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GOVERNMENT OF BALOCHISTAN

PROJECT DESIGN, CONSTRUCTION SUPERVISION AND IMPLEMENTATION SUPPORT FOR BALOCHISTAN WATER RESOURCES DEVELOPMENT SECTOR PROJECT
(LOAN 3700-PAK)




IEE REPORT
CHURRI INFILTRATION GALLERY SUBPROJECT
MULA RIVER BASIN

January 2023

A Joint Venture of

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ACRONYMS

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

NCS	National Conservation Strategy
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
PIU	Project Implementation Unit
BID	Balochistan Irrigation Department
QESCO	Quetta Electric Supply Company
RB	Requiring Body
RCC	Reinforced Cement Concrete
REA	Rapid Environmental Assessment
RHCs	Rural Health Centers
SIEE	Summary Initial Environmental Examination
SMART	Self-Monitoring and Reporting Tools
SOx	Oxides of Sulfur
SPS	Safeguard Policies
TA	Technical Assistance
TCI	Techno Consult International
TDS	Total dissolved solids
TSS	Total Suspended Solids
UNEP	United Nation Environment Program
VOCs	Volatile Organic Compounds
WHO	World Health Organization
WUA	Water User Association
ZRB	Zohb River Basin

EXECUTIVE SUMMARY

A. INTRODUCTION

1. Balochistan Water Resources Development Sector Project consists of implementation of 11 sub-projects in two potential river basins namely Mula and Zhob in the Balochistan. Churri Infiltration Gallery is one of the subprojects of Mula River Basin for implementation[1]. Detail design of the sub-project has been prepared by the BWRDSP consultants.

2. The Churri sub-project is proposed on Sohinda River, a tributary of Mula River, in Zehri area. It is located in tehsil Zehri, District Khuzdar, Balochistan. The scheme lies in UTM Zone 42R at 28°35'48.22" Northing and 66°45'44.22" Easting. The proposed structure is an infiltration gallery. The sub-project is located north-east of Khuzdar at a distance of 137 km, that is 79 km north of Khuzdar via N-25 Highway to Levies Check Post, and then 58 km east to sub-project location.

3. The subproject consists of an infiltration gallery on Sohinda River to intercept subsurface water into irrigation channel located on the left bank of serving a command area of 810 ha. The proposed the intervention for the subproject include; (a) Construction of infiltration gallery, (b) Construction of water conveyance system and associated structures.

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;

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

- 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. In Churri Infiltration Gallery Subproject, an infiltration gallery is designed in bed of Sohinda River to collect sub-surface flow from river. Infiltration gallery is connected to collection chamber (off-take well) and irrigation channels, which bring water to command area. Proposed gallery (HDPE perforated pipe, 0.71m) is 280 m long to trap sub surface water flow of Sohinda river to irrigate the proposed command area. Infiltration gallery is placed below scour at an average depth of 2.3 m below river bed.

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

Table A: Salient Features of Proposed Churri Infiltration Gallery Sub-project

Type of structure	**Infiltration Gallery & Offtake Well**
Coordinates	N = 28°35'48.22", E= 66°45'44.22"
Infiltration Gallery	**01**
Infiltration Gallery Length (m)	280
Gallery Pipe Diameter (m)	0.71
Canal Appurtenant Structure	
Lined Channel (m)	7062
Fall Structures	03
Super Passage	02
Outlets/Time Division Structures (Nr.)	17
Washing Structure	10
Wuzu Structure	05
Cattle Drinking trough	05
Flood Protection Bund (m)	02
Design Command Area (Ha)	694

D. PROJECT ALTERNATIVES

a) No Project Alternative

8. 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. Over the years, some part of gabion wall has been damaged due to flood flows in the Mula River. Water availability is scarce in area hence the proposed project will contribute positively to the project area.

b) Subprojects Alternative

9. The following two options were considered at Churri Infiltration gaallery:

- 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.

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

Table B: Comparison of Alternatives

Parameters	Weir	Infiltration Gallery
Cost	Costly	Cheaper
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

i. Physical Environment

11. High mountains surround the project area which lies near Churri Infiltration Gallery area. The terrain is generally flat in the subproject and its command area. It is located in an environment of degraded rangelands.

12. The proposed Churri infiltration gallary and vicinity area are surrounded by rocks of Jurassic to Cretaceous age, which are overlain by the derived material of these rocks. The strata exposed in the Nur Gama Samawari to Pandran area catchment consist of both consolidated rocks and unconsolidated sediments in low laying reaches surrounding the mountains.

