

Initial Environmental Examination

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PAK: Balochistan Water Resources Development Sector Project

Project No. 48098-002

Part 1 of 4

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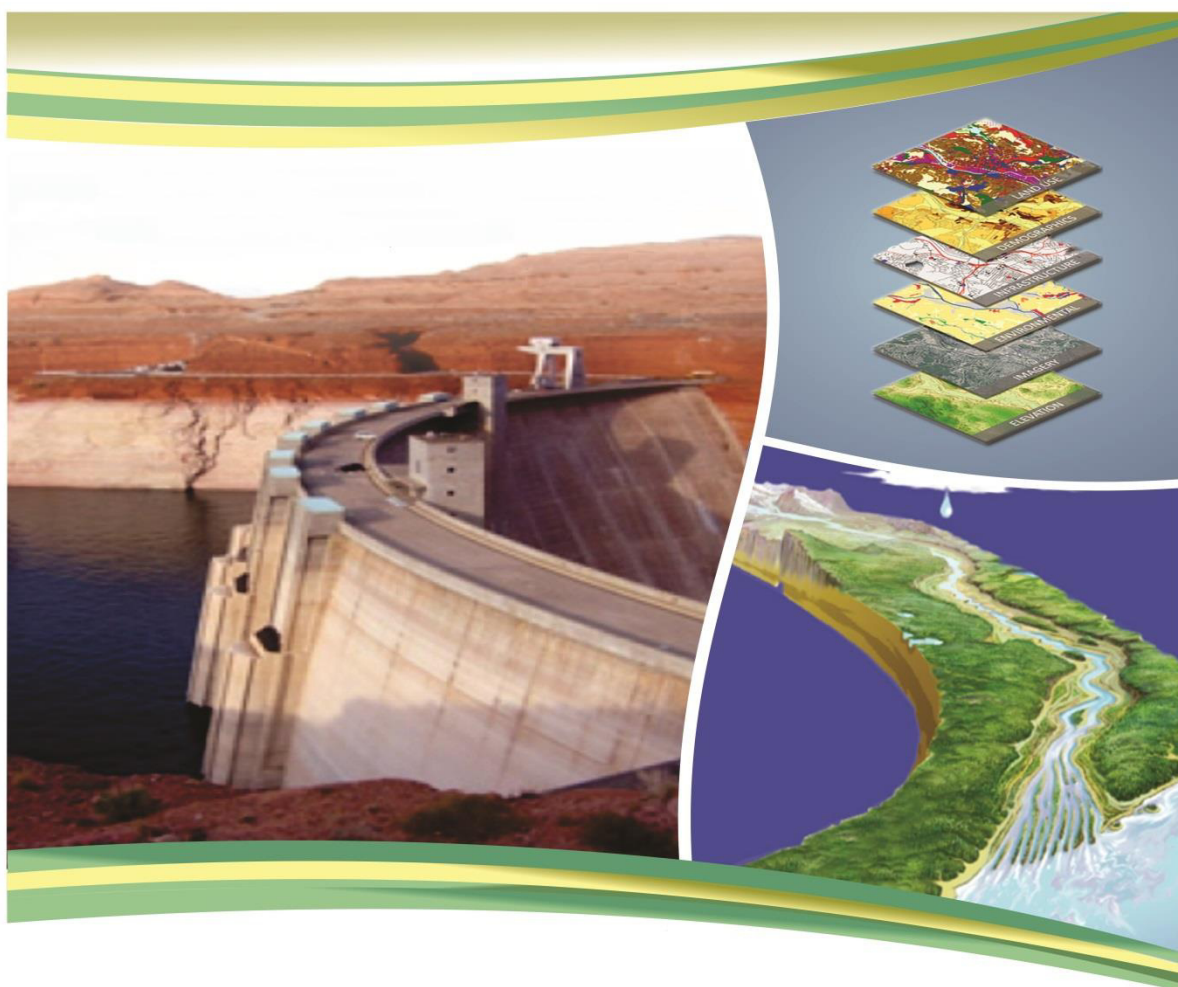


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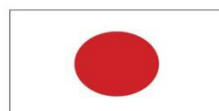
Balochistan Water Resources Development
Project (BWRDP)
(ADB TA 8800-PAK)

DRAFT

INITIAL ENVIRONMENTAL EXAMINATION BWRDP - Selected Schemes in Mula / Karak River Basin



Japan
Fund for
Poverty
Reduction



From
the People of Japan



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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 ₂ S	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
BIPD	Balochistan Irrigation and Power 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. This report presents the findings of an Initial Environmental Examination (IEE) study carried out by NEC Consultants (Pvt.) Limited for proposed core project on Karakh-Mula River. Six (06) schemes namely Wanderi, Chutta, Khadri, Jhalaro, Acherwand and Sinjori are located on Karkh River and Kharzan Hatachi Infiltration Gallery is located on Mula River. The Project is expected to be funded by Asian Development Bank (ADB) with Balochistan Irrigation and Power Department (BIPD) acting as the Executive Agency (EA).

2. The proposed Karkh River scheme are located at a few kilometres from each other and are therefore being bundled the location of the schemes is given in Table 1. These schemes will bring 2,250 hectares under cultivation out of which 2,000 (88.9%) hectares are already under cultivation, while an additional 250 hectares will be added to the command area. On the other hand, the Kharzan Hatachi Infiltration Gallery is located on Mula River approximately 120 km north-east of Khuzdar town via Rato Dero-Gawadar Motorway. The coordinates of the scheme are 3103885.09 m North and 313839.58 m East. The scheme will bring 681 hectares under cultivation out of which 576 (84.5%) hectares are already under cultivation, while an additional 105 hectares will be added to the existing command area.

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 of interventions related to all components of this subproject. These are divided as, (i) Irrigation Network – Rehabilitation and Lining. (ii) Flood Protection. and (iii) Weir construction at Jhalaro and rehabilitation of Weir at Chutta. The proposed Mula River interventions can be divided into three broad categories: (a) Construction of infiltration gallery for each village i.e. Kharzan and Hatachi, (b) Lining of unlined canals and rehabilitation of existing irrigation system, and (c) Improvement of flood protection works - raising existing bunds and protecting new low-lying command areas.

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 expected to be involved as a donor / financier, its relevant policies and guidelines will also govern the proposed project.

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:

- 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

6. 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 **Figure 10** in Chapter 3.

7. The design of interventions related to all components of this subproject. These are divided as, (i) Irrigation Network – Rehabilitation and Lining. (ii) Flood Protection. and (iii) Weir construction at Jhalaro and rehabilitation of Weir at Chutta.

8. Salient features of the Project are shown in below **Table A** and **Table B** respectively.

Table A: Salient Features of Proposed Project at Karkh River

Irrigation System	
Total length of irrigation system	34,960 m
Length of existing irrigation system	32,840 m
Length of canals to be lined	14,770 m
Length of canal to be repaired	1,810 m
Length of proposed New canal	2,115 m
Design Capacity New canal	0.15 cumecs
Canal Section	Rectangular Section (concrete bed and stone masonry walls)
Flood Protection Embankments (bunds)	
Nine flood protection bunds	Total length = 5,240

Construction of Jahlaro Weir and Rehabilitation of Chutta Weir	
Weir	106 m long and 1 m high gabion weir
Design specs	Weir is designed for a 50-year flood of 773 cumecs which corresponds to a design head of 2.61 m.
Chutta weir rehabilitation	Upstream cutoff wall of the existing weir is damaged. The computed upstream and downstream cutoff wall is 2 m deep from the structure's base which will be rehabilitated.

