Maternal, Newborn and Child Health (MNCH) Program

[31] Planning & Development Department, Government of Balochistan – UNICEF, “District Development Profile 2011”, Khuzdar,

240. Special Health Programs and Initiatives currently being carried out in the Khuzdar district are:

- Expanded Program on Immunization (EPI)
- TB Control Program
- Malaria Control Program
- Hepatitis Prevention Control Program
- AIDS Control Program

5.3.8 Cultural Heritage[32]

241. The central position of Khuzdar, at the point of convergence of roads from Multan (via the Mula pass), Makran and Kandhar (province of Afghanistan), made it a very important place for the Arabs invading India; also, its moderate climate made the locality attractive and acceptable for the Arabs. In the Arab Tenure, Khuzdar was protected by a small fortress, which was probably on the peak overlooking the valley; is now known as Biradari (Shahi Bagh).

242. Therefore, the Arabs made frequent attacks upon Khuzdar and in 664 AD, in the caliphate of Muawiya, Al-Manzar, son of Al-Jarud-al-Abdi, was appointed to the frontiers of India after conquering Nukan and Kikan, captured Khuzdar. Al-Manzar is said to have died here. During the caliphate of Al-Mutasimbillah (833-41 AD), Umar, who was nominated as the governor of Sindh, transferred the inhabitants of Kandabel (Gandava) to Khuzdar.

243. In 976 AD, Khuzdar was governed by an Arab named Muin bin Ahmed. A year after, Amir Nasir-ud-din Subuktegin commenced series of invasion on India and conquered Khuzdar but its possession was restored to the previous rulers through a treaty. The treaty stipulated that immediately a sum of money must be paid and that the ruler would thereafter send a tribute every year. Subuktegin again attacked the wayward ruler. During the days of Mahmud Ghaznivi, the rulers of Khuzdar again became disaffected and withheld the tribute. Mahmud Ghaznavi marched to Khuzdar and it was indeed owing to Mahmud's possession of Khuzdar that his subsequent conquests in Sindh were largely effective. Khuzdar was included in Mahmud's territory in 1031 AD.

244. With the downfall of the Ghaznivids, Khuzdar passed to the Ghorids and then to Nasir- ud-din Kabacha. In 1225 AD, Khuzdar was given to Shamsuddin Altamash. Afterwards, the country appears to have passed sovereignty to the Mughals. In 1590 AD, Abdul Fazal speaks of the Zehri section of the Baloch tribe. Decline of Mughal power was followed by the rise of the Brahvis to a position of greater or lesser independence. During the reign of Mir Mahmud Khan, Pottinger visited Jhalawan in 1810 AD, travelled to Kalat via Bela and Khuzdar. He described Khuzdar as

[32] Planning & Development Department, Government of Balochistan – UNICEF, “District Development Profile 2011”, Khuzdar,

a small town not having more than 500 houses. The mud-fort in Khuzdar was built by Khan Khuda Dad Khan in 1870, during a war with Jams of Lasbela.

245. In 1903, British Government appointed a political agent at Khuzdar to carry out administrative affairs of the government. This administrative system continued till partition of India. Before March 1974, Khuzdar was a sub-division of Kalat District.

246. A number of mounds of archaeological interest have also been found in Khuzdar. The most important one is Meri Bhar or Palace Mound. It is believed to be the seat of last Mongol governor of Khuzdar, Malik Chap, who was killed by Kurd inhabitants of Khuzdar. The "Shahi Bagh" at Khuzdar gives an indication of its importance and condition in ancient times. Many old dams and tombs are scattered throughout the district. A beautiful mosque, symbol of modern Islamic architecture on the RCD highway in Khuzdar, attracts many people.

247. Any site of cultural or historical importance were not seen in the project areas.

5.4 Stakeholder Consultation

248. In the consultation process for IEE, following key stakeholders were consulted:

- Irrigation Dept.
- Local communities, Men and village elders attended meetings.
- IUCN
- landlord and their representatives
- BRSP

249. Meetings with stakeholders consisted of community consultation meetings, focus group discussions, and in-depth interviews and discussions with landlords and their representatives. The location of the meetings, the process followed, and the outcomes are discussed in this section. The list of the villages where public consultation was carried out is given in Annexure – 11 while the photographs of consultations are included as Annexure - 12.

250. The summary of the various stakeholder consultations is given below.

251. The consultations were considered a good gesture and appreciated, especially by the landowners and locals of the project Karakh rivers interventions. The Consultants probed about the anticipated irrigation problems from the local community and presented the proposed project interventions as a solution to their problems. The local community perceived that the proposed project would improve their financial well-being to a great extent because 80% people job associated with Agriculture work. They emphasized that local villagers should be given priority when employing people for various project-related works and activities according to their skills because non-Local work force coming in the project area that will not be aware of the local customs and norms, may result in conflicts with the

[28] The subproject specific gender issues are to be discussed in PSA/Gender Disaggregated Socio-Economic Baseline report.

local community, keeping in mind the sensitive law and order situation and culture of the area. Local also expressed some fear that vehicles would disturb their cattle and that their livestock might get hurt or run away or die accidental death due to vehicular (heavy machines) movement. No reservations for proposed project interventions shown by the community during focused group discussions.

252. During a meeting with Syed Perveiz Bukhari, Chief Engineer of the Irrigation Department, Government of Balochistan presented the project background information. The consultants probed the justification of the project and conditions on the ground. The Chief Engineer was very positive that the project would have a positive impact on the community of the subproject areas. The consultants asked if the BIPD held discussions with the community regarding their issues and how the BIPD can facilitate to resolve their issues. The Chief Engineer informed that he and his department were constantly in contact with the community and the proposed design is based on informal meetings and discussions with the local community.

253. The consultations with Balochistan Rural Support Program (BRSP) were considered a good gesture and appreciated. They informed the consultants of successful work done by BRSP. The consultants briefed the BRSP team of the project interventions. BRSP expressed views on the positive impact the project may have on the local people and BRSP's role on agriculture extension in the project area. BRSP advocated synergistic approach as implementing partner for the sustainability of proposed interventions and wellbeing for the villagers. The consultants probed the functions of BRSP in the region and its past progress. This was done to find possible solutions of getting BRSP involved in the project at a later stage in the form of educating agriculturists of the area. Suggestions of CEO were duly noted and are presented in the conclusion and recommendations chapter.

254. A meeting was held with Mr. Naseeb ullah Khan at IUCN- Pakistan, Balochistan Program office Quetta. The Project was briefed by the team with the help of maps. IUCN shared its input and endorsed the need of the projects in Balochistan while focusing on improving water efficiency. IUCN shared its sensitivities about the protected areas and threaten species. During the consultation it was revealed that no protected areas and no threaten species are reported in the Project area.

255. A meeting was held with Mr. Iqbal Zehri, Conservator, Balochistan Forest and Wildlife Department, Khuzdar, at his residence at Khuzdar. He confirmed about no protected sites of ecological importance in and around the project areas, Mr. Zehri was of the opinion that the project will contribute to the wellbeing of the community as well as ecology. He proposed that if any tree is fallen, some additional trees should be planted to compensate its effect. The type and number would be finalized by Balochistan Environmental Protection Agency in consultation with Balochistan Forest and Wildlife Department at the time of IEE approval.

256. Project area was visited during November 10-13, 2019 and following stakeholders were consulted. Most of the findings were same, new one were followings

- Fugitive dust should be minimized by sprinkling of water during construction.
- In Chutta Weir and Irrigation Scheme- Construction of washing / community structures are required as the channel passed through the village / populated area.
- Least disturbance should be done to the population, settlements and residential houses in vicinity of Project area
- As proposed by TA Consultants, flood protection bund on left side from Road Bridge to river bend to protect Nurwah canal is already constructed under other development programme. No other flood protection bund is required on Nurwah scheme as discussed with FO.
- Project is beneficial as long as water availability is ensured
- During rainfall period, nullahs/drains intersecting the main Canal alignment carry flash floods from hill torrents. Flood protection structures should be provided along the Canal.
- Construction activities should confine within the RoW of the Canal to minimize disturbance to wildlife
- Cropping intensity of the command area will be increased with the use of river water.
- Vegetation cover and planation are expected to be increased in Project Area during operation phase of this scheme
- Proposed Project should be constructed on fast track basis.
- Project is well deserved for the command area, as the water quality and water shortage is the main bar for the development of the area.

5.5 Additional Consultations

257. Public consultations included meetings and interviews with the local residents, farmers, women and other stakeholders. The consultation was carried out in accordance with the requirements of ADB's SPS 2009 and its outcome is discussed in the proceeding sections. Consultations were also held with the PMO, BID and the design teams. The schedule of consultation meetings is given in below Table

List of Participants Contacted During Public Consultations

Town : Karkh				
Sr. No.	**Date**	**Venue**	**Name**	**Occupation**
1	O7-09-2020	Public Place	Ghulam Nabi	Farming /Livestock
2			Muhammad Hanif	Farming /Livestock
3			Abdul Hakim	Farming /Livestock
4			Ali Hussan	Farming /Livestock
6			Muhammad Arib	Farming /Livestock
7			Haji Ghulam Rasool	Farming /Livestock
8			Rehamatullah	Farming /Livestock
9			Sajjad Kareem	Farming /Livestock
10			Zahoor Kareem	Farming /Livestock
11			Attahullah	Farming /Livestock
12			Abdul Sattar	Farming /Livestock
13			Abdul Samad	Farming /Livestock
14			Zafrullah	Farming /Livestock
15			Ali Muhammad	Lbour

Village: Chutta				
1	07-09-2020	Residence Mr. Abdul Satta	Abdul Satta	Farming
2			Abdul Aziz	Farming
3			Naseer Ahmed	Labour
4			Zahoor Ahmed	Labour
5			Muhammad Raheem	Labour
6			Muhammad Ishaq	Labour
7			Haji Ahmad	Farming
8			Zain-ul-Abdin	Student
9			Muhammad Musa	Farming
10			Nadir	Farming
11			Qutab-ud-In	Shopkeeper/Farming
12			Mumtaz Ahmed	Farming
13			Abdul Sattar	Farming
14			Moula Bakhsh	Farming
15			Abdul Shakoor	Farming
16			Ghazi Khan	Farming
17			Nizam Din	Farming
18			Egaz Ahmed	Faming
19			Muhammad Asif	Student
20			Ghulam Sarwar	Farming
21			Muhammad Ramzan	Labour
22			Fazal-ur-Rehaman	Farming
23			Muhammad Rafique	Farming
24			Waqar Ahmed	Student
Village: Jhalaro				
1	08-09-2020	Residence Mr. Rustam Rindh	Mir. Rustam Rindh	Farming
2			Khursheed Ahmed	Farming
3			M. Akbar	Farming
4			Misri Khan	Farming
5			Saifullah	Farming
6			Muhammad Ayoub	Farming
7			Somar Khan	Farming
8			Nasrullah	Farming
9			Muhammad Nawaz	Farming
10			Javed Ahmed	Government Service
11			Muhammad Amir	Students
12			Aziz ullah	Government Job
Village: Nokajai				
1	08-09-2020	Residence Pervaiz Ahmed	Muhammad Sadiq	Government Service
2			Pervaiz Ahmed	Farming
3			Yaar Muhammad	Farming
4			Ali Khan	Farming
5			Kareem Bakhsh	Farming
6			Muhammad Akhtar	Farming
7			Shafqat Ali	Students
8			Muhammad Ashraf Jamal	Farming
9			Ghulam Hussain	Students
10			Sohrab Khan	Students
11			Dur Muhammmad	Teacher
12			Faisal Khan	Students
13			Maqbool Ahmed	Government Service
Village: Sun Chako				

1	08-09-2020	Residence Abdul Sammad	Hidyat ullah	Faming
2			Haji Abdul Fateh	Farming
3			Muhammad Ishaq	Lahoure
4			Zaiullah	Farming
5			Irfan Ali	Labour
6			Warand Khan	Labour
7			Mujeeb ullah	Faming
8			Faiz Ahmed	Labour
9			Qurban	Labour
10			Ali Gul	Ali Gul
11			Shabir Ahmed	Driver
12			Deedar Ali	Driver
13			Muhammad Anwar	Imam Mosque
14			Rehamat Khan	Farming

❑ Scope of Consultations

258. Discussions and consultations on Environment & social safeguard aspects of project were held with the local residents, farmers and women in the close proximity of the project site, PMO and design consultants during the month of September 2020. During the consultations, participants were requested to express their concerns with the proposed rehabilitation of Karkh Valley Development Scheme and suggestions or measures that can address potential consequences and enhance project benefits.

259. The project stakeholders include the local community, farmers, general public and women. Accordingly, the consultations/ focus group discussion was held with them to provide information about the proposed project activities and expected impacts and their concerns. Other key stakeholders include representatives of Government departments/ agencies involved in the planning, design, implementation and operation of the project, which includes PMO / PIO, On Farm Water Management (OFWM), Irrigation Department etc.

❑ General Response and Findings

- During the consultation meetings, participants were informed about the rehabilitation of the Karkh Valley Development Scheme and they considered it as positive step for the development of the agriculture in the area;
- The participants of the consultation showed concern that any damages to standing crops should be avoided during the construction activities;
- At the maximum extent, local labour should be engaged/ employed in the project related activities;
- The access to the agriculture fields of the local farmers should not be blocked during construction;
- During construction labour force movement should be controlled so that activities of the local population are not disturbed;
- The participants/representatives also stressed the need for timely completion of the project;

- Home privacy and routine activities especially of women should not be disturbed due to construction of work; and
- Project facilities should be located outside the existing residential areas. In order to avoid restricting the daily movement of the local community, construction vehicles should remain confined within their designated areas of movement.
- The movement of the labour force of the contractor should be confined within the project boundary so that the disturbance to the surrounding stakeholders is minimal;
- Regular sprinkling of water should be carried out to control the dust emissions during construction;
- Contractor's activities should be confined to avoid the public inconvenience; and

5.6 GENDER CONSULTATIONS

260. It is believed that an economic growth, poverty reduction, human development, including population planning and sound management of natural resources and the environment cannot be fully achieved without increased investments in women and greater attention in their needs, concerns and contribution. Investing in health and education of females not only results in positive returns to women themselves, but return to the society is even larger and last for generations.

261. The project has included women through its gender mainstreaming strategy rather than relying entirely on implementation of gender targeted interventions. Mainstreaming will ensure inclusion of females in the project process, particularly in scheme awareness campaigns and similar activities for implementation of Gender Action Plan (GAP) for all three out puts of the Project.

262. The project provides support the formation of formal and informal women's groups (WGs) to represent female beneficiaries. WGs will be responsible for: (a) giving input to PMO/PIO BWRDP on infrastructure design particularly location of social structures such as washing points and animal drinking troughs; and (b) acting as an agent for basic health and hygiene training, participation in income generation activities and Grievance Redress Committees GRCs.