13. Consolidated rocks in the area belong to Formations which range in age from Jurassic to Cretaceous and are mainly of sedimentary origin. The northwestern part of the Indo-Pakistan subcontinent was a passive carbonate platform during the breakup of Gondwanaland and its ensuing northward drift (Jurassic-Paleocene).

14. The project site is located on the western part of the Kirthar fold belt. The northern part of the two prominent north-south trending faults – Ornach-Nal Fault (Strike-Slip) and Pab fault (Thrust) starts south of the project area and these faults extend towards south up to Arabian Sea. Both of these faults are active faults as a lot of small to moderate earthquakes have been recorded along these faults during the last 100 years. However no large scale earthquakes have been recorded in this area as compared to the more active Quetta region in the north where a number of large damaging earthquakes have occurred during the last century. On the

basis of Peak Ground Acceleration (PGA) values obtained through Probabilistic Seismic Hazard Assessment (PSHA), Pakistan is divided into 5 seismic zones in line with the Uniform Building Code (UBC) 1997. The project area falls in zone-3 of the seismic zones boundry.

15. The mean daily temperature ranges from (July being the hottest month) 22.3°C to 24.3°C in the summer season (June to August) and 2.8°C to 5.3°C in winter season (December to February). Mean monthly temperature in July rises to a highest value of 24.3°C and falls to the lowest value of 2.8°C in January. June, July and August are the hottest months in summer season. December, January and February are the coldest months in winter season. The monthly averages of minimum, maximum and mean daily temperatures.

16. The average annual rainfall of the area is about 169 mm (11.7 inches), Rainfall runoff for Churri sub-project using rainfall data of Kalat for the period 1971-2018 worked out to be 18.5 MCM.

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

18. Ambient air and noise conditions in the Project Area, is generally clean and quiet. As there are no potential sources of air and Noise pollution i.e. no industries and little vehicular traffic in the project area, so ambient air and air quality are good.

ii. Biological and Natural Environment

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

20. **Flora** of the project area includes Khajoor, Babbur, Kandi, Devi, Kirri, Ber, Gujo, Merin, Gugul, Chill, Kulumurak, Grass and Nadak.

21. **Fauna** includes **Mammals, Birds & Reptiles:**

Wildlife Type	**Common Species**
Mammals	Asiatic Jackal (Canis aureus), Cape hare (Lepus capensis), Porcupine (Hystrix indica), Hedgehog (Hemiechinus auritus megalotis), Bush rat (Goluda ellioti) etc.
Birds	Black Bittern (Dupetor flavicollis), Lesser Kestrel (Falco naumanii), See partridge (Ammoperdix griseogularis), Grey Partridge (Francolinus pondicerianus), a number of sparrows, Finches, buntings, seasonal/migratory waterfowls, hawks, and sand grouse etc
Reptiles	Indian Cobra (Naja oxiana), Easter dwarf skink (Ablepharus pannonicus), Leaf nose viper (Eristicophis macmahonii) etc.

22. **Archaeology and Cultural Heritage:** Sites of importance in regard to cultural heritage are not reported from the specific area of the project.

iii. Demographic and Socio-economic Environment

23. In the studied killies, the main caste was Zahri and other castes were Musyami, Zarakzai, Jattak, Lotani, Kani, Dayan and Kumbrani. 100 percent of the population was Muslims. According to the current socio-economic survey, the literacy rate of the studied killies was less than 2 percent. Barohi is a main language spoken by the surveyed communities of the project area. Out of total respondents, the main occupation of about 84 % respondents was farming and livestock rearing. Few respondents were serving in Government department as school teachers.

24. The facility of electricity is available in the project area. The villages in the command area are connected with the roads. The Rural Health Center, Dispensary, Private Practitioner, veterinary Dispensary, Bank and Police station/post, are available in the Kahan and Jag soor Town. The schools at primary, middle and high level for boys and girls are available and inter college also under construction in the villages of the command area.

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

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

F. ENVIRONMENTAL IMPACTS & MITIGATIONS

27. 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.

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

❑ **Land Acquisition**

- The improvement/rehabilitation works of the existing channels will not involve any land acquisition or demolition of any built up private properties as all civil works will be confined within the existing ROW. Temporary acquisition of land may be required for the contractor's construction and accommodation facilities.
  Mitigation Measures: Contractor will be responsible to made contract with land owner(s), for temporary land acquisition on rent and will share contract agreement with PMO.