Table B: Salient Features of Proposed Project at Mula River

Parameter	Kharzan	Hatachi
Infiltration Gallery		
Gallery Length (m)	475	740
Gallery Pipe Diameter (m)	1	1
Design Discharge (cumec)	0.3	0.5
Command Area (Ha)	235	446
Gallery Elevation (m)	628.5	609.5
Canal Network		
Canal Length	26,562 m	12,689 m
Proposed Pipe	2,228 m	120 m
Canal Section	Rectangular Section (concrete bed and stone masonry walls)	
Design Capacity	0.5 cumecs	0.3 cumecs
Existing Main Canal	3,699 m	597 m
Proposed Main Canal	4,245 m	530 m
Existing Distributary Canal	630 m	4,110 m
Proposed Distributary Canal	17,988 m	7,453 m
Cattle Drinking Structure	1 No.	1 No.
Washing Structure	1 No.	1 No.
Water Storage Tank	2 No.	2 No.
Canal Structures		
Aqueduct	6 No.	1 No.
Existing Drainage Culvert	7 No.	2 No.
Existing Off-take Structures	10 No.	8 No.
Fall Structures	16 No.	17 No.
Manhole	21 No.	2 No.
Proposed Off-take Structures	17 No.	3 No.
Super Passage	-	1 No.
Transition Chamber	3 No.	1 No.

Parameter	Kharzan	Hatachi
Protection Works		
Flood Protection Bund	3,140 m	3,460 m

D. PROJECT ALTERNATIVES

a) No Project Alternative

9. 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. Over the years, some part of gabion wall has been damaged due to flood flows in the Mula River. 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

10. 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

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

12. The following two options were considered at Hatachi-Kharzan:

- A water intake structure, as head works, with proper flood protection works for canal system and lining the entire water channel to the command area including drainage structures.
- An infiltration gallery along with lined irrigation channel up to the command area.

13. **Table C** below provides comparison of alternatives with respect to cost, design and environment for Mula River interventions:

Table C: Comparison of Alternatives

Parameters	Weir	Infiltration Gallery
Cost	700 Million PKR	535.4 Million PKR
Design	Weir can only be operateable during surface flow of river.	Infiltration gallery can provide water to agricultural field around the year
Perceived Environmental Impacts	Soil erosion, loss of natural vegetation, deployment of external labor force.	Soil erosion, loss of natural vegetation, deployment of external labor force.

E. BASELINE CONDITIONS

a) Physical Environment

14. 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.

15. The geological features of **Kharzan-Hatachi subproject area** comprise of Paleocene sedimentary rocks. Area adjacent to the subproject location, and also some part of the command area has underlying Eocene sedimentary rocks.

16. 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.

17. **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.

18. **Kharzan-Hatachi subproject area** is located in the middle reach of Mula River. The subproject is proposed on relatively wide gorge where the river is bounded by high mountains on both sides. The river has a width of 530 m and an elevation of 638 m above mean sea level at the subproject location. Moreover, the river is very steep in this reach having a longitudinal slope of 1:70. The terrain is generally flat in the subproject area and is suitable for command area development. The new command area is on a degraded rangeland

19. 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).

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

21. 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

22. 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.

23. Vegetation zones of the **Karkh and Hitachi 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	Amaranthaceae	Shrub	Gujo
09	Periploca aphylla	Ascalpidaceae	Shrub	

#	Taxon	Family	Life form	Vernacular name
10	Capparis decidua	Capparidiaceae	Shrub	
11	Haloxylon recurvum	Amarantheaceae	Shrub	
12	Suaeda fruticosa	Amarantheaceae	Shrub	
13	Suaeda fruticosa	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	Boraginaceae	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 montana	Asteraceae	Herb	Kulumurak
24	Inula grantoides	Asteraceae	Herb	Kulumurak
25	Grewia tenax	Malvaceae	Shrub	Chill
26	Phoenix dactylefera	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	Convolvulaceae	Twiner	
34	Fagonia indica	Zygophyllaceae	Shrub	
35	Salsola sp	Chenopodiaceae	Shrub	

24. 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.

25. Cumulative faunal list of the **Karkh and Hitachi Area** consist mainly of following:

#	Taxon	Common name	Life form	Conservation status
01	Gazella bennettii	Chinkara	Mammals	Rare

#	Taxon	Common name	Life form	Conservation status
02	Capra aegagrus	Sindh Wild Goat	Mammals	Occasional
03	Ovis orientalis blanfordi	Urial (Gut)	Mammals	Occasional
04	Vulpes griffithii	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
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 knoieczyi	Indian desert monitor	Reptile	
27	Naja	Indian Cobra	Reptile	Common
28	Ablepharus pannonicus	Easter dwarf skink	Reptile	
29	Eristicophis macmahonii	Leaf nose viper	Reptile	

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

#	Area	Status	Tehsil	Distance from Karkh River Interventions	Distance from Haatachi Khizran Infiltration Gallery
1	Kera Dhor 8,094 hectares	Wildlife Sanctuary	Khuzdar	51 km away	55 km away
2	Chorani (19,433 hectare)	Notified forest	Khuzdar	88 km away	92 km away

c) Demographic and Socio-economic Environment

27. 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.

28. 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.

29. 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.

30. 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.

31. There is no group of people that could be termed as "Indigenous Community", under the definition of ADB.

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

F. ENVIRONMENTAL IMPACTS & MITIGATIONS

33. 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.

34. 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: Design works will ensure the assessment of water. Hydrological and flood & drought management analysis shall 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 - Faeces 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 and submit a Health & Safety Plan for approval by Supervision consultant / 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.

- **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 purposes shall not be used for 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 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/ 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 19** 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 - Faeces 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 and submit a Health & Safety Plan for approval by Supervision consultant / BIPD.

- **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 purposes shall not be used for 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 – 16** 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: Design works will ensure the assessment of water. Hydrological and flood & drought management analysis shall 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: Design engineer should ensure that seismic design of weir and other allied and irrigation structures should be carried out on international engineering standards. By adopting the above measure, the impact would be 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. Contractor shall prepare and submit a Health & Safety Plan for approval by Supervision consultant / BIPD.

- **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 - Faeces 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 – 17** 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 19** 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.

Infiltration Gallery at Hatachi - Kharzan (extensioning; lining of covered channel, open channel lining, social structures and time division structures)

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: Design works will ensure the assessment of water. Hydrological and flood & drought management analysis shall ensure the feasibility of project success.

- **Design works construction of infiltration gallery as per proper engineering standards**

Mitigation: Review of engineering design works will ensure the proper design of the system.

- **Social Issues**

Mitigation: Acquire full information about traditional water rights and ensure that these are not disturbed.

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: Design engineer should ensure that seismic design of weir and other allied and irrigation structures should be carried out on international engineering standards. By adopting the above measure, the impact would be 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

- **Changes in land use pattern, Cultural conflicts, Influx of external work force, Land degradation due to solid waste disposal of camp site, Workshop facilities will spread oils & chemicals, Soil erosion**

Mitigation: 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. Local residents shall be given priority in the employment opportunities generated during construction and operations phase. The land shall be rented for the camp site and equipment yard. No resettlement is envisaged for this purpose.