❑ Objectives of Gender Consultations

263. Provide a brief of Gender Interventions (Output-I-II-III from Gender Action Plan). Conduct needs assessment to determine the communities' choices of domestic water supply location, washing facilities, water collection points, and other like facilities.

- Create awareness among the women about gender activities provided in the GAP and ensure their participation;
- Identification of potential female activists in the project catchment areas to harmonize with the project initiatives;
- Assessment of opportunities to develop and implement gender specific intervention in the project ;
- Create awareness among women about the subprojects and it components and involvement and role of the local women in the activities related to the women development proposed in the project;

- Conduct needs assessment to determine the communities' choices of domestic water supply location, washing facilities, water collection points and other like facilities;
- Role of women in income generation activities and decision making (Agriculture, Livestock raring and any other);
- Need Assessment related to skill trainings;
- Assessment of gender issues and in the subprojects areas; and
- Gender concerns related to the subprojects and suggestions to get maximum benefits from the project.

❑ Process of Gender Consultation

264. According to Asian Development Policies and procedures, consultation process must be gender inclusive and responsive and tailored to the needs of disadvantageous and vulnerable groups. To explore the gender related issues, female mobilizers from the local areas were included in the team. Formal and informal meetings with the women were held to explore their needs, problems and priorities related to the project execution.

❑ Gender Consultation in Karkh Valley Development Scheme

265. Parallel with the meeting with male community, consultations were also held with females of the project area to achieve the objectives of the field visit the detail has provided in the following sub-section of the report.

266. In order to mobilize the women for the participation in the project activities; consultations were conducted in the five different locations in the project area of Karakh valley. In the meeting female participation was extraordinary where more than 164 women participated actively and shown a keen interest about women's involvement in the project activities. The locations, number of participants with age, occupation and educational status is provided in the Table 35.

Table 35: Consultations with the Participants (Karakh Valley)

Town: Karkh		Age (Years)	Occupation	Education
1	Fozia	19	Student	F A
2	Kalsoom	19	House Wife	Illiterate
3	Sajida	20	House wife	Illiterate
4	Sher bano	20	House wife	Primary
5	Maryam	25	House wife	Illiterate
6	Haseena	27	House wife	Illiterate
7	Zubaida	40	House wife	Illiterate
8	Laraib	19	House wife	Illiterate
9	Sifat khatoon	30	House wife	Illiterate
10	Naz bibi	40	House wife	Illiterate
11	Saeeda	35	House wife	Illiterate
12	Zareena	30	House wife	Illiterate
13	Ayesha	40	House wife	Illiterate
14	Haneefa	45	House wife	Illiterate
15	Rubeena	38	House wife	Illiterate
16	Amina	45	House wife	Illiterate
17	Saeeda	40	House wife	Illiterate
18	Jannat	40	House wife	Illiterate
19	Kaynat	23	House wife	Illiterate
20	Shabana	28	House wife	Matric
21	Sheh bibi	50	House wife	Illiterate
22	Haneefa	55	House wife	Illiterate

23	Mahnaz	35	House wife	Illiterate
24	Bibi naz	40	House wife	Illiterate
25	Shazia	25	House wife	Illiterate
26	Jamal khtoon	45	House wife	Illiterate
27	Taj bibi	40	House wife	Illiterate
28	Murad bibi	50	House wife	Illiterate
29	Mirzadi	37	House wife	Illiterate
30	Rehmat khtoon	42	House wife	Illiterate
31	Zahida	33	House wife	Illiterate
32	Dur bibi	40	House wife	Illiterate
33	Rani	38	House wife	Illiterate
34	Fazeela	30	House wife	Illiterate
35	Rukhsana	27	House wife	Illiterate
36	Saeeda	30	House wife	Illiterate
37	Saima	25	House wife	Illiterate
38	Afroz	24	House wife	Illiterate
39	Nazeera	30	House wife	Illiterate
40	Kauri	40	House wife	Illiterate
41	Rukhsana	30	House wife	Illiterate
42	Humaira	27	House wife	Illiterate
43	Jam bibi	50	House wife	Illiterate
44	Rehmat khtoon	55	House wife	Illiterate
45	Zaib un nisa	45	House wife	Illiterate
46	Shahida	18	Student	Matric
47	Fareeha	18	Student	Middle
48	Aneela	19	House wife	Matric
49	Shehzadi	45	House wife	Illiterate
50	Shareefa	50	House wife	Illiterate
51	Sania	30	House wife	Middle
52	Safia	20	House wife	Matric
53	Ayesha	19	House wife	FSc
54	Naila	20	House wife	Middle
55	Haseena	20	House wife	Matric
56	Atiya	21	House wife	Matric
57	Shazia	20	House wife	Matirc
58	Safia	30	House wife	Illiterate
59	Bashira	30	House wife	Illiterate
60	Habiba	35	House wife	Illiterate
Village: Killi Chutta				
1	Sabeela	19	House wife	Primary
2	Nabeela	19	House wife	Primary
3	Zenab	60	House wife	Illiterate
4	Saba	18	House wife	Illiterate
5	Fazeela	32	House wife	Matric
6	Faheema	21	House wife	Illiterate
7	Raheela	40	House wife	Illiterate
8	Naima	23	House wife	Illiterate
9	Sobia	21	House wife	Primary
10	Aneela	30	House wife	Primary
11	Haseena	35	House wife	Illiterate
12	Haleema	50	House wife	Illiterate
13	Ansa	19	House wife	Illiterate
14	Ambreen	30	House wife	Illiterate
15	Sajida	30	House wife	Illiterate
16	Ameera	40	House wife	Illiterate
17	Shaheena	30	House wife	Illiterate
18	Balqeesa	45	House wife	Illiterate
19	Allah rakhi	50	House wife	Illiterate
20	Kareema	40	House wife	Primary
21	Shaheen	20	House wife	Illiterate

22	Fazeela	20	House wife	Primary
23	Samina	21	House wife	Primary
24	Zulaikha	50	House wife	Illiterate
25	Nazeera	30	House wife	Illiterate
26	Saeeda	45	House wife	Illiterate
27	Arabi	30	House wife	Illiterate
28	Zulaikha	50	House wife	Illiterate
29	Faiza	20	House wife	Primary
30	Samera	35	House wife	Primary
31	Amina	55	House wife	Illiterate
32	Amina	55	House wife	Illiterate
33	Amira	18	House wife	Illiterate
34	Hajira	20	House wife	Illiterate
35	Nimat	48	House wife	Illiterate
36	Ameera	40	House wife	Illiterate
37	Bibi hajira	38	House wife	Illiterate
38	Zumrud bibi	25	House wife	Illiterate
39	Bibi Najma	24	House wife	Illiterate
40	Rasheeda bibi	24	House wife	Illiterate
41	Haleema	19	House wife	Illiterate
42	Jamila	18	House wife	Illiterate
43	Samina	24	House wife	Illiterate
44	Amina	21	House wife	Illiterate
45	Shakeela	20	House wife	Illiterate
46	Zareena	22	House wife	Illiterate
Village: Jhalaro				
1	Gull Bibi	50	House wife	Illiterate
2	Rehmat Khatoon	45	House wife	Illiterate
3	Maryam	40	House wife	Illiterate
4	Zenab	30	House wife	Illiterate
5	Mehr un nisa	30	House wife	Illiterate
6	Amina	45	House wife	Illiterate
7	Azizah	30	House wife	Illiterate
8	Sabra	35	House wife	Illiterate
9	Bilkeesa	30	House wife	Illiterate
10	Zarina	25	House wife	Illiterate
11	Wazira	30	House wife	Illiterate
12	Sabina	30	House wife	Illiterate
13	Dur Bibi	45	House wife	Illiterate
14	Naseema	18	Student	Matric
15	Zaib un nisa	25	House wife	Illiterate
16	Kareema	30	House wife	Illiterate
17	Aneela	20	Student	Matric
18	Arabi	35	House wife	Illiterate
19	Khair un nisa	45	House wife	Illiterate
Village: Nokajai				
1	Tahira	40	House wife	Illiterate
2	Raheema	40	House wife	Illiterate
3	Rifat	18	House work	Illiterate
4	Gull bibi	40	House wife	Illiterate
5	Gul bano	45	House wife	Illiterate
6	Hoor bibi	40	House wife	Illiterate
7	Zakia	28	House work	Illiterate
8	Sumiya	18	Student	Matric
9	Zenab	35	House wife	Illiterate
10	Murad bibi	35	House wife	Illiterate
11	Khair nisa	30	House wife	Illiterate
12	Malook	30	House wife	Illiterate
13	Taj bibi	40	House wife	Illiterate
14	Ulfat	22	House wife	Illiterate

15	Gul shan	30	House wife	Illiterate
16	Bushra	25	House wife	Illiterate
Village: Sun Chako				
1	Kausar	30	House wife	Illiterate
2	Faiz bibi	50	House wife	Illiterate
3	Neelofer	18	Student	Middle
4	Kaima khatoon	35	House wife	Illiterate
5	Abida	25	House wife	Matric
6	Imam zadi	40	House wife	Primary
7	Sayeda	25	House wife	Matric
8	Salma	23	House wife	Matric
9	Naila	18	Student	F A
10	Asma	25	House wife	Matric
11	Salma	18	House wife	F A
12	Unzila	19	Student	Matric
13	Maria	30	Student	Matric
14	Allah bachai	30	House wife	Illiterate
15	Sultana	30	House wife	Illiterate
16	Parvin	35	House wife	Primary
17	Afsana	30	House wife	F A
18	Fehmedah	22	House wife	Middle
19	Noor bibi	35	House wife	Illiterate
20	Jamila	35	House wife	Illiterate
21	Nusrat	30	House wife	Illiterate
22	Farhat	25	House wife	Illiterate
23	Rifat	20	House wife	Illiterate

267. The command area of the Karakh valley is developed as compared to the sub-project areas of the Zohb river basin. About 23% participant were literate and women of the area are also participating in agricultural activities to support the income of their families. Health and educational facilities of the basic level are also available. Participants were briefed about their involvement in the project activities mentioned in the three outputs in the project interventions.

268. In the valley the role of BRSP is important in involving women in income generation activities.

269. Pressing needs of the participants are clean drinking water, better health facilities and vocational training center.

- **Roles and Responsibilities of Women Regarding Livestock Management and Income Generation Activities**

270. In the project area of the Mula River Basin, (Karakh and Kharazan Hitachi) valleys, women are allowed to participate in agricultural activities and livestock rearing to some extend

271. Group Discussions were held with women to assess their involvement in livestock management. The discussions revealed that women of the area mange livestock at their homes. They spend time in preparing fodder, cleaning milking and watering of animals and without these activities livestock rearing would be incomplete. These working hours are not recognized and are unpaid. The Project area is potential suppliers of animal products for growing future needs and the role of women will remain significant in this regard and due

consideration. Recognition of their role and improvement in their socio-economic status is dire need of the time.

❑ Decision Making

272. The study explored the role of rural women in decision making in various family affairs. It has been observed that the role of women in decision making was very low like a marriage of Children, sale and purchase of property, sale and purchase of animals, decisions regarding the schooling of Children and to attend social activities. It was found during the consultations that the head of tribe male member of the family has a power of decision making. He determines the family interests and makes decisions with regard to the family.

❑ Gender Issues in the Sub-Project Areas

273. According to the women participants their major issues are:

- Unavailability of clean drinking water, health facilities, schools for boys and girls, Drainage and Sewerage system, lack of income generating activities or opportunities The community women fetch water distance is 15 mints walk;
- The participation of local women in government institutions is not visible because of high illiteracy rate in the areas. The community doesn't have any Vocational Center for Women and Girls. Financial services are not available in the sub-project areas.
- Women are unaware about property right and ownership;
- Drinking water is not good for health at all because of this people are suffering from disease Diarrhea, Malaria, Hepatitis, joint pain, kidney diseases especially kidney stones includes typhoid. There is no Drainage and Sewerage system;
- Private Roads, transport, vehicles. Mobile phone communication network and internet connections have a significant impact on socialization and modernization. In the sub-project areas these services are very poor. Due to the poor public transport mobility of local women is limited;
- Embroidered works are done at home by women and sometimes women sell handicrafts to support their families by creating some additional income. Women have no facility to market their product and their work, but product is not properly rewarded; and

  However, females had capabilities to earn money and support their Families but they were not allowed to work out of village.

❑ *Concerns Raised by Female Participants*

274. Following concerns raised by the participants:

- Various NGOs have visited and consulted the women of the local communities and ensured them work with local women in income generation activates and provision basic necessities, but there is no outcome regarding their statements.
- Due to male dominated society and strong cultural values women participation could be insured in the project activates with permission of their male family members.
- Women are not allowed to work and participate in the trainings and other activates.
- Women are expert in embroidery; but there is no market facility to sell their products.

Mitigation Measures to Address the Concerns

- Consultations held with the male members of the communities and they were briefed about intervention the interventions proposed for women's participation. They were motivated to allow their female members to participate in the training sessions, income generation activities and GRCs, etc.
- Session will be arranged in the clusters where women of the surrounding area could participate easily.
- Under the project women will be involved in income earning activities; i.e. kitchen gardening, food processing and value adding in the agricultural products. These could be carried out inside the premises of the house.

❑ ***Suggested Income Generation Activities and Training***

275. Information was collected regarding "potential area for increasing women's participation in economic activities". Participants mentioned that fruits and vegetable are often wasted if they are given a comprehensive training to process the fruits to add value and with proper marketing a small scale women led business can be introduced for the women.

276. During the group discussion with female respondents identified following potential areas for increasing women's participation in the small scale- women- led agribusiness business for fruits and vegetables:

- Tomato ketchup.
- Maraba Making
- Pickle Making.
- Mini feed mills for livestock feeds.
- Plastic Tunnel for Fruit drying.

277. Trainings recommended by the female participants which are:

- Livestock Sector (Rearing goat, sheep and cattle)
- Poultry Farming: (Selling poultry products)
- Dairy sector, process and packing milk
- Training in embroidery, sewing, and marketing
- Agriculture Sector: Crop Sowing, harvesting and picking
- Kitchen gardening (producing vegetables at small scale)

278. Women of the area can run these small businesses for themselves with minimal effort, training and credit facility that will allow them to supplement their earnings. The females were interested to take part in the above mentioned area.

❑ ***General Opinion of Consulted Communities***

279. The consulted communities highlighted the main problems of the area and suggested measures to overcome the problems given below:

❑ **Health Facilities**

280. Provision of health facilities in the project area is another need of females for the treatment they have to travel long way to get treatment and these facilities are only available

in big cities (Khuzdar). To provide health facilities in the area mobile medical teams in the area should be constituted. Moreover, there is a need of the mobile medical emergency team for in the project area for providing the best healthcare to the women of the area.