❑ **Disposal of Soil Material**

- Spoils will be generated from the excavation activities of channels and distribution canals. Disposal of spoil / surplus material may cause negative environmental impacts, if not properly mitigated during implementation of the proposed project. Potential impacts from spoils and its disposal are (i) land for disposal of spoil, (ii) conversion of those land areas in to a permanent dumping area, (iii) potential erosion from the spoil areas and spoil material reaching the river/waterways, and (iv) Aesthetic impacts.
  Mitigation Measures: a. The spoil material from the excavation will be dumped at desinated places. The Contractor will also ensure that no spoil material is disposed into river/stream/nullahs and into any other water body along the project site. As far as possible barren/waste lands available will be used for disposal of the excavated waste material.
  b. The spoil material shall be deposited in layers and properly rolled and sprinkled to avoid any negative environmental impacts.

❑ **Biological Environment**

- Biological environment of command area will have a negligible impact due to construction activity but all the effects will be limited to the site of construction and that also on a short-term basis.

- **Flora & Fauna**
  Impact

- Proposed project may impact some vegetation in the ROW of Channel and

during construction activities the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfill the camp requirements). The cutting of trees & vegetation will cause degradation of local environment.

- During the construction phase, there will be adverse impacts on the mammals and reptiles of the area due to construction activities involving excavation, access roads, movement of labor, carriage of goods and machinery to various sites along the project area. Mammals will avoid these areas. Same will be the case with reptiles. Some reptiles may be killed during the earthwork's operations. Movements of the mammals and reptiles will be restricted during the construction phase.
- Birds will try to find shelter and food somewhere else and will tend to move away from the project area due to the activities mentioned above for fear of being hunted/ trapped.

Mitigation Measures

- The loss of tree removal (if involved) should be compensated by carrying out tree plantation on proposed channel banks. Plantation activity is supposed to be implemented through Forest Department. The plant species present in the project area may be planted. However, section 32 (c) (d), Forest Act 1927 (Amended 2010) demands removal of one (01) tree should be compensated by plantation of ten (10) trees.
- Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will be required to warn its labor accordingly.
- Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.
- **Noise Pollution**

Impact

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

Mitigation Measure:

- Contractor will ensure that all construction equipment will strictly conform to NEQS.
- Construction workers will be provided with earplugs.

- **Ambient Air Quality**

Impact

- Air quality may decrease as a result of the project interventions. Construction

machinery, diesel generators and project vehicles will release exhaust emissions containing carbon monoxide (CO), sulfur dioxide (SO2), oxides of nitrogen (NOX), and particulate matter (PM). These emissions can deteriorate the ambient air quality in the project site and along the road leading to it. Furthermore, fuel combustion will release smoke emissions.

Mitigation Measure:

- Contractor's contractual obligation to ensure that all equipment, generator and vehicles used during the project are properly tuned and maintained in good working condition, in order to minimize the exhaust emissions
- Air quality should be monitored on regular basis near the batching plant and construction site.
- Select batching plant location away from the living area or construct zero emission plant.
- **Dust Emissions**

Impact

- Concentrations of airborne particulate matter will result from the earthwork, lining of channels and excavation activities. Generation of dust from these activities is likely to be significant in strong winds.

Mitigation Measure:

- Regular sprinkling of water at the exposed areas (excavation sites, service roads and dirt tracks etc.) should be done many times a day rendering the impact minimal.
- Hauling trucks containing construction materials shall be covered with tarpaulin and will be required to run at pre-determined speed in order to minimize dust generation.

- **Waste Management**

Impact

- It is expected that large quantities of solid waste including domestic waste, food waste, sewage (waste water), workshop waste, medical waste, packing waste, demolition material (concrete, masonry and steel), debris from construction sites (excess aggregate, sand etc.) and excavated material unsuitable for earth fill will be generated during construction.

Mitigation Measures

- Ensure that all the waste generated from different locations must be disposed-off according to the Waste Disposal Plan prepared by contractor.
- Minimize hazardous waste generation by implementing stringent waste

segregation to prevent mixing of non-hazardous and hazardous waste to be managed.

- **Traffic**

Impact

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

Mitigation Measures

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

- **Occupational Health and Safety**

Impact

- Occupational health and safety issues to be included in contraction specifications and other location.

Mitigation Measures

- Occupational health and safety issues to be included in contraction specifications and other location
- All project related staff will be provided with the required personal PPE and shall be trained to make sure that they are aware of the usefulness and correct use.
- Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.
- Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them.