- **Workshop facilities may spread oils & chemicals**

Mitigation: Proper disposal of used oil and chemical waste in accordance with MSDS shall be ensured. Efficient Use of Chemicals shall be ensured. Good housekeeping practices

shall be ensured at workshop areas. Mixing of waste into fresh water sources shall not be allowed.

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

Mitigation: Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.

- **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.

Vehicles shall have exhaust mufflers (silencers) to minimize noise generation. Nighttime traffic shall be avoided near the communities. Local population shall be taken in confidence if such work is unavoidable.

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

Mitigation: Ensure proper disposal of camp site waste at designated landfill/disposal sites. If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping. Prior to dumping the contractor should get the NOC from local authorities for disposal of solid waste. 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. After the dumping of solid waste the depression should be covered by scarified material. Good housekeeping practices within the camp site shall be adopted to minimize waste generation. Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed

- **Water contamination**

Mitigation: Waste management plan to be prepared for appropriate disposal of sewage – such as septic tank and soaking pits.

- **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 (five 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 to avoid any accidents. Firefighting equipment shall be made available at the camps. The camp staff shall be provided firefighting training. All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel. Health & safety plan should be prepared by contractor and get it approved by supervision consultant.

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 kept low, to avoid safety hazard and dust emissions.

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. Health & safety plan should be prepared by contractor and get it approved by supervision consultant

- **Delay in project execution**

Mitigation: 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: Vehicular traffic on unpaved roads shall be avoided as far as possible. Vehicles and equipment shall not be repaired in the field. If unavoidable, impervious sheathing shall be used to avoid soil and water contamination. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities to suppress dispersion of dust.

Material borrowing and disposal plan should be prepared. Cultivation fields should be avoided for borrowing material to the extent possible. Written consent of the land owner should be obtained for material (soil) borrowing. Photographic record (before, during, after) should be kept for the borrow and disposal areas. Leveling of borrow sites

- **Air pollution**

Mitigation: Vehicular traffic on unpaved roads shall be avoided as far as possible. Operation of vehicles and machinery close to the water channels, water reservoir shall be minimized. Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.

Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.

- **Noise pollution**

Mitigation: Vehicles shall have exhaust mufflers (silencers) to minimize noise generation. Nighttime traffic shall be avoided near the communities. Local population shall be taken in confidence if such work is unavoidable.

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. Avoid night time activity

- **Damage to infrastructure**

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

- **Site overburden**

Mitigation: Wind direction shall be considered while selecting sites for stock piles. Stockpiles of overburden shall be kept covered where possible. Ensure proper disposal of construction waste at designated landfill/disposal sites. If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping. Prior to dumping the contractor should get the NOC from local authorities for disposal of solid waste. Proper disposal of waste material. Demarcate the waste site and provide details of land use. Finally take approval from supervision consultant. 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. After the dumping of solid waste, the depression should be covered by scarified material Dismantled asphalt pavement shall be dumped to the waste site.

- **Borrow pit management**

Mitigation: As far as possible wasteland or natural areas with a high elevation will be demarcated for borrowing earth material. Where the use of agriculture land is unavoidable, the top 300 mm of the plough layer will be stripped and stockpiled for redressing the land after the required borrow material has been removed. Where deep ditching is to be carried out, the top 1 m layer of ditching area will be stripped and stockpiled. The ditch will initially fill with scrap material from construction and then leveled with the stockpiled topsoil. Ditches or borrow pits that cannot be fully rehabilitated will be landscaped to minimize the erosion and to avoid creating hazards for people and livestock. Land owners will be compensated according to the terms of lease agreement negotiated with the land owners, and restoration action agreed upon by the contractor will be duly carried out.

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

Mitigation: Proponent shall ensure that the construction contractor staff is educated about the location and importance of the cultural sites that exist in the Project area. The contractor shall ensure that these sites are not affected by the construction related activities including movement of the project vehicles and obtaining borrow material for construction. These aspects will be included in the trainings to be conducted for the contractor's staff. In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall ensure that the work is stopped at that site, the provincial and federal archeological departments are notified immediately, and their advice is sought before resumption of the construction activities at such sites. Graveyards shall not be disturbed during the construction activities including movement of the project vehicles and obtaining borrow material for construction.

- **Blocked of access due to earth works and stockpiling of excavated material**

Mitigation: A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.

c) Operation & Maintenance Phase

- **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.

- **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.

- **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 19** of this report

- **Risk due to Natural Hazard i.e. flooding and earthquakes (System sustainability)**

Mitigation: Emergency Response Plan for Infiltration Gallery will be followed which is attached as **Annexure – 15** of this report.

Mula 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)**

Mitigation: Review of engineering design works will ensure the proper design of the system.

- **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, Cultural conflicts, Influx of external work force, Land degradation due to solid waste disposal of camp site, Workshop facilities will spread oils & chemicals, Soil erosion**

Mitigation: 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. Local residents shall be given priority in the employment opportunities generated during construction and operations phase. The land shall be rented for the camp site and equipment yard. No resettlement is envisaged for this purpose.

- **Workshop facilities may spread oils & chemicals**

Mitigation: Proper disposal of used oil and chemical waste in accordance with MSDS shall be ensured. Efficient Use of Chemicals shall be ensured. Good housekeeping practices shall be ensured at workshop areas. Mixing of waste into fresh water sources shall not be allowed.

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

Mitigation: Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.

- **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. Avoid night time activity.

Vehicles shall have exhaust mufflers (silencers) to minimize noise generation. Nighttime traffic shall be avoided near the communities. Local population shall be taken in confidence if such work is unavoidable.

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. Avoid night time activity

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

Mitigation: Ensure proper disposal of camp site waste at designated landfill/disposal sites. If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping. Prior to dumping the contractor should get the NOC from local authorities for disposal of solid waste. 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. After the dumping of solid waste, the depression should be covered by scarified material. Good housekeeping practices within the camp site shall be adopted to minimize waste generation. Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed

- **Water contamination**

Mitigation: Waste management plan to be prepared for appropriate disposal of sewage – such as septic tank and soaking pits

- **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 (five 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 to avoid any accidents. Firefighting equipment shall be made available at the camps. The camp staff shall be provided firefighting training. All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel. Health & safety plan should be prepared by contractor and get it approved by supervision consultant.

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 kept low, to avoid safety hazard and dust emissions.

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. Health & safety plan should be prepared by contractor and get it approved by supervision consultant

- **Soil erosion and contamination**

Mitigation: Vehicular traffic on unpaved roads shall be avoided as far as possible. Vehicles and equipment shall not be repaired in the field. If unavoidable, impervious sheathing shall be used to avoid soil and water contamination.

Material borrowing and disposal plan should be prepared. Cultivation fields should be avoided for borrowing material to the extent possible. Written consent of the land owner should be obtained for material (soil) borrowing. Photographic record (before, during, after) should be kept for the borrow and disposal areas. Leveling of borrow sites.

- **Air pollution**

Mitigation: Vehicular traffic on unpaved roads shall be avoided as far as possible. Operation of vehicles and machinery close to the water channels, water reservoir shall be minimized. Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.

Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits. Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.