- **Vocational Training Centers**

281. Living standard of women in the project area can be improved by promoting the traditional Crafts of Balochistan specially to empower female entrepreneurs through skill development in numerous arts & crafts pertaining to the cultural heritage of the area, providing Mirco Credit facility for purchase of Tools/Machinery & Working Capital enabling poor to stand on their feet. In fact, embroidery is the predominant craft of a cottage industry that is widely practiced craft in Balochistan but the vocational training centres do not exist in the project areas. These facilities should be extended in the project area. Trainings will help in the better quality production and poverty alleviation.

- **Communication Facilities**

282. Transport is another issues faced by the community of the project area. There are not proper roads from settlements to main city which is the main hindrance for them to have easy access to markets, health and educational facilities. With the development of water resource construction, development of communication facilities should be included in the proposed project.

PHOTOGRAPHIC VIEW OF THE CONSULTATION ACTIVITIES

A view of public consultation in Karakh Valley

A view of public consultation in Karakh Valley

On site Consultation with local community members at Chuttah Weir

A view of public consultation in Jhalaro Village

A view of consultation meeting with FO members in Karakh Valley

Gender Consultation meeting in Jhalaro Village

A view of public consultation in San Chakku

On site Consultation with local community members at San Chakku Karez

On site Consultation with local community members at Chuttah Village

Gender Consultation meeting in San Chakku Village

A view of public consultation in Nokjoi

Gender Consultation meeting in UC Abaad

6. ASSESSMENT OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 General

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

6.2 Impact Assessment Methodology

284. For the purpose of evaluating the environmental impact of this proposed project, the following steps have been executed:

- Scoping of impacts
- Environmental screening
- Qualitative impact evaluation
- Describing mitigation measures
- Residual impact significance
- Determining cumulative impacts

285. Each of these steps undertaken for the evaluation of environmental impacts and to describe mitigation measures, is described in the following section.

6.3 Scoping of Impacts

286. Potential environmental impacts of the Project on various environmental features in the Project Area are identified through the following studies:

- Environmental quality baseline monitoring of air, noise and water;
- Detailed review and analysis of primary and secondary data available for all environmental parameters in Project Area such as physical, ecological and social resources;
- Desktop study of engineering investigations, studies and designs;
- Consultations with implementing agencies, local government, affected community, traditional and religious leaders of community;
- Stakeholder consultations with relevant government agencies and national NGOs;
- Knowledge assimilation of international best practices on environmental assessment of irrigation projects.

6.4 Notion of Significance

287. The term “Environmental Impact” or simply “Impact” covers the negative, adverse or harmful as well as positive, desirable or beneficial impacts of the project on environmental settings. Prediction of impacts of the proposed activity is based on factual data; however, the significance of these impacts involves subjective judgment. The nature of the impacts may be categorised in terms of:

- **Direction** - Positive or Negative
- **Duration** - Long or Short Term
- **Effect** - Direct or Indirect
- **Extent** - Wide or Local

288. Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater will be the significance of impact of that change. For this IEE Report, nature of change is combined with the sensitivity of the receptor to evaluate the significance of the impact. The significance of impact is characterized as very low, low, moderate, high and very high. Environmental issues having “moderate”, “high” and “very high” significance would be provided with mitigation measures. Residual impacts after implementation of mitigation measures have also been provided.

6.5 Environmental Screening

289. For identification of potential impacts of the project, screening of activities causing impacts had been carried out in different phases of the project life. In the impact assessment exercise, major project activities with their associated environmental issues were identified and then their impacts on the relevant physical, ecological, and socio- economic elements of the area were evaluated.

290. In broader spectrum, the project activities could be categorized in the following three phases:

- Planning & Design Phase;
- Implementation & Construction Phase; and
- Operations & Maintenance Phase.

291. During the first phase, the focus will be not only on the engineering design, but also on laying the foundation for integrated planning for water resources management. Extensive inter-departmental coordination will be necessary at this stage for improvement in institutional arrangements and capacity in the areas of environmental and social management and monitoring. Development of decision support systems and training to develop local expertise is expected to substantially improve the management and monitoring of social and environmental impacts.

292. The planning, information management, and capacity-building activities are all intended to facilitate increased awareness-raising to foster ownership, understanding and mainstreaming of environmental and social considerations. Such activities to be planned and partly to be implemented.

293. The construction phase mainly entails rehabilitation of weirs, construction of infiltration gallery, new canal and other irrigation structures. Rehabilitation of weirs, construction of the infiltration gallery, new canal and other irrigation structures are expected to introduce direct significant benefits to the local population. This phase will be very sensitive in terms of environmental and social implications, because of a wide range of issues including the very extent of construction activities etc. The interventions planned under this component will become less damage to environment, if the EMP is implemented in letter and spirit.

294. Operations & Maintenance will be another stage where major impacts, both positive and negative, can surface, and the earlier predictions could be validated. This phase will comprise commissioning the newly rehabilitated weirs, constructed infiltration gallery, new canal and other irrigation structures. While the operation phase mostly consists of engineering activities, it has an equally important requirement of continued inter-departmental coordination, for harvesting the full potential of positive impacts of the project.

295. Table 32 below presents the screening of activities for proposed infiltration gallery, new canal and irrigation system during design, construction and O&M phases

Table 36: Screening of Activities

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
Karkh River Intervention: Irrigation Network Rehabilitation and Lining of Canals							
A. Design & Planning Phase							
Field surveys	✓			✓			• No potential Impact
Assessment of water availability		✓			✓		• Failure of design
Route selection (Alignment) of proposed new canal and its land acquisition		✓			✓		• Social issues • Resettlement/relocation of assets
Design works construction of new canal as per proper engineering standards		✓			✓		• In case of design failure system will be collapsed and Social issues
Traditional water rights considerations		✓			✓		• Social issues
Public disclosure of final design		✓			✓		• Social issues
Disruption to public life	✓			✓			• No potential Impact
Disruption to wildlife	✓			✓			• No potential Impact
Risk due to Natural Hazard i.e. flooding and earthquakes		✓			✓		• System sustainability
B. Implementation and Construction Phase							
Security and Safety Risks		✓			✓		• Delay in project execution
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard		✓			✓		• Changes in land use pattern • Influx of external work force • Social conflicts

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
							• Workshop facilities may spread oils & chemicals • Deterioration of air quality due to machinery & equipment • Noise • Land degradation due to solid waste disposal of camp site • Water contamination • Loss of vegetation Health and Safety issues
Excavation, backfilling and compaction works: New Canal Total Length= 2,107 m		✓			✓		• Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues especially COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material
Concrete lining of Canal = 14,770 m		✓			✓		• Noise pollution • Air pollution • Health and safety issues • Blocked of access due to construction works
Existing Canal to be Repaired		✓			✓		• Noise pollution • Air pollution

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
							• Health and safety issues • Blocked of access due to construction works
C. Operation & Maintenance Phase							
Breaching of Canal		✓			✓		• System sustainability
Conflicts caused by unavailability or improper distribution of water in the area		✓			✓		• Social issue
Use of water for drinking purposes		✓			✓		• Health issues • Social issues
Disposal waste (connection of waste streams) in the Canal		✓			✓		• Degradation of irrigation water • Health issues
Periodic cleaning and maintenance of the system		✓			✓		• Solid waste generation
Increase of agricultural lands		✓			✓		• Loss of pastoral lands
Ground water contamination in command area		✓			✓		• In case of improper drainage ground water will be contaminated
Community Participation for management and operation of the irrigation system		✓			✓		• Social issues • System sustainability
Risk due to Natural Hazard i.e. Flooding and Earthquakes		✓			✓		• System sustainability

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
Use of fertilizers & pesticides		✓			✓		• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff
Disruption to wildlife		✓			✓		• Conservation issues
Karkh River Intervention: Flood Protection Bund							
A. Design & Planning Phase							
Field surveys	✓			✓			• No potential Impact
Design works construction of flood protection bund as per proper engineering standards		✓			✓		• In case of design failure system will be collapsed and Social issues
Public disclosure of final design		✓			✓		• Social issues
Risk due to Natural Hazard i.e. flooding and earthquakes		✓			✓		• System sustainability
B. Implementation & Construction Phase							
Construction contractor mobilization and Establishment of campsite and machinery/ equipment Yard		✓			✓		• Changes in land use pattern • Influx of external work force • Social conflicts • Workshop facilities may spread oils & chemicals • Deterioration of air quality due to machinery & equipment • Noise

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
							• Land degradation due to solid waste disposal of camp site • Water contamination • Loss of vegetation • Health and Safety issues
Transportation of construction material		✓			✓		• Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues • Damage to infrastructure
Earthen Bund with Stone Pitching: 1. Protection Bund -1 1,097 m 2. Protection Bund -2 625 m 3. Protection Bund -3 665 m 4. Protection Bund -4 400 m 5. Protection Bund -5 675 m 6. Protection Bund -6 550 m 7. Protection Bund -7 325 m 8. Protection Bund -8 280 m		✓			✓		• Soil erosion • Site overburden • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues especially COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material
C. Operation & Maintenance Phase							

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
Breaching of flood protection bund		✓			✓		• System sustainability
Risk due to Natural Hazard i.e. Flooding and Earthquakes		✓			✓		• System sustainability
Karkh River Intervention: Construction of New Weir at Jhalaro and Repair of Cutoff Wall of Chutta Weir							
A. Design & Planning Phase							
Field surveys	✓			✓			• No potential Impact
Assessment of water availability		✓			✓		• Failure of design
Design works construction of weir as per proper engineering standards		✓			✓		• In case of design failure system will be collapsed and Social issues
Traditional water rights considerations		✓			✓		• Social issues
Public disclosure of final design		✓			✓		• Social issues
Disruption to public life	✓			✓			• No potential Impact
Disruption to wildlife	✓			✓			• No potential Impact
Risk due to Natural Hazard i.e. flooding and earthquakes		✓			✓		• System sustainability
B. Implementation & Construction Phase							
Construction contractor mobilization and Establishment of campsite and machinery/ equipment Yard		✓			✓		• Changes in land use pattern • Influx of external work force • Social conflicts • Workshop facilities may spread oils & chemicals

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
							• Deterioration of air quality due to machinery & equipment • Noise • Land degradation due to solid waste disposal of camp site • Water contamination • Loss of vegetation • Health and Safety issues
Security and Safety Risks		✓			✓		• Delay in project execution
Transportation of construction material		✓			✓		• Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues • Damage to infrastructure
Earth Works For 106m long and 1m high Gabion Weir		✓			✓		• Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues especially COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material
Concrete and Form		✓			✓		• Noise pollution

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low	Moderate Risk	High Risk	Low	Moderate	High	
Works for New Weir and Repair of Cutoff Wall of Chutta Weir							• Air pollution • Health and safety issues • Blocked of access due to construction works
C. Operation & Maintenance Phase							
Breaching of Weir		✓			✓		• System sustainability
Conflicts caused by unavailability or improper distribution of water in the area		✓			✓		• Social issue
Use of water for drinking purposes		✓			✓		• Health issues • Social issues
Periodic cleaning and maintenance of the system		✓			✓		• Solid waste generation
Increase of agricultural lands		✓			✓		• Loss of pastoral lands
Community Participation for management and operation of the irrigation system		✓			✓		• Social issues • System sustainability
Use of fertilizers & pesticides		✓			✓		• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff
Disruption to wildlife		✓			✓		• Conservation issues
Risk due to Natural Hazard i.e. Flooding and Earthquakes		✓			✓		• System sustainability

6.6 Assessment of Risk – Environmental Aspects

296. The next stage of the IEE process is a detailed assessment to forecast the characteristics of the main potential impacts. Known as impact analysis. Impact identification and prediction are undertaken against an environmental baseline, often through indicators e.g. air/water, noise, ecological sensitivity, biodiversity. The aim is to take account of all of the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are taken into consideration.

297. The anticipated environmental impacts due to project is based on the methodology provided in chapter 1 of this report presented below in Table 33.

298. Residual impacts after implementation of mitigation measures have also been provided.

299. The project and its activities may have a potential to impact the environment and this section intends to evaluate the significant impacts. It is imperative that the project is considered into its different aspects. The following environmental impacts have been evaluated:

- Impacts owing to Design Phase
- Impacts owing to Construction Phase
- Impacts owing to Operations Phase

300. The impacts of Design and Operational Phases are similar for all intervention. However, impacts for construction phase is specific with respect to sites.

Table 37: Anticipated Environmental Impacts Assessment

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Karkh River Intervention: Irrigation Network Rehabilitation and Lining of Canals				
A. Design & Planning Phase				
Field surveys	No potential impact	-		No potential impact
Assessment of water availability	Failure of design	C-3	Water availability has been properly assessed at design phase. Hydrological and flood management analysis has been done to ensure the feasibility of project success.	C-1
Route selection (Alignment) of proposed new canal and its land acquisition	Failure of design	C-3	Irrigation Department and Land Revenue Department to ensure that the land acquisition act 1894 procedures are followed in a transparent manner. Complete records should be maintained, particularly for asset valuation and compensation payment. The communities' grievances associated with the land acquisition and compensation should be addressed on priority basis, in order to avoid any unrest/mistrust among the communities towards the project.	C-1
Design works construction of new canal as per proper engineering standards	Social issues and Resettlement/relocation of assets	D-4	Review of engineering design works has ensured the proper design of the system. The system has been designed on proper engineering standards.	D-1
Traditional water rights considerations	In case of design failure system will be collapsed and Social issues	D-4	Acquire full information about traditional water rights and ensure that these are not disturbed	D-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Public disclosure of final design	Social issues	D-4	Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	D-1
Disruption to public life	No potential impact	-		No potential impact
Disruption to wildlife	No potential impact	-		No potential impact
Risk due to Natural Hazard i.e. flooding and earthquakes	The Project area lies in zone 2B as per seismic map of Pakistan which clearly shows that the area is in moderate risk zone. So due to earthquake the breaching canal and other irrigation structures can be possible. This impact would be of moderate significance. The other natural hazard which affect the area is flood which would also be of moderate significance.	D-4	Seismic design of canal and other allied and irrigation structures has been carried out on international engineering standards. By adopting the above measure, the impact is of low significance. Flood protection bunds has been included as an integral component of the project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.	D-2
B. Implementation & Construction Phase				

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Changes in land use pattern Loss of vegetation Cultural conflict	B-2	Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD 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.	B-1
	Influx of external work force		Residents of village shall be employed for the construction phase (mostly for unskilled jobs).	
	Workshop facilities may spread oils	B-2	Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured.	B-1
			Good housekeeping practices shall be ensured at workshop areas.	