- **Water contamination**

Mitigation: Proper sewage disposal arrangements for camp sites and compliance of NEQS will result in decrease in water pollution. Periodic monitoring as mentioned in EMP will result in decrease in water pollution.

- **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. Contractor shall prepare and submit a Site-specific EMP (SSEMP), Site Specific Health & Safety Plan (SSHSP) and SOP to manage COVID-19 risks for approval by Supervision consultant

  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.

❑ **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 the 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 structures at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BID 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 15** 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 – 12** of this report.

G. ENVIRONMENTAL MANAGEMENT PLAN

29. 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.

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

- **Implementation during Construction Phase**: The executing agency for this Project is Balochistan Irrigation Department (BID) having core implementation responsibility. The immediate requirement considering the existing institutional setup of EA (BID) is the establishment of Environmental & Social Management and Monitoring Cell (ESMMC). The ESMMC 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 the ESMMC of EA (BID), District Environmental Officers of Zhob, Water User Associations (WUA) & Farmer Organizations (FOs) Chairman and Vice Chairman. ESMMC will get input from WUA and FOs, randomly check the project operation in context of EMP and report to BEPA annually.

31. 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.

H. EMP Budget

32. The EMP budget for construction period of Project is PKRs. 40,00000 which covers cost of laboratory analysis, supervision consultant, third party monitoring, and trainings. For operation and maintenance phase, the cost is estimated for initial three years of operation which is PKRs. 1,22,000 covering costs of laboratory analysis, third party monitoring, trainings and community engagement.

I. CONCLUSION

33. The report provides conclusion based on the impacts assessed and the mitigation measures suggested. It is recommended that EMP will be made a part of all bidding/tender document. Contractor will be bound to completely implement relevant mitigation measures set out in the EMP. Also, the cost related to these mitigation measures has to be borne by the Contractor. Contractor shall prepare detailed Burrow, Quarrying and Disposal Plan, site specific HSE Plan as mentioned in EMP.

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

35. Environmental impacts during the construction phase are related to the establishment of campsite which are temporary and can be minimized with better management. Construction worker camps will not necessarily be based on the scale of the works needed. If for some

unforeseen reason a larger workforce is needed, the construction camp will not be located in settlement areas or near sensitive water resources and will be provided with lavatories. Local employment will be preferred to avoid cultural conflicts.

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

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

1. INTRODUCTION

38. Balochistan is the largest province of Pakistan in terms of area and smallest in terms of population. It is reckoned to be comparatively less developed and the sole reason is scarcity and paucity of water. Islamic Republic of Pakistan received a loan (3700-PAK) from the Asian Development Bank (ADB) for financing the Balochistan Water Resources Development Sector Project (BWRDSP). The project will support implementation of the integrated water resources management policy of the Government of Balochistan (GoB).

39. Government of Balochistan has now hired the services of the Consultants[1] for Project Design, Construction Supervision and Implementation Support (hereafter called 'the Consultants' for Balochistan Water Resources Development Sector Project (BWRDSP). The project consists of development of 11 sub-project in two river basin (Mula & Zhob). The Consultants will help GoB in preparing detailed design of three core subprojects and also feasibility studies and detailed design of the balance non-core subprojects.

40. Churri Subproject is one of subprojects of the Mula River Basin. The assignment under consideration involves conducting an Initial Environmental Examination of this project.