- **Damage to infrastructure**

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

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

Mitigation: Proponent shall ensure that the construction contractor staff is educated about the location and importance of the cultural sites that exist in the Project area. The contractor shall ensure that these sites are not affected by the construction related activities including movement of the project vehicles and obtaining borrow material for construction. These aspects will be included in the trainings to be conducted for the contractor's staff. In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall ensure that the work is stopped at that site, the provincial and federal archeological departments are notified immediately, and their advice is sought before resumption of the construction activities at such sites. Graveyards shall not be disturbed during the construction activities including movement of the project vehicles and obtaining borrow material for construction

c) Operation & Maintenance Phase

- **Breaching of Flood Protection Bund (System sustainability)**

Mitigation: 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 – 16** of this report.

G. ENVIRONMENTAL MANAGEMENT PLAN

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

36. EMP also provides its implementation mechanism during construction and operational phases

- **Implementation during Construction Phase:** The executing agency for this Project is Balochistan Irrigation and Power Department (BIPD) having core implementation responsibility. The BIPD will overall monitor the environment related activities of Supervision Consultant and Construction Contractor and report to EPA-Balochistan regarding implementation status of EMP. Construction Contractor will be in direct coordination with Supervision Consultant through its HSE Department. Contractor's HSE Department is highly recommended to be on-board before mobilization.
- **Implementation during O&M:** The key players involved during operation of the proposed project are EA (BIPD), District Environmental Officers of Khuzdar, Water User Associations (WUA) & Farmer Organizations (FOs) Chairman and Vice Chairman. BIPD will get input from WUA and FOs, randomly check the project operation in context of EMP and report to District Environment Officers annually.

37. The EMP is prepared taking into account environmental consequences of the proposed action. Mitigation measures are suggested in Environmental Mitigation Plan at different stages of activities with performance indicators to mitigate the potential impacts. Environmental Monitoring Plan has also been prepared as a part of EMP which details about monitoring mechanism of a specific receptor /item, its frequency and parameters to be considered. The designer has carefully considered all recommendations related to the design. Though construction impacts are not severe, proper mitigation measures are needed. A suitable training program is proposed to train the Contractor(s) staff who will be involved in the Construction Phase and the professional staff from the proponent involved at the operational phase of the project. All required permits shall be obtained from the concerned departments before starting the related activity. Grievances should be addressed promptly, as suggested in the EMP.

EMP Budget

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

Table D: Cost for Contractor

Sr. #	Description	Unit Cost* PKR / Month
1	Laboratory Analysis Cost	200,000
2	Contractor Environmental Engineer (each contractor)	80,000
	Total	Rs. 280,000/-

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

Table E: 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.

H. CONCLUSION

39. 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.

40. 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.

41. 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.

42. 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 dairy production.

43. 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

44. 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.

45. 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.

46. 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.

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

Proponent & Execution Agency	Irrigation and Power Department, Government of Balochistan
Design Consultants	Techno Consult International (TCI)
IEE Consultants	NEC Consultants (NEC)
Financiers	Asian Development Bank (ADB)

1.1 Karkh River Development Scheme

48. 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**.

49. 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

1.2 Kharzan Hatachi Infiltration Gallery

50. The Kharzan Hatachi Infiltration Gallery is located on Mula River approximately 120 km north-east of Khuzdar town via Rato Dero-Gawadar Motorway. The coordinates of the scheme are 3103885.09 m North and 313839.58 m East. The location of subproject is shown on the Location Map in **Figure 1 and 2**.

51. The scheme is proposed on river bents (small flat patches) and therefore, limited amount of land is available for irrigation. The proposed scheme will use surface flow as well as sub-surface flow for irrigation. The scheme will bring 681 hectares under cultivation out of which 576 (84.5%) hectares are already under cultivation, while an additional 105 hectares will be added to the existing command area. After construction of this scheme, lands belonging

to two villages in Mula Tehsil, namely Kharzan and Hatachi will come under cultivation. Kharzan is located on the right bank while Hatachi is on the left bank of the Mula River.

Figure 1: Location of Core Subproject Mula River Basin (Karkh River Scheme)