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	Deterioration of air quality due to machinery & equipment	B-2	Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.	B-1
	Noise	B-2	Equipment with high levels shall be fitted with noise reduction devices Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs	B-1
	Land degradation due to solid waste disposal of camp site	B-2	Since landfill sites at Wandhri do not exist and the areas surrounding the intervention area are dedicated to irrigation practices such as cultivation, wheat thrashing etc., construction contractor shall not dispose of any solid waste in the area. Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.	
	Water - Feaces contamination	B-2	Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.	B-1
	Loss of vegetation	B-2	The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	B-1
	Health and Safety issues	B-2	Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed.	B-1
			Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary fire fighting equipment.	
			The camp staff shall be provided firefighting training.	
			All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel	
			Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Security and Safety Risks	Delay in project execution	C-3	Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites	C-1
Transportation of construction material	Soil erosion and contamination	B-2	Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. Vehicles and equipment shall not be repaired in the field.	B-1
	Air pollution due to vehicle fuel	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	B-1
	Noise pollution due to vehicle movement	B-2	Vehicles shall have exhaust mufflers (silencers) to minimize noise generation	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	
	Health and Safety issues	B-2	Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic	B-1
			Project drivers shall be trained on defensive driving	
			Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to avoid damage to infrastructure.	
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
Construction Works: 1. Excavation, backfilling and compaction works: New Canal Total Length= 2,107 m 2. Concrete lining	Soil erosion and contamination	B-2	Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval.	B-1
			Lands used for agricultural purposed shall not be used borrowing material.	
			Written consent of the land owner should be obtained for material (soil) borrowing	
			Photographic record (before and after) should be kept for the borrow and disposal areas.	

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
of Canal = 20,587 m			Leveling of borrow sites shall be done by contractor on his own expense.	
	Loss of natural vegetation	B-2	Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.	B-1
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
	Sites of Historical, Cultural, Archeological or Religious Significance	B-2	In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.	B-1
	Noise pollution	B-2	Equipment with high levels shall be fitted with noise reduction devices	B-1
			Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed	
			Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured	
			Construction work shall be carried out during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation	

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature	
	Air pollution	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	B-1
			Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	
	Health and Safety issues	B-2	Demarcation tapes to be installed around the construction site to avoid any unauthorized entry	B-1
			Personal protective equipment should be made available at site and the usage of the PPEs should be ensured.	
			Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	
C. Operation and Maintenance Phase				
Breaching of Canal	System sustainability	D-4	The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities, Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.	D-2

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Conflicts caused by unavailability or improper distribution of water in the area	Social issues	C-3	Agreements between different communities/tribes. Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. From the outset water management rules and regulations must incorporate ways to tackle such issues as water scarcity and surplus flows. Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures. This needs to be done on collaborative basis with irrigation and agriculture department where communication system among farmers, water user association and department is assured. Farmers in downstream areas should be compensated in case they lose their water rights. All villages deprived of Project's water rights should be compensated for drinking water supply schemes otherwise very soon all villages and settlements will be deserted as underground water may not be fit for drinking purpose for every village and it would probably not be within the	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			financial or technical capacity of local population to initiate such schemes on their own.	
Use of water for drinking purposes	Health issues	C-3	Proper treatment system shall be provided Water quality will be tested as per WHO/ NEQS standards to ensure the integrity of the water supply system. Turbidity and free residual chlorine tests shall be regularly performed. Arsenic will be tested as per WHO standards.	C-1
Disposal waste (connection of waste streams) in the Canal	Degradation of irrigation water and Health issues	C-3	Proper monitoring of canal alignment and disconnect all identified waste streams	C-1
Periodic cleaning and maintenance of the system	Solid waste generation	C-3	Ensure proper disposal of waste at designated landfill/disposal sites.	C-1
Increase of agricultural lands	Loss of pastoral lands	C-3	Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals.	C-1
Community Participation for management and operation of the irrigation system	Social issues and System sustainability	C-3	Ensure community participation in management and operation of the irrigation system Training of community	C-1
Disruption to wildlife	Conservation issues	C-3	Design has already provided cattle drinking troughs at different intervals	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.	
Use of fertilizers & pesticides	Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff	C-3	Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as **Annexure 17** of this report	C-1
Risk due to Natural Hazard i.e. Flooding and Earthquakes	System sustainability	C-3	Emergency Response Plan for Breaching of Canal will be followed which is attached as **Annexure 13** of this report.	C-1
Karkh River Intervention: Flood Protection Bund				
A. Design & Planning Phase				
Field surveys	No potential impact	-		No potential impact
Design works construction of flood protection	In case of design failure system will be	D-4	Review of engineering design works has ensured the proper design of the system.	D-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
bund as per proper engineering standards	collapsed and Social issues		The system has been designed on proper engineering standards.	
Public disclosure of final design	Social issues	D-4	Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	D-1
B. Implementation & Construction Phase				
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Changes in land use pattern Loss of vegetation Cultural conflict	B-2	Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD 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.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	Influx of external work force		Residents of Wandhri village shall be employed for the construction phase.	
	Workshop facilities may spread oils	B-2	Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured.	B-1
			Good housekeeping practices shall be ensured at workshop areas.	
	Deterioration of air quality due to machinery & equipment	B-2	Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.	B-1
	Noise	B-2	Equipment with high levels shall be fitted with noise reduction devices	B-1
			Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed	
			Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured	
			Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs	
	Land degradation due to solid waste disposal of camp site	B-2	Since landfill sites at Wandhri do not exist and the areas surrounding the intervention area are dedicated to irrigation practices such as cultivation, wheat thrashing etc., construction contractor shall not dispose of any solid waste in the area. Contractor shall collect in separate bins	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.	
	Water - Feaces contamination	B-2	Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.	B-1
	Loss of vegetation	B-2	The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	B-1
	Health and Safety issues	B-2	Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary fire fighting equipment.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			The camp staff shall be provided firefighting training.	
			All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel	
			Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	
Transportation of construction material	Soil erosion and contamination	B-2	Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material.	B-1
			Vehicles and equipment shall not be repaired in the field.	
	Air pollution due to vehicle fuel	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	B-1
	Noise pollution due to vehicle movement	B-2	Vehicles shall have exhaust mufflers (silencers) to minimize noise generation	B-1
			Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	
	Health and Safety issues	B-2	Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic	B-1
			Project drivers shall be trained on defensive driving	

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to avoid damage to infrastructure.	
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
Construction Works: Earthen Bund with Stone Pitching: 1. Protection Bund -1 1,097 m 2. Protection Bund -2 625 m 3. Protection Bund -3 665 m 4. Protection Bund -4 400 m 5. Protection Bund -5 675 m	Soil erosion and contamination	B-2	Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval.	B-1
			Lands used for agricultural purposed shall not be used borrowing material.	
			Written consent of the land owner should be obtained for material (soil) borrowing	
			Photographic record (before and after) should be kept for the borrow and disposal areas.	
			Leveling of borrow sites shall be done by contractor on his own expense.	
	Loss of natural vegetation	B-2	Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.	B-1
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
6. Protection Bund -6 550 m 7. Protection Bund -7 325 m 8. Protection Bund -8 280 m	Sites of Historical, Cultural, Archeological or Religious Significance	B-2	In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.	B-1
	Noise pollution	B-2	Equipment with high levels shall be fitted with noise reduction devices	B-1
			Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed	
			Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured	
			Construction work shall be carried out during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	
	Air pollution	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	
	Health and Safety issues	B-2	Demarcation tapes to be installed around the construction site to avoid any unauthorized entry	B-1
			Personal protective equipment should be made available at site and the usage of the PPEs should be ensured.	
			Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	
C. Operation and Maintenance Phase				
Breaching of flood protection bund	System sustainability	D-4	The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities. Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.	D-2
Risk due to Natural Hazard i.e. Flooding and Earthquakes	System sustainability	C-3	Emergency Response Plan for Flood Protection Bund will be followed which is attached as **Annexure – 14** of this report.	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Karkh River Intervention: Construction of New Weir at Jhalaro and Repair of Cutoff Wall of Chutta Weir				
A. Design & Planning Phase				
Field surveys	No potential impact	-		
Assessment of water availability	Failure of design	C-3	Water availability has been properly assessed. Hydrological and flood & drought management analysis has ensured the feasibility of project success.	C-1
Design works construction of weir as per proper engineering standards	In case of design failure system will be collapsed	D-4	Review of engineering design works has ensured the proper design of the system	D-1
Traditional water rights considerations	Social issues	D-4	Acquire full information about traditional water rights and ensure that these are not disturbed	D-1
Public disclosure of final design	Social issues	D-4	Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	D-1
Disruption to public life	No potential impact	-		No potential impact
Disruption to wildlife	No potential impact	-		No potential impact
Risk due to Natural Hazard i.e. flooding and earthquakes	The Project area lies in zone 2B as per seismic map of Pakistan which clearly shows that the area is in moderate risk zone. So due to earthquake the	D-4	Seismic design of weir and other allied and irrigation structures has been carried out on international engineering standards. By adopting the above measure, the impact is of low significance.	D-2

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	breaching weir, canal and other irrigation structures can be possible. This impact would be of moderate significance. The other natural hazard which affect the area is flood which would also be of moderate significance.		Flood protection bunds has been included as an integral component of the project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.	
B. Construction Phase (Construction of Weirs at Jhalaro)				
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Establishment of fuel depot / Workshop facilities may spread oils	B-2	In order to avoid spread of oil by virtue of establishment of fuel depot / Workshop facilities, the contractor should avoid it altogether. Incase, it cannot be avoided, the contractor must house it and underlay the area with proper liner. Dispensing pumps should be used. Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. Good housekeeping practices shall be ensured at workshop areas.	B-1
	Loss of vegetation	B-2	The construction crew shall be provided with LPG as cooking (and heating, if	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			required) fuel. Use of fuel wood shall not be allowed.	
	Influx of external work force	B-2	Farmer's Organization will be contacted by the contractor and with their assistance, the contractor will get a tentative list of workers for employment. Residents of Jhalaro village shall be employed for the construction phase.	B-1
	Land degradation due to solid waste disposal of camp site	B-2	Construction contractor shall not dispose of any solid waste in the area. The construction Contractor may dump solid waste with proper lining material in depressions and have a daily and monthly cover on it. Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	Changes in land use pattern	B-2	Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD 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.	B-1
	Health and Safety issues	B-2	Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			and stored in buckets along with other necessary fire fighting equipment. The camp staff shall be provided firefighting training All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	
	Deterioration of air quality due to machinery & equipment	B-2	Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.	B-1
	Noise	B-2	Equipment with high levels shall be fitted with noise reduction devices Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs	B-1
	Water - Feaces contamination	B-2	Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			contractor and submitted for approval to the Chief Engineer, BIPD.	
Security and Safety Risks	Delay in project execution	C-3	Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites	C-1
Transportation of construction material	Soil erosion and contamination	B-2	Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. Vehicles and equipment shall not be repaired in the field.	B-1
	Air pollution due to vehicle fuel	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	Noise pollution due to vehicle movement	B-2	Vehicles shall have exhaust mufflers (silencers) to minimize noise generation Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	B-1
	Health and Safety issues	B-2	Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. Project drivers shall be trained on defensive driving Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to avoid damage to infrastructure.	B-1
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Construction Works: 1. Earth Works for 150m long Weir with 3m wide Under Sluice 2. Concrete and Form Works for New Weir and Repair of Cutoff Wall of Chutta Weir	Soil erosion and contamination	B-2	Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. Lands used for agricultural purposed shall not be used borrowing material. Written consent of the land owner should be obtained for material (soil) borrowing Photographic record (before and after) should be kept for the borrow and disposal areas. Leveling of borrow sites shall be done by contractor on his own expense.	B-1
	Loss of natural vegetation	B-2	Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.	B-1
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
	Sites of Historical, Cultural, Archeological or Religious Significance	B-2	In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
	Noise pollution		Equipment with high levels shall be fitted with noise reduction devices. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. Construction work shall be carried out during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	B-1
	Air pollution	B-2	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	B-1
	Health and Safety issues	B-2	Demarcation tapes to be installed around the construction site to avoid any unauthorized entry. Personal protective equipment should be made available at site and the usage of the PPEs should be ensured.	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan(SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant	
C. Operation and Maintenance Phase				
Breaching of Weir	System sustainability	D-4	The Irrigation Department should monitor the system on a regular basis. Capacity building of the communities should be carried out in the O&M activities. Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.	D-2
Conflicts caused by unavailability or improper distribution of water in the area	Social issues	C-3	Agreements between different communities/tribes Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. From the outset water management rules and regulations must incorporate ways to tackle such issues as water scarcity and surplus flows. Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures. This needs to be done on collaborative basis	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			with irrigation and agriculture department where communication system among farmers, water user association and department is assured. Farmers in downstream areas should be compensated in case they lose their water rights. All villages deprived of Project's water rights should be compensated for drinking water supply schemes otherwise very soon all villages and settlements will be deserted as underground water may not be fit for drinking purpose for every village and it would probably not be within the financial or technical capacity of local population to initiate such schemes on their own.	
Use of water for drinking purposes	Health issues	C-3	Proper treatment system shall be provided Water quality will be tested as per WHO/ GOP standards to ensure the integrity of the water supply system. Turbidity and free residual chlorine tests shall be regularly performed. Arsenic will be tested as per WHO standards.	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
Periodic cleaning and maintenance of the system	Solid waste generation	C-3	Ensure proper disposal of waste at designated landfill/disposal sites.	C-1
Increase of agricultural lands	Loss of pastoral lands	C-3	Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals.	C-1
Community Participation for management and operation of the irrigation system	Social issues and System sustainability	C-3	Ensure community participation in management and operation of the irrigation system Training of community	C-1
Disruption to wildlife	Conservation issues	C-3	Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.	C-1
Use of fertilizers & pesticides	Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff	C-3	Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and Use of restricted pesticides identified by WHO shall not be allowed. The list of	C-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	Site Specific Mitigation Measures	Residual Impacts
			restricted pesticides is attached as **Annexure 17** of this report	
Risk due to Natural Hazard i.e. Flooding and Earthquakes	System sustainability	C-3	Emergency Response Plan for Breaching of Weir will be followed which is attached as **Annexure – 15** of this report.	C-1

6. ENVIRONMENTAL MANAGEMENT PLAN

7.1 Environmental Management Plan (EMP)

7.1.1 General

301. 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.

302. 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.

303. 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, in this case BEPA, if any issue has been overlooked or if any need would arise as the project continues.

7.1.2 Structure of EMP

304. 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
  a. Role and Responsibilities of the Functionaries involved in EMP Implementation
  b. Reporting Mechanism
  c. Non-Compliance of the EMP
- ❑ Institutional Arrangements for Implementation of EMP during Operation Phase
  a. Role and Responsibilities of the Functionaries involved in EMP Implementation
  b. 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

7.1.3 Regulatory Requirements

-

305. This EMP refers to the applicable National and International legal framework for the proposed project for the protection of the environment.

7.1.4 Purpose and need of the EMP

306. 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. 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[2].

7.1.5 Objectives of the EMP

307. 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 EIA and recommend improvement if any need would arise.

7.1.6 Scope of the EMP

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

- Implementation and Construction Phase; and
- Operation Phase.

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

7.1.7 Institutional Arrangement for Implementation of EMP

310. 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 PMO of ADB's Karakh Valley Development Irrigation 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.