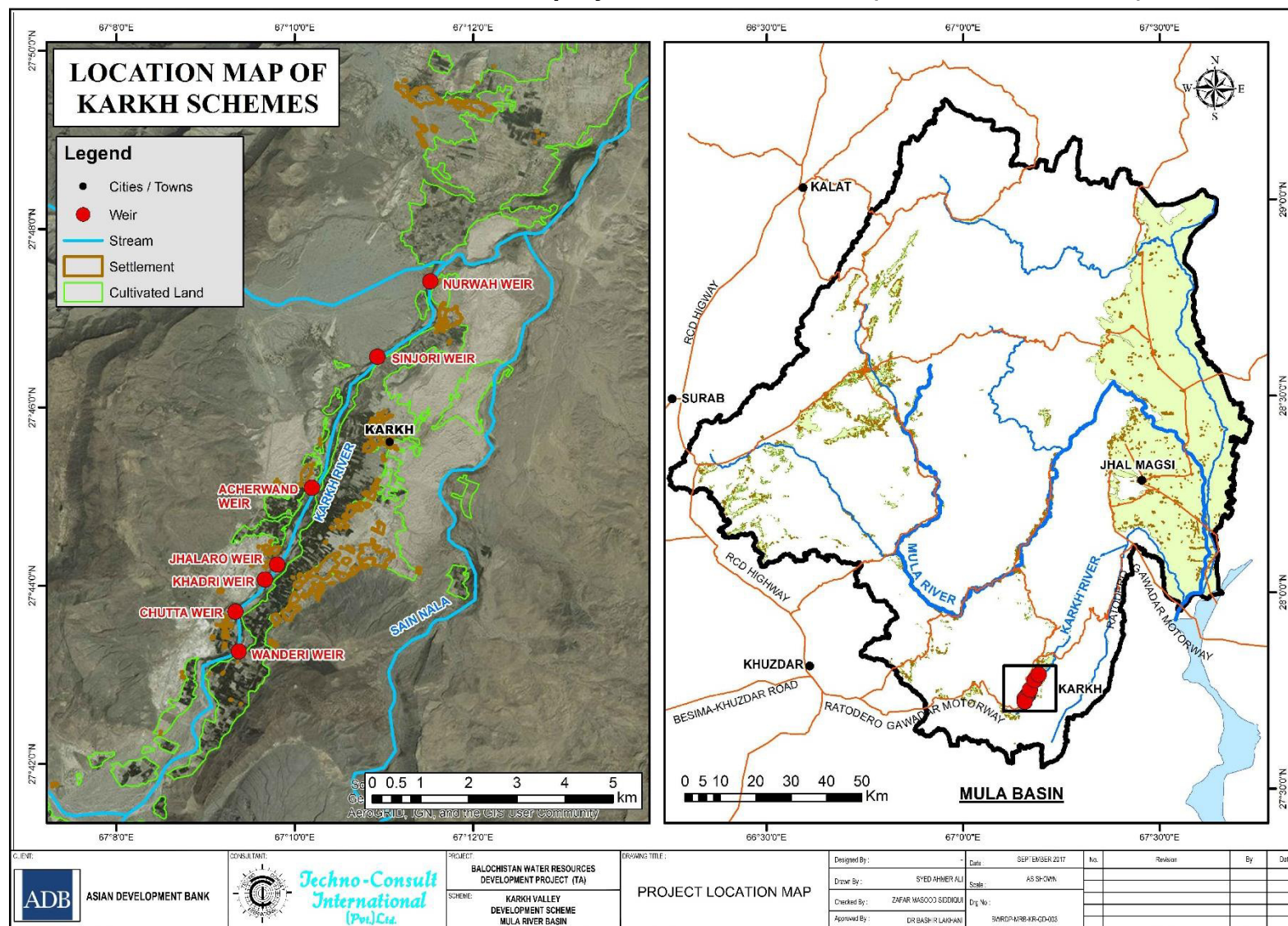
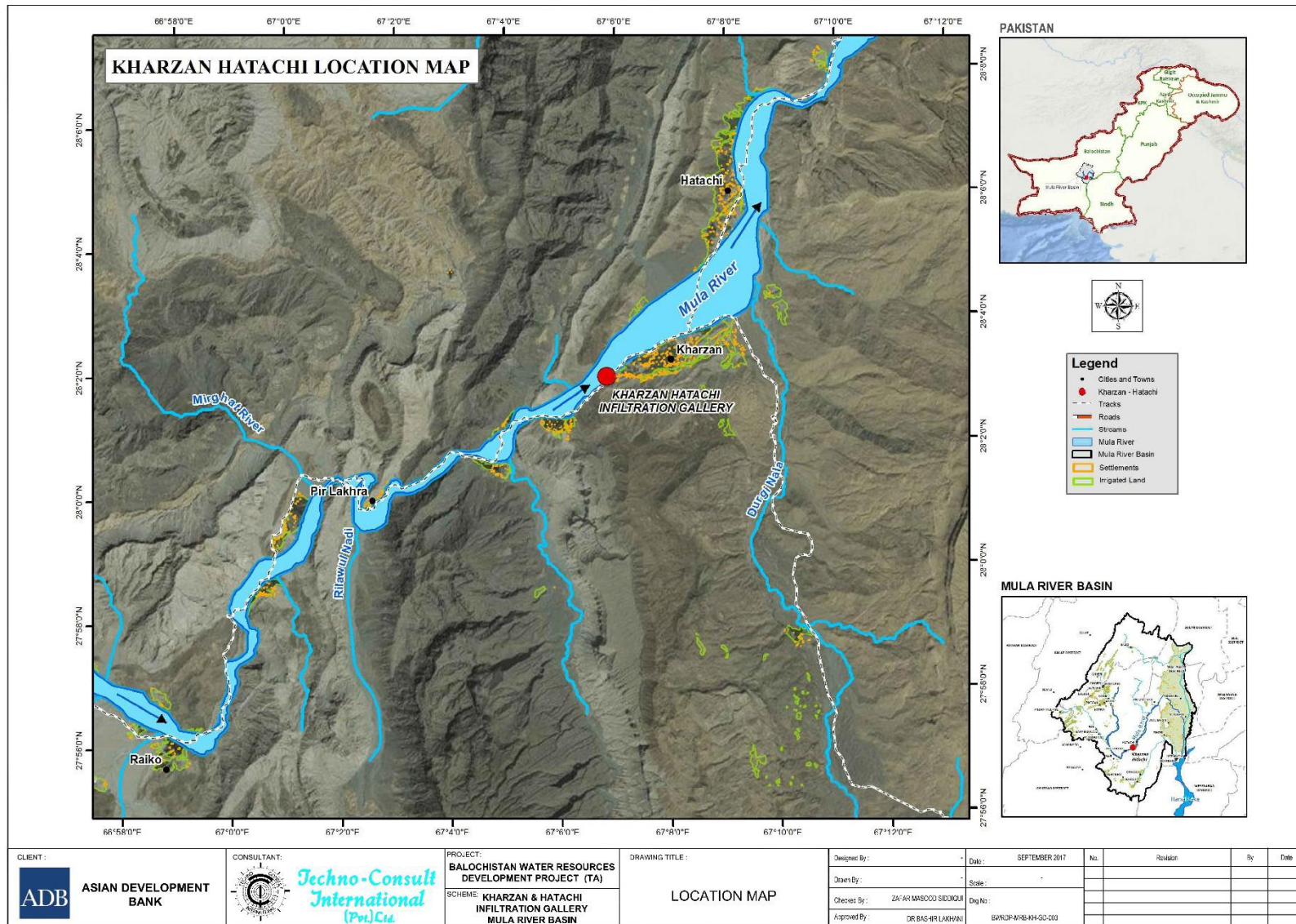


Figure 2: Location of Core Sub Project Mula River Basin (Kharzan Hatachi Infiltration Gallery)



1.3 Proposed Karkh – Mulla River Interventions

1.3.1 Proposed Interventions at Karkh River

52. 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. **Figure 1** gives clear idea of the project interventions:

53. the design of interventions related to all components of this subproject. These are divided as, (i) Irrigation Network – Rehabilitation and Lining. (ii) Flood Protection. and (iii) Weir construction at Jhalaro and rehabilitation of Weir at Chutta.

1.3.2 Proposed Interventions at Mullah River (Kharzan and Hatachi Infiltration Gallery)

54. The proposed interventions can be divided into three broad categories. **Figure 2** gives clear idea of the project interventions:

- i Construction of infiltration gallery for each village i.e. Kharzan and Hatachi,
- ii Lining of unlined canals and rehabilitation of existing irrigation system,
- iii Improvement of flood protection works - raising existing bunds and protecting new low-lying command areas.

1.4 Environmental Assessment

55. 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.

56. 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 and construction of infiltration gallery in Hitachi – Kharzan area of Mula River at district

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.”

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.

57. 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.

58. 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**.

59. 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.

60. 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.

61. 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.

62. 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.

63. 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 Mula River Basin Project.

64. 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.

65. 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.

1.5 More Specific Objectives of IEE Report

66. 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

1.6 Scope of IEE

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

☐ Description of the Project:

68. 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:

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

☐ Legislative and Regulatory Considerations:

70. 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:

71. 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 are 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	UTM Zone 42R at 3073729.22 Northing and 320874.34 Easting

#	Intervention Description	Coordinates
	Council Abad, tehsil Karkh, district Khuzdar, Balochistan	

72. In Mula River, the proposed subproject of Kharzan-Hitachi Gallery is situated at UTM Zone 42R and coordinates of the subproject are 3103885.09 North and 313839.58 East at about 120 kms north-east of Khuzdar via Ratodero-Gawadar motorway. The mean altitude of the subproject command area is 600 m above mean sea level.

☐ Physical Environment:

73. 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.

74. 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:

75. 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:

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

77. 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:

78. 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.

79. "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.

80. 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

81. 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.

82. 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

83. 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

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

☐ Mitigation measures for Adverse Impacts:

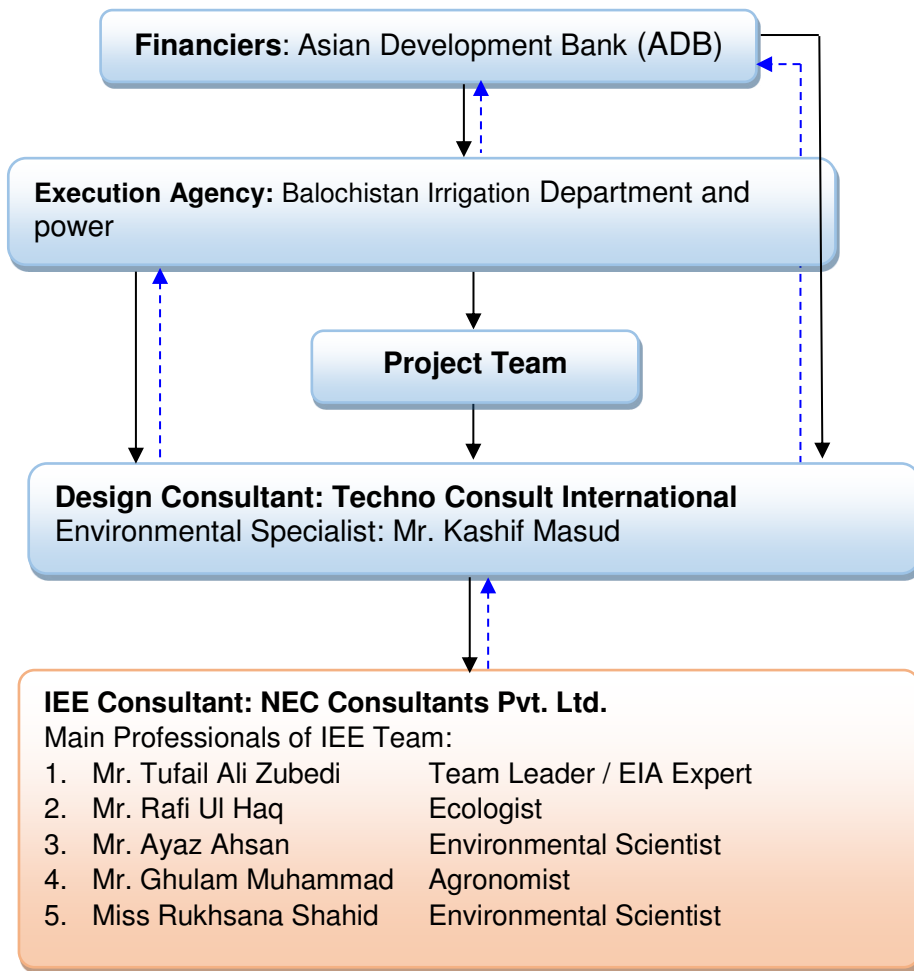
85. Possible measures to prevent or reduce significant negative impacts to acceptable levels will be identified. Recommendations to adopt feasible mitigation measures will be included in the report.

☐ Development of an Environmental Monitoring and Management Plan:

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

87. 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.

1.7 IEE Team Arrangement



2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 General

88. 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.

2.2 Background

89. 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.

90. 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 NCS³. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP)⁴.

91. 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 EPA⁵. 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; pg.1.

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.

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

2.3 National Environmental Policy

93. 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.

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

2.4 IWRM Policy

95. 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.

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

97. "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.

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

98. 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.

99. 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.

100. 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.

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

2.6 Environmental Legislations

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

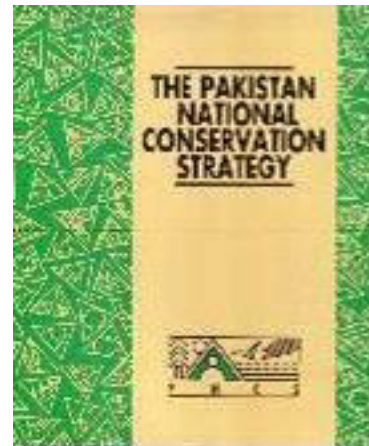
2.6.1 National Regulations

103. 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

104. 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



105. 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 development⁶.

2.6.2 Pakistan Environmental Protection Act, 1997

106. 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 projects⁷ 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.

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."

107. 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

108. 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.

109. 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.

110. 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.

111. 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

112. 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.

113. 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.

114. 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

115. 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.

116. 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

117. 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

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

2.6.8 The Balochistan Wildlife Protection (Amendment) Ordinance, 2001

119. 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

120. 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

121. 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

122. 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

123. 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)

124. 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.

125. 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

126. 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”.

127. The Initial Environmental Examination in hand is fully committed to the requirements determined in the “ADB Safeguard Policy Statement”. The environmental works carried out by

NEC on behalf of project proponents have been essentially guided by these rules as enunciated in the "Outline of an Initial Environmental Examination Report".

128. 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.

129. 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.

130. 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

131. 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.

132. 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

S. No.	Safeguard Policies	Key Requirements	Remarks
1	Environment	Projects and subprojects need IEE to address important issues not covered by any applicable regional or sectoral EA.	Applicable to proposed project
2	Involuntary Resettlement	Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-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. However, the situation may change at the detailed design level. Therefore, this policy is assumed to be applicable due to the serious nature of possible impacts.
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	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.

S. No.	Safeguard Policies	Key Requirements	Remarks
		and economic benefits that are culturally appropriate and gender and intergenerationally inclusive.	

2.8.3 Relevant International Treaties

□ Convention on Biological Diversity

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

134. 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

135. 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.

3. DESCRIPTION OF SUBPROJECTS

136. 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.

137. 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

138. Salient features of existing infrastructures are discussed below:

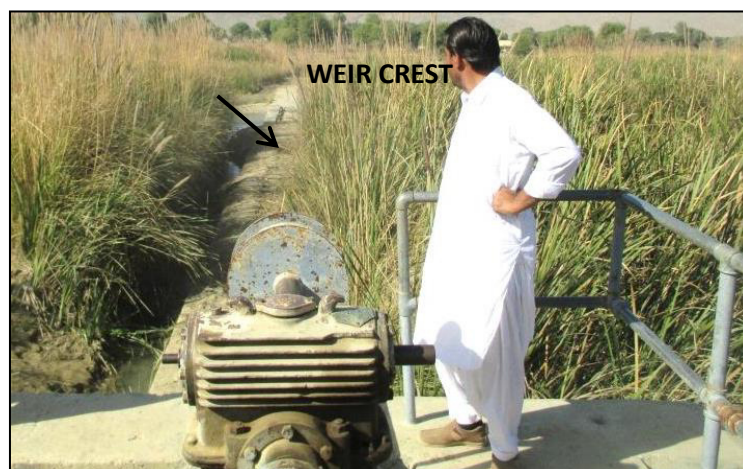
139.

□ Wanderi PIS

140. 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 3**).
- 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 & Power Dept.

Figure 3: View of Wanderi Weir



□ Chutta PIS

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

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

143. 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 choked with pan grass & weed which also need to be restored with stone pitching as shown in attached cross section as **Annexure 4**.

144. 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 4: View of damage portion of Chutta Weir



□ Khadri PIS

145. A 2 m high vertical drop weir having a top width of 2.3 m was constructed under BCIAP (see **Figure 5**). The weir is functional and has no significant issue but only needs cleaning. However, sometimes water overtops the flood protection bund.

Figure 5: View of Khadri Weir



□ **Jhalaro PIS**

146. There is no proper head works at the source (see **Figure 6**). 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 6: Location of proposed Infiltration gallery at Jhalaro PIS



□ **Acherwand PIS**

147. A weir was constructed under BCIAP (see **Figure 7**). Channel and under sluice gates are not functional (see **Figure 8**). 2.5 km channel length is lined. Grass and weeds are grown in the upstream and downstream of the weir.