[2] Guidelines for Preparation and Review of Environmental Reports, 1997

a) Institutional Arrangements for Implementation of EMP during Construction Phase

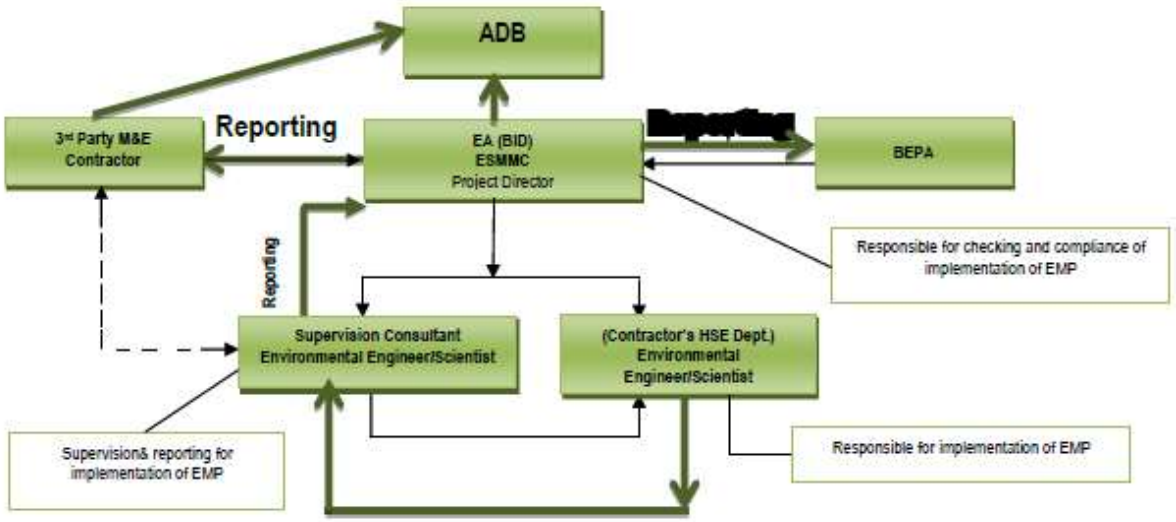
311. The Project Director (PMO, BWRDSP) will formulate an Environmental & Social Management and Monitoring Cell (ESMMC) which will comprise senior professionals, and should preferably have representative of various stakeholders.

312. The key players involved during construction stage of the proposed project are the ESMMC, 3rd Party M&E Contractor, Balochistan Environmental Protection Department/ Agency, the Contractor and the Supervisory Consultants (SCs). The roles, remits and responsibilities of these organizations are outlined below.

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

- ESMMC Representative;
- 3rd Party M&E Contractor;
- SC's Environmental Specialist/Engineer; and
- Contractor's Environmental Engineer/Scientist.

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



❑ Roles and Responsibilities

a) BEPA

315. 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) 3rd Party M&E Contractor (if required)[3]

316. 3rd Party M&E shall be responsible for:

- To make sure that all the contractual obligations related to the environmental and social compliance are met;
- To monitor the progress regarding implementation of environmental safeguard as provided in EMP;
- Oversee the Compliance of all the monitoring programs as given in EMP;
- Check randomly whether monitoring of the environmental aspects of the project during construction phase is being properly carried out;
- Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports, and make follow-up on these actions to ensure progress toward the desired outcomes;
- Make sure that the Contractor is implementing the additional measures suggested by the M&E Contractor; and
- Reporting the status of EMP compliance to BID and ADB

c) Project Director, PMO-BWRDSP:

317. Project Director through ESMMC will have responsibility for assuring implementation of EMP. This includes the following:

- Ensuring that the required environmental training is provided to the concerned staff;
- The Project Director will be responsible for carrying out random site visits to the construction sites to review the environmental performance of the Construction Contractors;
- Review monitoring reports for the progress of environment 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 approvals from the concerned departments.
- Maintaining interface with the other lined departments / stakeholders; and
- Reporting to the BEPA on status of EMP implementation.
- Reporting to ADB on status of EMP implementation.

d) Supervision Consultant: Resident Engineer

318. Resident Engineer’s (RE) roles and responsibilities will be:

[3] Normally on some of the ADB’s Projects 3rd Party M&E contractor performed the monitoring of EMP as well.

- 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 ESMMC.

e) Supervision Consultant: Environmental Inspector

319. SC's Environmental Inspector will perform following roles and responsibilities:

- Directly reporting to the RE;
- Ensure the implementation of the mitigation measures suggested in EMP;
- To supervise and monitor environmental activities being performed at site;
- To organize periodic environmental training programs and workshops for the consultant's and contractor's staff with the help of Environmental Specialist.
- Suggest any additional mitigation measures if required.

f) Construction Contractor: Environmental Supervisor/Inspector

320. Contractor will be bond to appoint a Site Environmental Supervisor/Inspector with relevant educational experience and background. Contractor's Environmental Engineer/Scientist will carry out following activities:

- Implementation of the mitigation measures at construction site;
- Contractor will be bond through contract to take actions against all the special and general provisions of the contract document;
- Contractor will make sure the compliance of EMP recommendations and will also be responsible for effective liaison with local heads of villages;
- Provision of proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use;
- To conduct the environmental and health & safety trainings to the workers/labor; and
- Coordinate with RE / Environmental Specialist of SC.

❑ **Reporting Mechanism**

321. 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-PMO. A bi-annual report of environmental activities shall be submitted to ADB by BID.

322. 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.

❑ **Non-Compliance of the EMP**

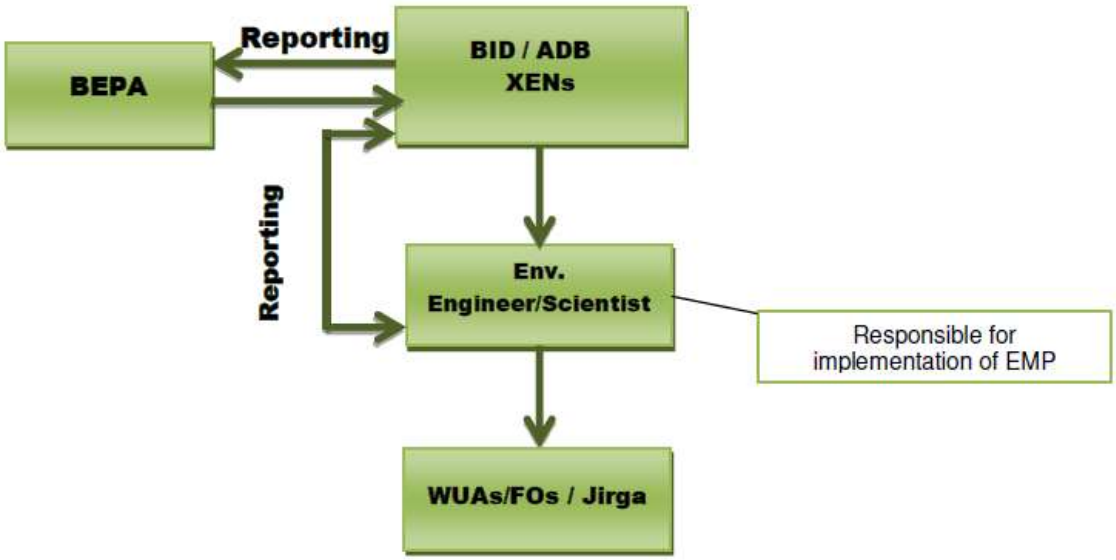
323. The implementation of the proposed EMP involves inputs from various functionaries. Construction Contractor will be primarily responsible for ensuring implementation and reporting of the mitigation measures proposed in the EMP, which will be part of the contract documents. In addition, the Contractor will also need to prepare Site Specific Environmental

Management Plan (SSEMP) and get it approved from SC / BID before start of any construction phase. The SSEMP will provide the risk rating for each construction activity and will provide mitigation measures to reduce activities with higher degree of risk. Various plans, and layout maps (construction camp layout plan) will also form part of SSEMP. The provision of the environmental mitigation cost will be made in the total cost of project, for which Construction Contractor will be paid on the basis of monthly compliance reports. However, if the Construction Contractor fails to comply with the implementation of EMP and submission of the monthly compliance reports, deductions will be made from the payments to the Construction Contractor claimed under the heads of environmental components.

❑ Institutional Arrangement for Implementation of EMP during Operation Phase

324. The key players involved during operation phase of the proposed project are BID, BEPA, Water User Associations (WUA) and Farmer Organizations (FOs) or Jirga. The roles, remits and responsibilities of these organizations are outlined below. The following staff will be involved in the implementation of EMP. Organizational setup for implementation of EMP is also given below.

- WUA and FOs, or Jirga; and
- BID, Environmental Engineer/Scientist.



- **Roles and Responsibilities**

a) Environmental Engineer/Scientist

325. Environmental Engineer/Scientist will have responsibility for assuring implementation of EMP. This includes the following:

- Coordinating and planning the overall activities, as per EMP;
- Environmental Engineer/Scientist will randomly check the operation of project and make sure system is in compliance with EMP;
- Make sure that the WUA & FOs are implementing the measures suggested in the EMP and to report in environmental monitoring reports; and

- Bi-annual reporting to BEPA on environmental compliance of the project during operation stage.

b) Water User Association (WUA) and Farmer Organizations (FOs), Chairman & Vice Chairman / Jirga

326. WUA and FOs will ensure the implementation of the mitigation measures at operation site and will report to BID.

7.1.8 Environmental Management Plan

327. 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 34. 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 38: Environmental Management and Monitoring Plan

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Karkh River Intervention: Irrigation Network Rehabilitation and Lining of Canals					
A. Design & Planning Phase					
Assessment of water availability	• Failure of design	• Water availability has been properly assessed at design phase. Hydrological and flood management analysis has been done to ensure the feasibility of project	• Feasibility and Design report before project execution	• Once before start of construction works	• Design Engineer
Route selection (Alignment) of proposed new canal and its land acquisition	• Failure of design	• Irrigation Department and Land Revenue Department to ensure that the land acquisition act 1894 procedures are followed in a transparent manner. Complete records should be maintained, particularly for asset valuation and compensation payment. • The communities' grievances associated with the land acquisition and compensation should be addressed on priority basis, in order to avoid any unrest/mistrust among the communities towards the project.	• Feasibility and Design report before project execution	• Once before start of construction works	• Design Engineer

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Design works construction of new canal as per proper engineering standards	• Social issues and Resettlement/relocation of assets	• Review of engineering design works has ensured the proper design of the system	• Design Report	• Once before start of construction works	• Design Engineer
Traditional Water Rights Considerations	• In case of design failure system will be collapsed and Social issues	• Acquire full information about traditional water rights and ensure that these are not disturbed	• Water Rights Consideration Included in the Design Report	• Once before start of construction works	• Design Engineer • Project Director
Public disclosure of final design	• Social issues	• Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	• Minutes of Meetings with Stakeholders	• Once before start of design works • Once before start of construction works	• Design Engineer • Project Director
Risk due to Natural Hazard i.e. flooding and earthquakes	• The Project area lies in zone 2B as per seismic map of Pakistan which clearly shows that the area is in moderate risk zone. So due to earthquake the breaching canal and other irrigation structures can be possible. This impact would be of moderate significance. The other natural hazard which affect the area is	• Seismic design of weir and other allied and irrigation structures has been be carried out on international engineering standards. By adopting the above measure, the impact is of low significance. • Flood protection bunds has been included as an integral component of the	• Design Report	• Once before start of construction works	• Design Engineer

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	flood which would also be of moderate significance	project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.			
B. Implementation & Construction Phase					
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	• Changes in land use pattern • Loss of vegetation Cultural conflict	• Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD before release of final payment. Site for camp site shall be selected keeping in view the cultural norms of the area to	• Monthly rent receipts.	• Strict compliance monitoring on fortnightly basis • Monthly Reporting by SC and submitted to PMU	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		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.			
	• Influx of external work force	• Residents of village shall be employed for the construction phase (mostly for unskilled jobs).	• Development & implementation of policy on local employments • Employment record	• Strict compliance monitoring on fortnightly basis • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Workshop facilities may spread oils	• Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. • Good housekeeping practices shall be ensured at workshop areas.	• Visual inspection • Photographic record	• Daily monitoring report • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Deterioration of air quality due to machinery & equipment	• Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant PM

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		Quality Standards of Pakistan.	Smoke, SOx, CO, VOCs and NOx. • Evidence of measurement records.		
	• Noise	• Equipment with high levels shall be fitted with noise reduction devices • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Land degradation due to solid waste disposal of camp site	• Since landfill sites do not exist and the areas surrounding the intervention area are dedicated to irrigation practices such as cultivation, wheat thrashing etc., construction contractor shall not dispose of any solid waste in the area. • Contractor shall collect in separate bins and	• Visual inspection	• Weekly monitoring reports • Weekly waste tracking register. • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.			
	• Water - Feaces contamination	• Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.	• Monitoring compliance to NEQS of sanitary wastewater generated from campsite. The monitoring parameters will be TSS, BOD, COD and Oil & Grease. • Waste management plan in place • Photographic record	• Fortnightly wastewater testing/monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Loss of vegetation	• The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	• Use of LPG cylinders at campsite	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. • Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary fire fighting equipment. • The camp staff shall be provided firefighting training. • All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel • Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan “Health & Safety	• Use of personal protective equipment at campsite • Site Specific Health and Safety Management Plan (SSHSMP) in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

		of Building and Construction Workers during COVID-19 outbreak", The contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant Implement SOP provisions for prevention, detection and emergency procedure.			