Figure 7: View of Acherwand Weir**Figure 8: View of Channel Off-take point of Acherwand Weir**

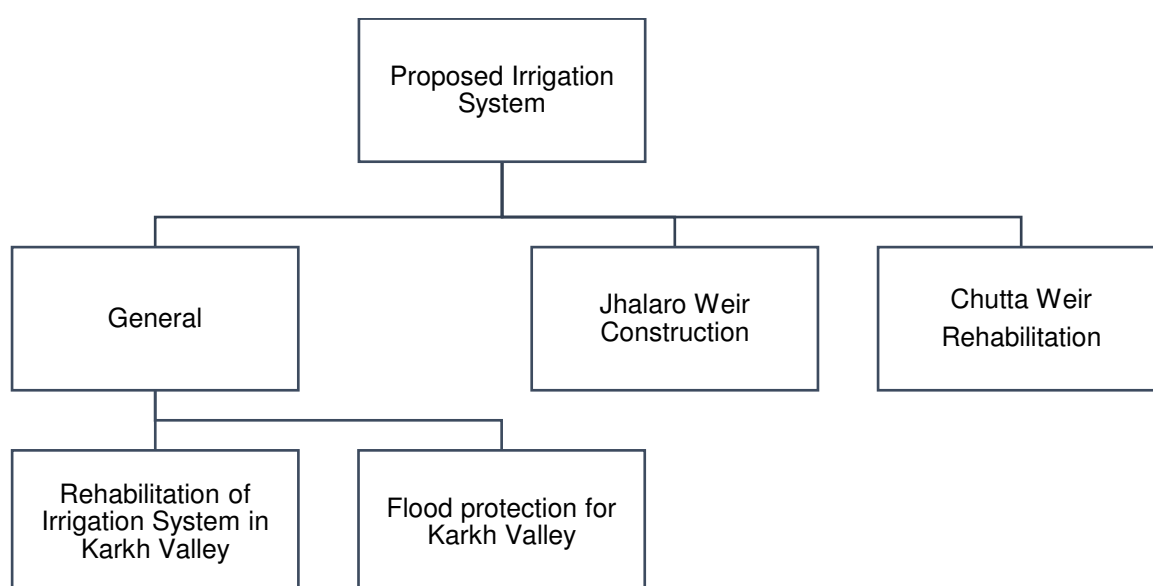
□ Sinjori PIS

148. A weir was constructed under BCIAP (see **Figure 9**). 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 9: View of Sinjori Weir

3.1.2 Proposed Projects

149. 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. **Figure 10** gives clear idea of the project interventions:

Figure 10: Karkh Valley Development Proposed Works

150. The design of interventions related to all components of this subproject. These are divided as, (i) Irrigation Network – Rehabilitation and Lining. (ii) Flood Protection. and (iii) Weir construction at Jhalaro and rehabilitation of Weir at Chutta.

3.1.3 Irrigation Network – Rehabilitation and Lining

151. Existing canal alignments are followed for the rehabilitation, repair and lining. Only two small canals are proposed in this subproject, both are located in Chutta village. Salient features of canal length and related structures provided on main canal are given in **Table 7**.

Table 7: Salient Features of Proposed Irrigation System

Total length of irrigation system	34,960 m
Length of existing irrigation system	32,840 m
Length of canals to be lined	14,770 m
Length of canal to be repaired	1,810 m
Length of proposed New canal	2,115 m
Design Capacity New canal	0.15 cumecs
Canal Section	Rectangular Section (concrete bed and stone masonry walls)

3.1.4 Flood Protection

152. A total of 9 protection bunds have been provided. Details of the bunds are as follows:

- i. Protection Bund -1 1,060 m

ii. Protection Bund -2	480 m
iii. Protection Bund -3	450 m
iv. Protection Bund -4	400 m
v. Protection Bund -5	680 m
vi. Protection Bund -6	560 m
vii. Protection Bund -7	330 m
viii. Protection Bund -8	300 m
ix. Protection Bund -9	980 m

3.1.5 Construction of Jhalaro Weir and Rehabilitation of Chutta Weir

□ Jhalaro Weir

153. 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. A 106 m long and 1 m high gabion weir is proposed at Jhalaro. Presently at this location flow is being diverted for irrigation by a locally constructed diversion embankment. The weir is designed for a 50-year flood of 773 cumecs which corresponds to a design head of 2.61 m.

□ Chutta Weir

154. 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.

155. A typical drawing and cross-section of the rehabilitation at Karkh river is given as **Annexure - 4. Table 8** below provides the cost estimates of Mula River interventions.

Table 8: Cost of Karakh Valley Development Proposed Works

No.	Components	Unit	Quantity	Amount (Rs.) Million
1	Jhalaro Weir	m	106	66.78
2	Chutta Weir Rehabilitation Works	-	-	132.86
3	Irrigation Channel	m	34,960	210.5
4	RCC Pipe Line (Under Ground)	m	347	4.87
5	Fall Structure	Nr.	5	1.36
6	Transition Chamber	Nr.	1	0.119
7	Siphon	Nr.	1	2.75
8	Washing Structure	Nr.	6	1.30
9	Cattle Drinking Trough	Nr.	6	0.698
10	Protection Works (Flood and Guide Bund)	Nr.	10	103.5

No.	Components	Unit	Quantity	Amount (Rs.) Million
11	River Bed Cleaning and Other Works	-	-	40.85
12	Water Supply System	-	-	5.013
13	Command Area Development	-	-	151.20
14	Watershed Management & Groundwater Recharge	-	-	17.70
15	Khushkaba Area Development	-	-	1.05
Total (Million Rs.)				740.55

Source: Design Report

3.2 Interventions at Mullah River (Infiltration Gallery)

3.2.1 Current Status

156. Perennial surface flow is diverted to irrigate the existing command area in the Hatachi and Kharzan villages. Due to the presence of considerable surface water, it is also used for livestock, drinking and other domestic purposes. Although perennial flow is used for irrigation, flood water is also available during high flow season.

157. An intake structure (See **Figure 11**) and water channel (See **Figure 12**) has been constructed under BMIAD project about 20 years ago with some protection wall of gabion (See **Figure 13**). Over the years, some part of gabion wall has been damaged due to flood flows in the Mula River. The intake structure is reported to be damaged and not supplying water to the supply channel. The irrigation channel is generally in good condition for the carrying water to Kharzan and Hatachi. The farmers of subproject contribute for making a channel from river on self-help basis and connect it into supply system of channel for the two villages. In recent years, the irrigation department has provided gabion protection wall to this river channel to avoid flood damages.

158. There is considerable perennial flow in the river that can be used for irrigation through proper means and can bring additional land under cultivation. The flood water in the river causes damages to the existing intake system which requires engineering solution. Absence of proper flow diversion structure restricts the villagers to use the perennial flow.

Figure 11: Existing intake structure**Figure 12: Existing channel and bifurcation****Figure 13: Existing gabion wall**

3.2.2 Proposed Projects

159. The proposed interventions can be divided into three broad categories:

- i. Construction of infiltration gallery for each of village,
- ii. Lining of unlined canals and rehabilitation of existing irrigation system,
- iii. Improvement of flood protection works - raising existing bunds and protecting new low-lying command areas.

□ Type of Structure

160. It is need of the day that new structures like extension of infiltration gallery tunnel, lining of infiltration gallery wells, infiltration gallery tunnel cleaning; lining of covered channel, open channel lining, social structures and time division structures be constructed for an efficient use of water for enhancement of cropping intensity in command area of the infiltration gallery. The provision of permanent infrastructure will improve system efficiency by reducing losses and conveyance times between the source and outlets. These savings will lead to expansion of the existing command area, diversification of the existing cropping pattern and an increase in cropping intensities. Additional advice regarding crop production will lead to improved practices and subsequently, increased yields.

161. The objective of the project is to provide more irrigation water to the existing and available command area in Kharzan and Hatachi Villages. The subproject will also provide with the protection bund along some reaches of command area to preserve it from flood water. Availability of water round the year will increase productivity of the area and enhance income generation activities in the area.

162. Two options were considered. The first being a water intake structure, as head works, with proper flood protection works for canal system and lining the entire water channel to the command area including drainage structures. The other option being the infiltration gallery along with lined irrigation channel up to the command areas.

□ Typical features of infrastructure

163. Infiltration gallery along with lined irrigation channel has been opted for irrigating the total command area (existing and proposed). About 681 hectares of potential command area has been observed which can be cultivated by the subproject. Irrigation canals are connected on the other end of these wells and carrying water to the command area. The layout plan and different cross sections of canal and infiltration gallery of the proposed subproject are shown in **Annexure 5**. Moreover, flood protection bunds at various locations of the subproject have been proposed for both the existing and proposed command areas.

164. The salient features and the cost estimates of the proposed interventions are shown in **Table 9** and **Table 10** respectively. A typical drawing and cross-section of Hatachi-Kharzan Infiltration gallery on Mula river is given as **Annexure - 5**.

Table 9: Salient Features - Kharzan Hatachi Infiltration Gallery, Irrigation System and Flood Protection Bund Subproject

Parameter	Kharzan	Hatachi
Infiltration Gallery		
Gallery Length (m)	475	740
Gallery Pipe Diameter (m)	1	1
Design Discharge (cumec)	0.3	0.5
Command Area (Ha)	235	446
Gallery Elevation (m)	628.5	609.5
Canal Network		
Canal Length	26,562 m	12,689 m
Proposed Pipe	2,228 m	120 m
Canal Section	Rectangular Section (concrete bed and stone masonry walls)	
Design Capacity	0.5 cumecs	0.3 cumecs
Existing Main Canal	3,699 m	597 m
Proposed Main Canal	4,245 m	530 m
Existing Distributary Canal	630 m	4,110 m
Proposed Distributary Canal	17,988 m	7,453 m
Cattle Drinking Structure	1 No.	1 No.
Washing Structure	1 No.	1 No.
Water Storage Tank	2 No.	2 No.
Canal Structures		
Aqueduct	6 No.	1 No.
Existing Drainage Culvert	7 No.	2 No.
Existing Off-take Structures	10 No.	8 No.
Fall Structures	16 No.	17 No.
Manhole	21 No.	2 No.
Proposed Off-take Structures	17 No.	3 No.
Super Passage	-	1 No.
Transition Chamber	3 No.	1 No.
Protection Works		
Flood Protection Bund	3,140 m	3,460 m

Source: Design Report

Table 10: Cost of Kharzan Hatachi Infiltration Gallery, Irrigation System and Flood Protection Bund SubProject

No.	Items	Unit	Quantity	Amount (million Rs.)
1	Infiltration Gallery and Offtake Well	Nr.	2	196.13
2	Flood Protection Bund	m	6600	137.86
3	RCC Pipe Line (Under Ground)	m	2400	56.87
4	Irrigation Channel	m	39,400	185.06
5	Fall Structure	Nr.	33	8.97
6	Cattle Drinking Trough	Nr.	2	0.23
7	Washing Structure	Nr.	2	0.43
8	Offtake Structure	Nr.	20	0.80
9	Transition Chamber	Nr.	4	0.37
10	Super Passage	Nr.	1	0.42
11	Aqueduct	Nr.	7	3.18
12	Water Supply System	-	-	6.25
13	Watershed Management	-	-	7.23
14	Command Area Development	-	-	50.94
15	Khushkaba Area Development	-	-	6.32
Total (Million Rs.)				661.06

Source: Design Report

165. The proposed Construction schedule and Estimated labor force and resource usage by contractor is shown in **Figure 14** and **Table 11** below:

Table 11: Estimated Labor Force and Resource Usage by Contractor

#	Description	Unit	Quantity
Construction Works at Karkh River Interventions			
1	Labor force deployed for 18 months	No.	120
2	Water requirement for construction works	m ³	2,500
3	Water requirement for labor force	m ³	6,480
4	Wastewater generated from campsite	m ³	5,184
5	Following machine will be utilized at site: 1. Concrete Batching Plant 2. Concrete Pump Mobile 3. Concrete Static Pump 4. Transit Mixture 5. Loader 6. Excavator (Type) 7. Excavator (Chain) 8. Dumper	No.	Various depending upon contractor progress

#	Description	Unit	Quantity
	9. Mobile Crain 10. Truck Crain 11. Tractor 12. Tractor Trolley 13. Electric Vibrator (Petrol) 14. Steel Cutting Machine 15. Steel Bending Machine 16. Water Bowser 17. Fuel Pump 18. Power Generator 19. Welding Plant (Diesel) 20. Dewatering Pump (Diesel)		
6	Cement	tons	3,875
7	Sand	tons	5,183
8	Crush	tons	11,625
Construction Works at Kharzan Hatachi Infiltration Gallery			
1	Labor force deployed for 18 months	No.	50
2	Water requirement for construction works	m ³	2,000
3	Water requirement for labor force	m ³	2,700
4	Wastewater generated from campsite	m ³	2,160
5	Following machine will be utilized at site: 1. Concrete Batching Plant 2. Concrete Pump Mobile 3. Concrete Static Pump 4. Transit Mixture 5. Loader 6. Excavator (Type) 7. Excavator (Chain) 8. Dumper 9. Mobile Crain 10. Truck Crain 11. Tractor 12. Tractor Trolley 13. Electric Vibrator (Petrol) 14. Steel Cutting Machine 15. Steel Bending Machine 16. Water Bowser 17. Fuel Pump 18. Power Generator 19. Welding Plant (Diesel) 20. Dewatering Pump (Diesel)	No.	Various depending upon contractor progress

#	Description	Unit	Quantity
6	Cement	tons	3,100
7	Sand	tons	4,650
8	Crush	tons	9,300

Source: Design Report

166. The BWRDP is scheduled to be constructed in a period of five years. The Project is planned to start in Oct, 2018 and end in Sep, 2023. Primavera 6 is used to prepare the project implementation schedule of the project. It includes the recruitment of the Project Design, Supervision and Implementation Consultant (PDSIC), Bidding and Award Process for core projects and Construction of PMO Building.
167. The bidding and award process for core subprojects in Mula River Basin is scheduled in the first three months of the Project. The Implementation Support Consultant will be recruited in the fourth month. Construction of PMO building will start from Oct. 2018. Karkh River Development core subproject includes the command area development and some rehabilitation works, while Kharzan & Hatachi Infiltration Gallery core subproject includes the construction of two infiltration galleries one for each village and their irrigation network. Karkh River Development and Kharzan & Hatachi Infiltration Gallery core subprojects are the first two to be constructed. Construction of both subprojects will take two years for their completion. Both are programmed to start in Nov. 2018 and end in Oct. 2020 and their watershed development works are scheduled in Mar. 2020 to Aug. 2021.
168. Command Area development (CAD) schemes works under Farmer Organization (FO) contracts of Karkh and Kharzan subprojects are planned to start after one year of its main infrastructure contract works respectively. Khushkaba Area Development schemes works under KFO contracts of Karkh River and Kharzan Hatachi subprojects are scheduled to start with its command area development works respectively.