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Security and Safety Risks	• Delay in project execution	• Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and	• Minutes of meetings of community consultation • Dissemination material	• Monthly reporting	• Contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites			
Transportation of construction material	• Soil erosion and contamination	• Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. • Vehicles and equipment shall not be repaired in the field. • Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	• Log of vehicle and equipment repairs	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Air pollution due to vehicle exhaust	• Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	• Route maps of vehicle movement • Log of vehicle maintenance • Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
			Smoke, SOx, CO, VOCs and NOx.		
	• Noise pollution due to vehicle movement	• Vehicles shall have exhaust mufflers (silencers) to minimize noise generation • Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	• Log of vehicle movement time • Visual inspections of the vehicles • Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic • Project drivers shall be trained on defensive driving • Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to	• Visual inspections • Training record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		avoid damage to infrastructure.			
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Photographic records • Infrastructure restoration records	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
Construction Works: 1. Excavation, backfilling and compaction works: New Canal Total Length= 2,107 m 2. Concrete lining of Canal = 20,587m	• Soil erosion and contamination	• Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. • Lands used for agricultural purposed shall not be used borrowing material. • Written consent of the land owner should be obtained for material (soil) borrowing • Photographic record (before and after) should be kept for the borrow and disposal areas. • Leveling of borrow sites shall be done by contractor on his own expense.	• Evidence of plan in place. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Loss of natural vegetation	• Compensatory tree plantation (ten times the trees cut down for	• Evidence of plantation. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		construction) should be carried out at appropriate locations within the project area.			• Monitoring by Supervision Consultant
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections	• Daily monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Sites of Historical, Cultural, Archeological or Religious Significance	• In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD.[37] • The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites	• Evidence of training provided to contractor staff. • Evidence of maps in place with these sites shown. • Record of appropriate action taken in case of chance find. • Photographic record of chance find	• Immediately after chance find, to be reported in next quarter.	• Execution by construction contractor • Monitoring by Supervision Consultant

[37] Project routing does not envisage any archeological site, however in case of any chance find the ***"Chance Find Procedures"*** should be adopted, as given in **Annexure-18**

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Noise pollution	• Equipment with high levels shall be fitted with noise reduction devices • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured • Construction work shall be carried out during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Air pollution	• Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions • Water should be sprinkled where needed and appropriate, particularly at	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		work sites near the communities to suppress dispersion of dust.	• Evidence of measurement records.		
	• Health and Safety issues	• Demarcation tapes to be installed around the construction site to avoid any unauthorized entry • Personal protective equipment should be made available at site and the usage of the PPEs should be ensured. • Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19 outbreak", the contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant	• Use of personal protective equipment • Site Specific Health and Safety Management Plan (SSHSMP) in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

		• Implement SOP provisions for prevention, detection			
C. Operation & Maintenance Phase					
Breaching of Canal	• System sustainability	• The Irrigation Department should monitor the system on a regular basis. • Capacity building of the communities should be carried out in the O&M activities. • Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.	• Monitoring reports	• Quarterly reporting	• Environmental Specialist to develop reports • PD to review and take management actions, where needed

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Conflicts caused by unavailability or improper distribution of water in the area	• Social issues	• Agreements between different communities/tribes • Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. From the outset water management rules and regulations must incorporate ways to tackle such issues as water scarcity and surplus flows. • Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures. This needs to be done on collaborative basis with irrigation and agriculture department where communication system among farmers, water user association and department is assured. • Farmers in downstream	• Agreement between parties • Training records	• Quarterly reporting	• Environmental Specialist to develop reports • PD to review and take management actions, where needed

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		areas should be compensated in case they lose their water rights. • All villages deprived of Project's water rights should be compensated for drinking water supply schemes otherwise very soon all villages and settlements will be deserted as underground water may not be fit for drinking purpose for every village and it would probably not be within the financial or technical capacity of local population to initiate such schemes on their own.			
Use of water for drinking purposes	• Health issues	• Proper treatment system shall be provided • Water quality will be tested as per WHO/ GOP standards to ensure the integrity of the water supply system. • Turbidity and free residual chlorine tests shall be regularly performed. • Arsenic will be tested as per WHO standards.	• WHO/ NEQS Drinking Water Standards	• Daily monitoring reports of turbidity and free residual chlorine test • Monthly analysis of water quality parameters • Quarterly reporting	• Environmental Specialist to develop reports • PD to review and take management actions, where needed

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Disposal waste (connection of waste streams) in the Canal	• Degradation of irrigation water and Health issues	• Proper monitoring of canal alignment and disconnect all identified waste streams	• Visual inspection • Monitoring records	• Monthly monitoring and quarterly reporting	• Irrigation department
Periodic cleaning and maintenance of the system	• Solid waste generation	• Ensure proper disposal of waste at designated landfill/disposal sites.	• Periodic cleaning records • Visual inspection	• Monthly monitoring and quarterly reporting	• Irrigation Department • Water User Association
Increase of agricultural lands	• Loss of pastoral lands	• Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals	• Monitoring records	• Monthly monitoring and quarterly reporting	• Agriculture Department • Forestry Department • Wildlife Department
Community Participation for management and operation of the irrigation system	• Social issues • System sustainability	• Ensure community participation in management and operation of the irrigation system • Training of community	• Training records • Community participation records	• Monthly monitoring and quarterly reporting	• Irrigation Department • Water User Association
Disruption to wildlife	• Conservation issues	• Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. • It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures.	• Monitoring and maintenance records	• Monthly monitoring and quarterly reporting	• Irrigation Department • Wildlife Department

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		By adopting the aforementioned measures, the impact would be finally of low significance.			
Use of fertilizers & pesticides	• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff	• Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; • Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and • Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as Annexure 19 of this report	• Visual inspection • Monitoring records • Market survey for availability of AN and CAN fertilizers	• Monthly monitoring and quarterly reporting	• Agriculture department
Risk due to Natural Hazard i.e. Flooding and Earthquakes	• System sustainability	• Emergency Response Plan for Breaching of Canal will be followed which is attached as **Annexure – 13** of this report.	• Training record of emergency response plan	• Monthly monitoring and quarterly reporting	• Irrigation Department

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Karkh River Intervention: Flood Protection Bund					
A. Design & Planning Phase					
Design works construction of flood protection bund as per proper engineering standards	• In case of design failure system will be collapsed and Social issues	• Review of engineering design works has ensured the proper design of the system. The system has been designed on proper engineering standards.	• Design Report	• Once before start of construction works	• Design Engineer
Public disclosure of final design	• Social issues	• Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	• Minutes of Meetings with Stakeholders	• Once before start of design works • Once before start of construction works	• Design Engineer • Project Director
B. Implementation & Construction Phase					
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	• Changes in land use pattern • Loss of vegetation • Cultural conflict	• In order to avoid spread of oil by virtue of establishment of fuel depot / Workshop facilities, the contractor should avoid it altogether. Incase, it cannot be avoided, the contractor must house it and underlay the area with proper liner.	• Visual inspection	• Daily monitoring report • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Dispensing pumps should be used. • Spent Oil shall be properly collected in impermeable containers. Spent oil shall be disposed in accordance with MSDS shall be ensured. • Good housekeeping practices shall be ensured at workshop areas.			
	• Influx of external work force	• Residents of village shall be employed for the construction phase (mostly for unskilled jobs).	• Development & implementation of policy on local employments • Employment record	• Strict compliance monitoring on fortnightly basis • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Workshop facilities may spread oils	• In order to avoid spread of oil by virtue of establishment of fuel depot / Workshop facilities, the contractor should avoid it altogether. Incase, it cannot be avoided, the contractor must house it and underlay the area with proper liner.	• Visual inspection	• Daily monitoring report • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Dispensing pumps should be used. • Spent Oil shall be properly collected in impermeable containers. • Spent oil shall be disposed in accordance with MSDS shall be ensured. • Good housekeeping practices shall be ensured at workshop areas.			
	• Deterioration of air quality due to machinery & equipment	• Proper engine tuning of machinery/ equipment every month shall be carried out to comply with National Environmental Quality Standards of Pakistan.	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx. • Evidence of measurement records.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant PM
	• Noise	• Equipment with high levels shall be fitted with noise reduction devices	• Monitoring compliance to NEQS	• Fortnightly monitoring reports • Quarterly Reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured • Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs	for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)		• Monitoring by Supervision Consultant
	• Land degradation due to solid waste disposal of camp site	• Construction contractor shall not dispose of any solid waste in the area. The construction Contractor may dump solid waste with proper lining material in depressions and have a daily and monthly cover on it. Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before	• Visual inspection	• Weekly monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.			
	• Water - Feaces contamination	• Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Chief Engineer, BIPD.	• Monitoring compliance to NEQS of sanitary wastewater generated from campsite. The monitoring parameters will be TSS, BOD, COD and Oil & Grease. • Waste management plan in place • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Loss of vegetation	• The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	• Use of LPG cylinders at campsite • Tree cutting approvals • Pictorial evidence of use of LPG	• Monthly monitoring reports • Quarterly reporting	• Construction Contractor • Monitoring by Supervisio ı Consultant and reporting to ESMMC.
	• Health and Safety issues	• Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. • Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary fire fighting equipment. • The camp staff shall be provided firefighting training. • All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel	• Use of personal protective equipment at campsite • Site Specific Health and Safety Management Plan (SSHSMP) in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19 outbreak", the contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant • Implement SOP provisions for prevention, detection and emergency procedure.			

Transportation of construction material	• Soil erosion and contamination	• Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. • Vehicles and equipment shall not be repaired in the field.	• Log of vehicle and equipment repairs	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Air pollution due to vehicle fuel	• Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	• Route maps of vehicle movement • Log of vehicle maintenance • Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Noise pollution due to vehicle movement	• Vehicles shall have exhaust mufflers (silencers) to minimize noise generation	• Log of vehicle movement time • Visual inspections of the vehicles	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)		• Monitoring by Supervision Consultant
	• Health and Safety issues	• Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. • Project drivers shall be trained on defensive driving • Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to avoid damage to infrastructure.	• Visual inspections • Training record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Photographic records • Infrastructure restoration records	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
Construction Works: Earthen Bund with Stone Pitching: 1. Protection Bund -1 1,097 m 2. Protection Bund -2 625 m 3. Protection Bund -3 665 m 4. Protection Bund -4 400 m 5. Protection Bund -5 675 m 6. Protection Bund -6 550 m 7. Protection Bund -7 325 m	• Soil erosion and contamination	• Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. • Lands used for agricultural purposed shall not be used borrowing material. • Written consent of the land owner should be obtained for material (soil) borrowing • Photographic record (before and after) should be kept for the borrow and disposal areas. • Leveling of borrow sites shall be done by contractor on his own expense.	• Evidence of plan in place. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
8. Protection Bund -8 280 m					
	• Loss of natural vegetation	• Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.	• Evidence of plantation. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Monitoring Particulate Matter PM_{10}	• Daily monitoring reports • Fortnightly monitoring reports of PM_{10} • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Sites of Historical, Cultural, Archeological or Religious Significance	• In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with	• Evidence of training provided to contractor staff. • Evidence of maps in place with these sites shown. • Record of appropriate action taken in case of chance find.	• Immediately after chance find, to be reported in next quarter.	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		Supervising Consultant and BIPD. [38] • The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites. [1]	• Photographic record of chance find		
	• Noise pollution	Equipment with high levels shall be fitted with noise reduction devices. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. Construction work shall be carried out during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

[38] Project routing does not envisage any archeological site, however in case of any chance find the ***"Chance Find Procedures"*** should be adopted, as given in **Annexure-18**

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		issue and shall ensure that such incidents do not become a regular feature.			
	• Air pollution	Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx. • Evidence of measurement records.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	Demarcation tapes to be installed around the construction site to avoid any unauthorized entry Personal protective equipment should be made available at site and the usage of the PPEs should be ensured. • Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19	• Use of personal protective equipment • Site Specific Health and Safety Management Plan (SSHSMP) in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

		outbreak", the contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant • Implement SOP provisions for prevention, detection and emergency procedure.			
C. Operation & Maintenance Phase					
Breaching of flood protection bund	• System sustainability	• The Irrigation Department should monitor the system on a regular basis. • Capacity building of the communities should be carried out in the O&M activities. • Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.	• Monitoring reports	• Quarterly reporting	• Environmental Specialist to develop reports • PD to review and take management actions, where needed
Risk due to Natural Hazard i.e. Flooding and Earthquakes	• System sustainability	• Emergency Response Plan for Flood Protection Bund will be followed which is attached as **Annexure – 14** of this report.	• Training record of emergency response plan	• Monthly monitoring and quarterly reporting	• Irrigation Department

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Karkh River Intervention: Construction of New Weir at Jhalaro and Repair of Cutoff Wall of Chutta Weir					
A. Design & Planning Phase					
Assessment of water availability	• Failure of design	Water availability has been properly assessed • at design phase. Hydrological and flood management analysis has been done to ensure the feasibility of project	• Feasibility and Design report before project execution	• Once before start of construction works	• Design Engineer
Design works construction of weir as per proper engineering standards	• In case of design failure system will be collapsed	• Review of engineering design works has ensured the proper design of the system	• Design Report	• Once before start of construction works	• Design Engineer
Traditional water rights considerations	• Social issues	• Acquire full information about traditional water rights and ensure that these are not disturbed	• Water Rights Consideration Included in the Design Report	• Once before start of construction works	• Design Engineer • Project Director
Public disclosure of final design	• Social issues	• Continual two-way communication with relevant stakeholders to understand causes of previous failures, community needs, and establish rationale perceptions	• Minutes of Meetings with Stakeholders	• Once before start of design works • Once before start of construction works	• Design Engineer • Project Director
Risk due to Natural Hazard i.e. flooding and earthquakes	• The Project area lies in zone 2B as per seismic map of Pakistan which clearly shows that the	• Seismic design of weir and other allied and irrigation structures has been be carried out on international	• Design Report	• Once before start of construction works	• Design Engineer

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	area is in moderate risk zone. So due to earthquake the breaching weir, canal and other irrigation structures can be possible. This impact would be of moderate significance. The other natural hazard which affect the area is flood which would also be of moderate significance.	engineering standards. By adopting the above measure, the impact is of low significance. • Flood protection bunds has been included as an integral component of the project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.			
B. Construction Phase (Construction of Weirs at Jhalaro)					
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	• Establishment of fuel depot / Workshop facilities may spread oils	• In order to avoid spread of oil by virtue of establishment of fuel depot / Workshop facilities, the contractor should avoid it altogether. Incase, it cannot be avoided, the contractor must house it and underlay the area with proper liner. • Dispensing pumps should be used.	• Visual inspection	• Daily monitoring report • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Spent Oil shall be properly collected in impermeable containers. • Spent oil shall be disposed in accordance with MSDS shall be ensured. • Good housekeeping practices shall be ensured at workshop areas.			
	• Loss of vegetation	• The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	• Use of LPG cylinders at campsite	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Influx of external work force	• Residents of village shall be employed for the construction phase (mostly for unskilled jobs).	• Development & implementation of policy on local employments • Employment record	• Strict compliance monitoring on fortnightly basis • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Land degradation due to solid waste disposal of camp site	• Construction contractor shall not dispose of any solid waste in the area. The construction	• Visual inspection	• Weekly monitoring reports • Quarterly Reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		Contractor may dump solid waste with proper lining material in depressions and have a daily and monthly cover on it. • Contractor shall collect in separate bins and segregate solid waste according to its type. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the supervision consultant. The Contractor shall transport and dispose solid waste at existing municipal dump site at the outskirts of Khuzdar after acquiring approval / NOC from Town Municipal Authority at Khuzdar every month. The contractor shall submit the NOC to the office of BIPD every month.			• Monitoring by Supervision Consultant
	• Changes in land use pattern	• Location for establishment of campsite shall be duly discussed and approved	• Visual inspection	• Weekly monitoring reports • Quarterly Reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BIPD 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 Chief Engineer, BIPD 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			• Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Health and Safety issues	• Protective fencing to be installed around the Camp and its latrines to avoid any accidents. Open defecation shall not be allowed. • Firefighting equipment shall be made available at the camps. Sand being excessively available shall also be used and stored in buckets along with other necessary fire fighting equipment. • The camp staff shall be provided firefighting training. • All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel • Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19 outbreak", the contractor will prepare Site-specific	• Use of personal protective equipment at campsite • Site Specific Health and Safety Management Plan (SSHSMP) in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

		EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant • Implement SOP provisions for prevention, detection and emergency procedure.			
	• Deterioration of air quality due to machinery & equipment	• Proper engine tuning of machinery/ equipment every month shall be carried out to comply with	• Monitoring shall be done on stack of machinery and equipment. The	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		National Environmental Quality Standards of Pakistan.	parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx. • Evidence of measurement records.		• Monitoring by Supervision Consultant PM
	• Noise	• Equipment with high levels shall be fitted with noise reduction devices • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured • Activity having high noise potential shall be postponed to day time i.e. in between 0800hrs to 1700hrs	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Water - Feaces contamination	• Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for	• Monitoring compliance to NEQS of sanitary wastewater generated from campsite. The	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		approval to the Chief Engineer, BIPD.	monitoring parameters will be TSS, BOD, COD and Oil & Grease. • Waste management plan in place • Photographic record		
Security and Safety Risks	• Delay in project execution	• Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and	• Minutes of meetings of community consultation • Dissemination material	• Monthly reporting	• Contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites			
Transportation of construction material	• Soil erosion and contamination	• Only Ratodero-Gawadar (M-8) paved highway shall be used for transportation of construction material. • Vehicles and equipment shall not be repaired in the field.	• Log of vehicle and equipment repairs	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Air pollution due to vehicle fuel	• Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions	• Route maps of vehicle movement • Log of vehicle maintenance • Monitoring shall be done on stack of machinery and equipment. The parameters required	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
			to be monitored are Smoke, SOx, CO, VOCs and NOx.		
	• Noise pollution due to vehicle movement	• Vehicles shall have exhaust mufflers (silencers) to minimize noise generation • Construction material shall be transported during 0800hrs to 1700hrs to avoid night time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature	• Log of vehicle movement time • Visual inspections of the vehicles • Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. • Project drivers shall be trained on defensive driving	• Visual inspections • Training record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Vehicle speeds near / within the communities shall be limited to 10-15 km/hr. to avoid damage to infrastructure.			
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Photographic records • Infrastructure restoration records	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
Construction Works: 1. Earth Works for 150m Weir with 3 m wide UnderSluice 2. Concrete and Form Works for New Weir and Repair of Cutoff Wall of Chutta Weir	• Soil erosion and contamination	• Material borrowing and disposal plan should be prepared by contractor and submitted to Supervising Consultant / BIPD for approval. • Lands used for agricultural purposed shall not be used borrowing material. • Written consent of the land owner should be obtained for material (soil) borrowing • Photographic record (before and after) should be kept for the borrow and disposal areas. • Leveling of borrow sites shall be done by	• Evidence of plan in place. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		contractor on his own expense.			
	• Loss of natural vegetation	• Compensatory tree plantation (ten times the trees cut down for construction) should be carried out at appropriate locations within the project area.	• Evidence of plantation. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections □	• Daily monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Noise pollution	• Equipment with high levels shall be fitted with noise reduction devices. • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. • Construction work shall be carried out during 0800hrs to 1700hrs to avoid night	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		time disturbance. If unavoidable, the Supervising Consultant in consultation with BIPD and Contractor shall resolve this issue and shall ensure that such incidents do not become a regular feature.			
	• Sites of Historical, Cultural, Archeological or Religious Significance	• In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall immediately stop work and notify the provincial and federal archeological departments along with Supervising Consultant and BIPD. [39] • The appropriate line of action shall be sought from the concerned department before resumption of the construction activities at such sites.	• Evidence of training provided to contractor staff. • Evidence of maps in place with these sites shown. • Record of appropriate action taken in case of chance find. • Photographic record of chance find	• Immediately after chance find, to be reported in next quarter.	• Execution by construction contractor • Monitoring by Supervision Consultant

[39] Project routing does not envisaged any archeological site, however in case of any chance find the ***"Chance Find Procedures"*** should be adopted , as given in **Annexure-18**

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Air pollution	• Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions • Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, SOx, CO, VOCs and NOx. • Evidence of measurement records.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Demarcation tapes to be installed around the construction site to avoid any unauthorized entry • Personal protective equipment should be made available at site and the usage of the PPEs should be ensured. • Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19 outbreak", the contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety	• Use of personal protective equipment • Site Specific Health and Safety Management Plan (SSHSMP in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

		Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant • Implement SOP provisions for prevention, detection and emergency procedure.			
C. Operation & Maintenance Phase					
Breaching of Weir	• System sustainability	• The Irrigation Department should monitor the system on a regular basis. • Capacity building of the	• Monitoring reports	• Quarterly reporting	• Environmental Specialist to develop reports • PD to review and

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		communities should be carried out in the O&M activities. • Liaison with the communities to be maintained to identify potential weaknesses in the system that could cause breaches.			take management actions, where needed
Conflicts caused by unavailability or improper distribution of water in the area	• Social issues	• Agreements between different communities/tribes • Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. From the outset water management rules and regulations must incorporate ways to tackle such issues as water scarcity and surplus flows. • Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other	• Agreement between parties • Training records	• Quarterly reporting	• Environmental Specialist to develop reports • PD to review and take management actions, where needed

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		structures. This needs to be done on collaborative basis with irrigation and agriculture department where communication system among farmers, water user association and department is assured. • Farmers in downstream areas should be compensated in case they lose their water rights. • All villages deprived of Project's water rights should be compensated for drinking water supply schemes otherwise very soon all villages and settlements will be deserted as underground water may not be fit for drinking purpose for every village and it would probably not be within the financial or technical capacity of local population to initiate such schemes on their own.			
Use of water for drinking purposes	• Health issues	• Proper treatment system shall be provided • Water quality will be tested as per WHO/ GOP	• WHO/ GOP Drinking Water Standards	• Daily monitoring reports of turbidity and free residual chlorine test	• Environmental Specialist to develop reports • PD to review and

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		standards to ensure the integrity of the water supply system. • Turbidity and free residual chlorine tests shall be regularly performed. • Arsenic will be tested as per WHO standards.		• Monthly analysis of water quality parameters • Quarterly reporting	take management actions, where needed
Periodic cleaning and maintenance of the system	• Solid waste generation	• Ensure proper disposal of waste at designated landfill/disposal sites.	• Periodic cleaning records • Visual inspection	• Monthly monitoring and quarterly reporting	• Irrigation Department • Water User Association
Increase of agricultural lands	• Loss of pastoral lands	• Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals	• Monitoring records	• Monthly monitoring and quarterly reporting	• Agriculture Department • Forestry Department • Wildlife Department
Community Participation for management and operation of the irrigation system	• Social issues • System sustainability	• Ensure community participation in management and operation of the irrigation system • Training of community	• Training records • Community participation records	• Monthly monitoring and quarterly reporting	• Irrigation Department • Water User Association
Disruption to wildlife	• Conservation issues	• Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval.	• Monitoring and maintenance records	• Monthly monitoring and quarterly reporting	• Irrigation Department • Wildlife Department

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.			
Use of fertilizers & pesticides	• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff	• Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; • Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and • Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as Annexure 19 of this report	• Visual inspection • Monitoring records • Market survey for availability of AN and CAN fertilizers	• Monthly monitoring and quarterly reporting	• Agriculture department
Risk due to Natural Hazard i.e. Flooding and Earthquakes	• System sustainability	• Emergency Response Plan for Breaching of Canal will be followed which is attached as **Annexure – 13** of this report.	• Training record of emergency response plan	• Monthly monitoring and quarterly reporting	• Irrigation Department

7.1.9 Planning for Implementation of EMP

328. NOC and Other Approvals

- **BEPA Approval Process**

329. The BID has obtained No Objection Certificate (NOC) from the EPA Balochistan that was mandatory requirement before project commencement.

- **Stakeholder Coordination**

330. 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.

331. 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.

332. 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.

7.2 Training

333. In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. An environmental and social training and Technical Assistance (TA) program is to be carried out before the implementation of the project. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures. 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 stage of the project.

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335. The training consultant will organize training courses for Proponent and Contractor staff to train them in specialized areas such as air and noise pollution monitoring and water quality monitoring etc. The details of this training program are presented in Table 35.

Table 39: Personnel Training Program

Training Provided by	Contents	Trainees	Duration
supervision / training consultants/ organizations specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations, daily monitoring and supervision	• Irrigation Staff • Contractor • project staff • Project Implementation Staff	1 day
Training consultants/ organizations specializing in social management and monitoring	Short seminars and courses on: Social awareness	• Project staff dealing • in Social/lands • matters	1 day
Training consultants/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	• Contractor's staff	2 days

7.3 Communication & Documentation

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

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

- ***Data Recording and Maintenance***

338. 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***

339. 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***

340. 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.

341. 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***

342. 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***

343. 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.

7.4 Grievance Redressal Mechanism

344. The Grievance Redress Mechanism (GRM), outlines the policy and procedure for documenting, addressing, responding and employing methods to resolve project grievances (and complaints) that may be raised by displaced persons (DPs) or community members arising from environmental and social performance, the engagement process, land acquisition and resettlement and/or unanticipated environmental or social impacts resulting from project activities that are performed and/or undertaken by PMO/PIO. The document describes the scope and procedural steps and specifies roles and responsibilities of the parties involved. The purpose of the GRM is to receive, review and resolve grievances from DPs and ensure smooth and fair implementation of subproject activities.

- ***Principles***

345. A GRM is proposed to address any complaints or grievances arising during the implementation period of the projects undertaken by the PMO/PIO. Members of the public may perceive risks to themselves or their property or their legal rights or have concerns about the possible adverse environmental and social impact that a project may have. Any concerns or grievances should be addressed quickly and transparently, and without retribution to the DP or complainant.

346. The primary principle is that any complaints or grievances are resolved as quickly as possible in a fair and transparent manner.

347. All minor complaints regarding land or property disputes that can be resolved should be resolved immediately on the site at the village level Displaced Person Committees (DPCs)/ Farmer Organizations (FOs). In case the concerned parties are unable to resolve the said dispute on the site, the DP may make a complaint to the Grievance Redress Committee (GRC) at the subproject level/district/basin level (PMO/PIO), the details of which are provided herein below. The focus of the GRM is to resolve issues in a customarily appropriate fashion and record details of the complaint, the complainant and the resolution.

- ***Objectives***

348. The objectives of the GRM are to:

- develop an organizational framework to address and resolve the grievances of individual(s) or community(s), fairly and equitably;
- provide enhanced level of satisfaction to the aggrieved;
- provide easy accessibility to the aggrieved/affected individual or community for immediate grievance redress;
- ensure that the targeted communities and individuals are treated fairly at all times;
- identify systemic flaws in the operational functions of the project and suggest corrective measures; and
- Ensure that the operation of the project is in line with its conception and transparently

to achieve the goals for sustainability of the project.

- ***Structure of Grievance Redress Mechanism***

349. The project shall have multi-tier GRM (Figure 26) with designated staff responsibilities at each level. These levels comprise the following:

1. Displaced Person Committees (DPCs)

350. For effective coordination in the field with DPs and community, DPCs will be established at the village level to maintain a close rapport with affected persons and local community throughout project implementation. The DPC will act as coordinator among the PMO/PIO, the DPs and local community for coordination and information dissemination to keep them informed about day to day development on the project, particularly about the grievance resolution progress. The Senior Sociologist (PMO/PIO), Social/Community Organizer & Environment Specialist of supervision consultant (Design team) will coordinate with the affected persons for constitution of DPC at the village level comprising of at least five members with one as committee convener. The DPC at village level will provide a platform for DPs to raise and discuss their concerns, resolve petty issues at the village level with PMO/PIO assistance, and coordinate with project executors to communicate the issues and concerns regarding social & environmental issues unresolved at DPC. The project safeguards and engineering staff will coordinate with DPs and village level committees to review and resolve the issue or concern related to LAR planning or implementation & environmental concerns preferably within 15 days from receipt of the grievance. DPC will comprise of the following members;

- Social/Community Organizer of SC (male/female);
- Female member; and
- Two male members
- Environment Specialist of SC (Design Team)

2. District/ Project Management Office (PMO)/ Project Implementation Office (PIO)/Basin Level

351. Baluchistan Irrigation Department (BID) shall constitute a Grievance Redress Committee (GRC) headed by Deputy Project Director (DPD) at District/PMO/PIO level for each river basin i.e Zhob & Mula to resolve all grievances and complaints of the DPs and the complainants. The GRC shall comprise of the following members:

- Deputy Project Director (DPD)/EXEN, PMO/PIO as head/convener of GRC;
- Senior Sociologist-Female, PMO/PIO; act as secretary of GRC
- Land Acquisition Collector (LAC) as Member;
- Resettlement Specialist;
- Environment Specialist of SC (PMO Support)and
- Any notable personality from the area to be nominated in writing by the relevant District Administration in consultation with the community.

352. Note: Representative from any other Department may be called as and when required by the GRC. Environmental Specialist of SC will join GRC meeting related to

Environmental issues only.

353. The GRC will meet once a month and when the need arises. The GRC will review grievances involving all LAR planning and implementation, environmental issues (water, Air, Noise pollution etc) and social issues including, compensation, relocation, and other assistance as well as social issues that may arise due to restricted access to the resources and amenities.

354. GRC will perform following functions:

- Record grievances, categorize and prioritize the grievances that need to be resolved by the committee and solve them within a month;
- Summon and hear aggrieved persons/parties to produce evidence of their claims and record their view point;
- Communicate its decisions and recommendations on all resolved disputes to project executors and the aggrieved persons for implementation;
- Forward the unresolved cases to GRC-BID/project level within an appropriate time frame with reasons recorded and its recommendations;
- Develop an information dissemination system and acknowledge the aggrieved parties about the development regarding their grievance and decision of GRC-BID/project level;
- Maintain a complaint register accessible to the stakeholders with brief information about complaints and GRC decision with status report; and,
- Maintain complete record of all complaints received by the GRC with actions taken.

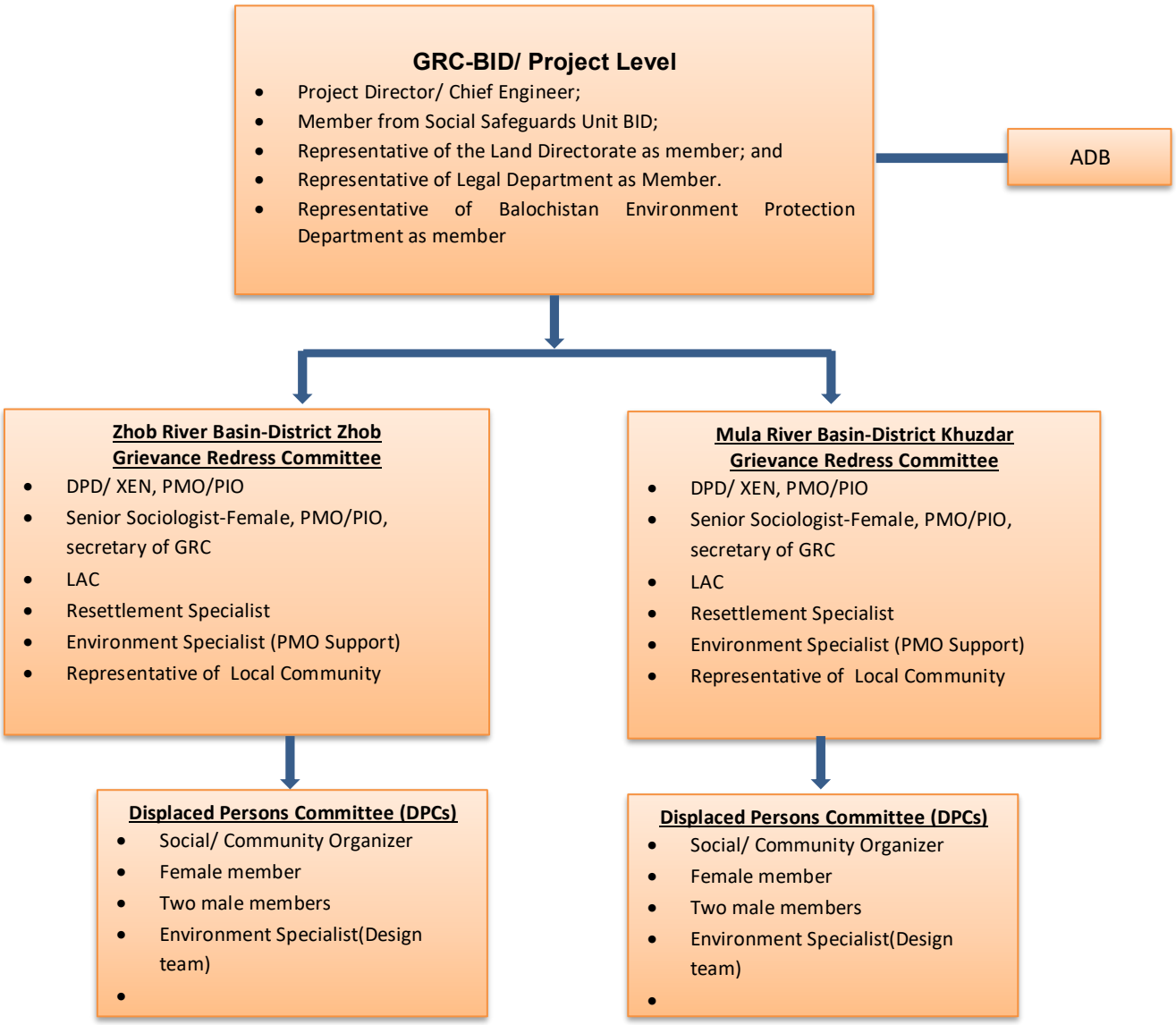
3. BID/ Project Level

355. BID shall constitute a Grievance Redress Committee (GRC) at BID/ project level. The committee will have following composition:

- Project Director/ Chief Engineer, as head/ convener of GRC;
- Member from Social Safeguards (female) Unit BID;
- Representative of the Land Directorate as member; and
- Representative of the Legal Department as member.
- Representative of the Balochistan Environment Protection Department as member.
-

356. This GRC-BID/project level, through authorized representative, will acknowledge the complainant about his complaint, scrutinize the record of the GRC-PMO/PIO/basin, investigate the remedies available and request the complainant to produce any record in favour of his claim. After thorough review and scrutiny of the available record on complaint, visit the field and collect additional information, if required. Once the investigations are completed, the GRC-BID/project level shall give decision within 30 days of receipt of the complaint. If the complainant is still dissatisfied with the decision, he can go to the court of law, if he/she wishes so.

Figure-26: Organogram for GRM



357. Gender representation will be ensured by inducting a female member in both GRCs. The mechanism will ensure the access of DPs to a GRM that openly and transparently deals with the grievances and makes decision in consultation with all concerned that are consistent with SPS-2009 and country safeguard system.

- Grievance Redress Proceedure

358. The intention of GRM is to resolve a complaint as quickly and at as low a level as possible to avoid a minor issue becoming a significant grievance. Irrespective of the stage of the process, a complainant has the option to pursue the grievance through the court as is his or her legal right in accordance with law. The details of the process are given below:

359. The GRC will work both at the project and field level. The PMO/PIO safeguards and engineering staff, in coordination with district-level BID staff will inform the DPs about the GRC and its mechanism through consultations, focus group discussion and by posting at prominent places. The complaints received through any media will be screened by type and category and registered in a community complaints register (CCR), where the name

& address of complainant, date, description of complaint and action taken will be recorded. The GRC will acknowledge the complaints within 5 days of receipt and will review available records. If required, GRC will advise the safeguards/engineering staff to conduct field visits in consultation with the aggrieved person, local community and the land revenue staff and submit a fact finding report. Preferably the fact finding will be completed within 15 days from receipt of complaints. The GRC in its formal meeting to be conducted within 30 days from receipt of complaint, will hear and clarify with the complainant (if required so) about the issue and shall conclude and communicate its recommendations for further implementation. Complainant will be kept informed during the process and the GRC decision will be communicated to him in a language and form understandable to him. The GRC proceedings will be documented step by step and all records will be maintained and summarized in the project progress and internal monitoring reports.

360. Nonetheless, the complainant will be at liberty to access the formal legal course if he is dissatisfied with the GRC findings and recommendations. If GRC fails to conclude its recommendations either due to some technical or legal constraint, the GRC will immediately report the issue to BID/project level GRC and will request guidance and support it deems necessary. BID/project level GRC will ensure to resolve the grievance in 30 days. In case of any delay, the complainants will be informed on the progress and process about their grievances.

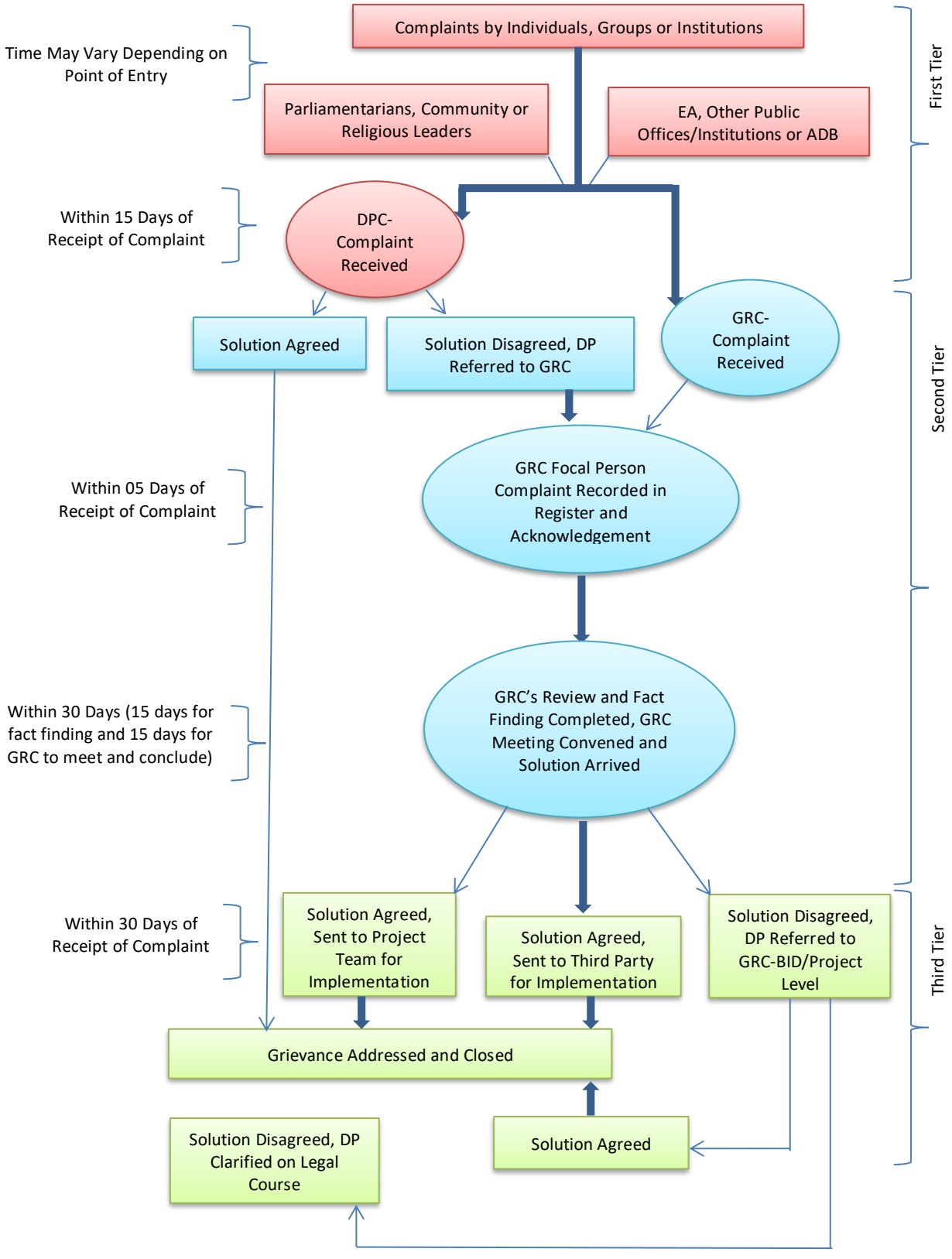
361. Disputes on land title, land compensation awarded and payable under law and apportionment of compensation will be dealt under the grievance redress mechanism provided in the LAA-1894. Environmental issues will be dealt according to Balochistan environmental protection act 2012 and ADB SPS 2009 guidelines. Any complaint received will be registered in the GRM and the DPs will be clarified on the process and supported to access the legal course. All other issues will be resolved through the project-based GRM. Community complaints and grievances will be addressed through two different processes as described in the following Table-30.

Table-40: Grievance Redressal Process

Land/Crop Compensation Issues	Project/ Other Issues (Including Environmental)
a. First, complaint resolution will be attempted at site (village level) through the involvement of the PMO/DPC/ FO. **b.** If unsettled, grievance can then be lodged to the GRC or DOR/LAC to proceed under law and communicate decision in least possible time. **c.** GRC will acknowledge the complaint within 5 days of complaint and after initial review and consultation with the LAC, within 15 days of receipt of complaint, the GRC will clarify the legal course of action and guide aggrieved persons to approach appropriate legal forum. PMO will coordinate with the land administration	**a.** First, complaints resolution will be attempted at site (village level) through the involvement of the PMO/DPC/FO. **b.** If unresolved, a grievance will be lodged to the GRC, which will acknowledge receipt of the complaint within 5 days. **c.** The GRC will conduct fact finding in 15 days of receipt of complaint and after review of fact findings reports and hearing the DPs in person will conclude its recommendations in 30 days of receipt of complaint. In case GRC could not decide in stipulated time, the reasons if any will be recorded and the grievance will be resolved in next 30 days.

authorities including District Collector and LAC to request early resolution of the issue/complaint. **d.** In case the grievance pertains to awarded compensation, PMO will clarify with the DPs the process as set out in Section 18 to 22 of the LAA.	**d.** If the complainant is not satisfied, he can pursue further by submitting to the appropriate court of law.

Figure-27: Grievance Process and Time Frame



7.5 Environmental Management Cost

362. The budget presented in Table 41 and 42 will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

Table 41: Cost for Contractor

Sr. #	Description	Unit Cost* PKR / Month
1	Laboratory Analysis Cost	200,000
2	Contractor Environmental Engineer (each contractor)	80,000
3	Health & safety measures to manage COVID-19	1000,000 for whole project period
* based on unit parameter testing and sampling cost for air, water and noise.		

Table 42: Cost for Proponent

Sr. #	Description	Amount (PKR)*
A	**During Construction Period**	
1	Laboratory Analysis Cost	100,000/Quarter
2	Supervision Consultant/Environmental Officer	100,000/Month
3	Third Party Monitoring	500,000/Quarter
4	Tree Plantation Cost	1,500/Tree
5	Training on EMP	100,000/day
B	**During Operation & Maintenance Period (for initial three years)**	
1	Laboratory Analysis Cost	50,000/Six Months
2	Training & Community Engagement Cost	50,000/Month
3	Third Party Monitoring	300,000/ Six Months
* based on unit parameter testing and sampling cost for air, water and noise.		

7.6 Change Management

363. The EIA and the EMP have been updated at the Detail Design Stage of the project. However, these are dynamic documents. During the construction phase of the project, monitoring will need to be accompanied by a rapid feedback decision taking system that allows any corrective action to be taken if things are not as predicted. The whole environmental management system is a dynamic process that has to be responsive and also anticipate conditions.

364. Specific actions that will need to be made include the following:

- Once a Main Contractor has been appointed then a meeting will need to be held between the proponent of the project, the Supervisory Consultants and the contractor to clearly define the environmental management responsibilities of each party. The detailed nature of

the EMP will need to be discussed and agreed, including a matrix of items and responsibilities related to the timing of the construction works and the contracts;

- Based upon the discussions during the meeting, a Change Report will be collectively produced which will include any recommended modifications needed to the EMP;
- The Change Report will be submitted to the relevant department for final approval and form part of the EMP; and
- All relevant project personnel will be given information of the required changes to the EMP.

8. CONCLUSIONS AND RECOMMENDATIONS

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

8.1 Findings and Recommendations

366. 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.

367. 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 Balochistan Environmental Protection Act 2012.

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

369. 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.

370. Environmental impacts during the construction phase are related to the establishment of campsite which are temporary and can be minimized with better management. Construction 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.

371. During the execution of this study, consultations with relevant government officials, academia, NGOs and local community have been conducted to gain their perceptions of the project and ascertain the nature and scope of local participation in project planning and implementation.

372. Water rights are equally distributed among the agriculturists according to the land holdings. The FOs in the subproject areas have not been active and need to be strengthened. The Agriculture Extension Department in Balochistan can play a vital role in enhancing the cropping intensity of the proposed subproject area with timely knowledge of best agricultural practices.

373. Construction of subproject is going to bring positive changes in the area in terms of availability of water, cultivation of crops, establishment of new settlements and improvement in the standard of life of the inhabitants of the area.

374. Land which is lying barren at present would change to lush green valley through provision of irrigation water.

375. Availability of irrigation and agriculture would support livestock growth and in due course of time would enable farmers to diversify in areas of diary production.

376. The project will generate employment opportunities for local laborers during all three phases of project. The Project will positively contribute in improving the carrying capacity of biological environment and overall improvement of the ecosystem.

377. Household income will increase substantially with irrigation improvement measures owing to availability of water for irrigation, crop yields, increase in the number of animals, and availability of other occupational opportunities.

378. 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.

379. Careful planning and management is recommended to avoid air pollution and generation of solid waste during construction phase especially during storage & transport of overburden soil.

380. Water rights are equally distributed among the agriculturists according to the land holdings. The FOs in the subproject areas have not been actively and need to be strengthened. The Agriculture Extension Department in Balochistan can play a vital role in enhancing the cropping intensity of the proposed subproject area with timely knowledge of best agricultural practices.

8.2 Conclusions

381. 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.

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

329. "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 implementatio***