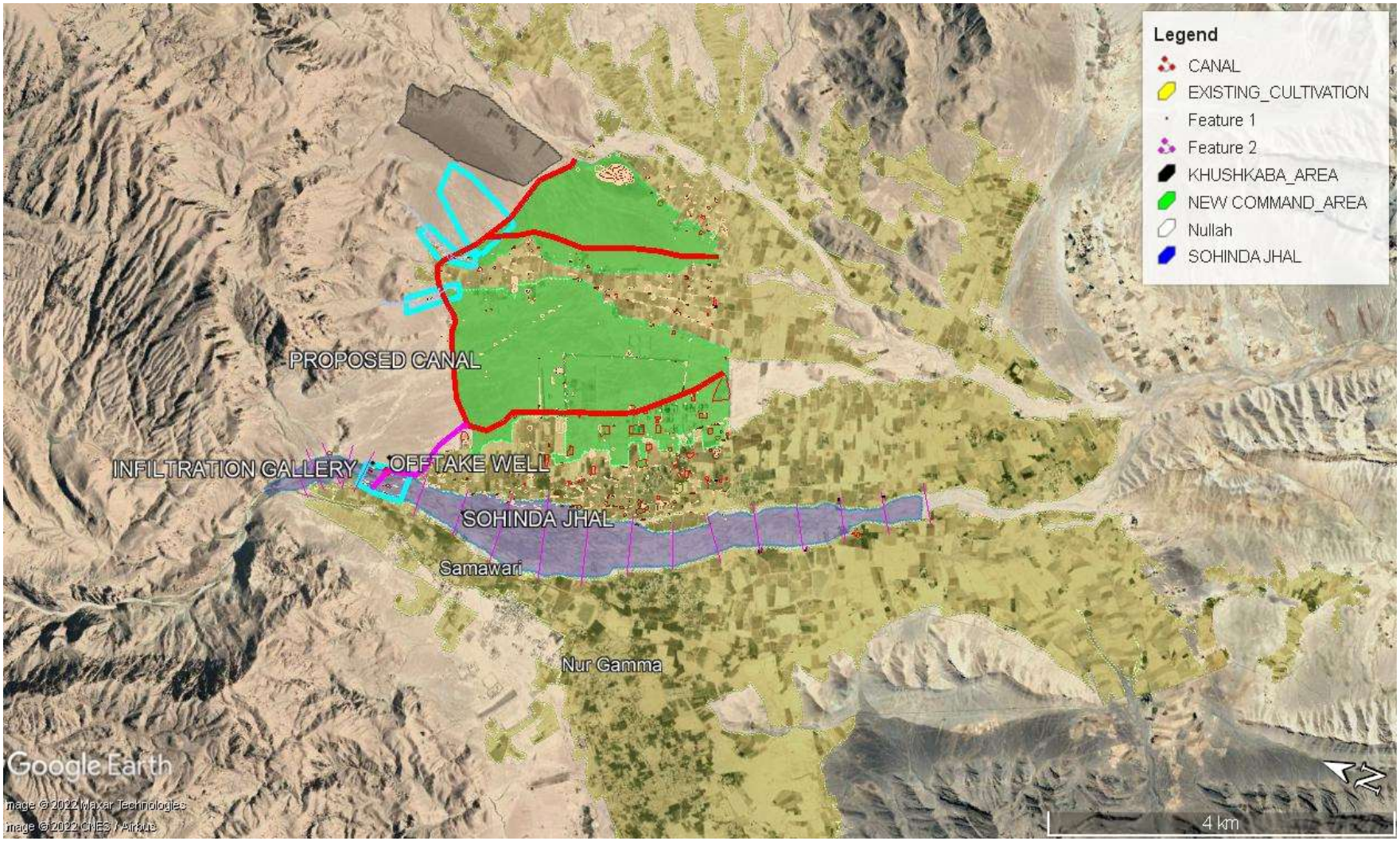
1.1 Churri Infiltration Gallery Subproject

41. The Churri sub-project is proposed on Sohinda River, a tributary of Mula River, in Zehri area. It is located in tehsil Zehri, District Khuzdar, Balochistan. The scheme lies in UTM Zone 42R at 28°35'48.22" Northing and 66°45'44.22" Easting. The proposed structure is an infiltration gallery. The sub-project is located north-east of Khuzdar at a distance of 137 km, that is 79 km north of Khuzdar via N-25 Highway to Levies Check Post, and then 58 km east to sub-project location. The location of sub-project is shown on the Location Map in **Figure 1.**

42. In Churri Infiltration Gallery subproject, an infiltration gallery is proposed to divert subsurface flow to command area, which will assure extension of command area. The available perennial water will be utilized for irrigating extended command area so that farm income and livelihood of local people will be improved. The sub-project will also provide protection bunds along Sohinda River to channelize the river flow along the location of gallery. Availability of water round the year will increase productivity of area and enhance income generation activities in area.

43. The subproject will improve 115.0 ha of existing command area whereas 695.0 ha new area will be brought under cultivation. After construction of subproject, it will significantly improve the agricultural production and rural livelihood.

Figure 1: Location of Churri Infiltration Gallery Sub Project Mula River Basin



1.2 Proposed Interventions

44. The scope of work for the subproject includes design of Infiltration Gallery along with the construction of irrigation channel and associated structures, construction of protection bunds. Details of scope of work for the subproject are presented in Table below:

Sr. No.	Parameter of Irrigation Component	Quantity of Irrigation Component
1	Construction of Infiltration Gallery	01
2	Length of Covered Channel (km)	2.885
3	Length of Open Channel (km)	4.177
4	Fall Structures (number)	03
5	Super Passage (number)	02
6	Outlets/Time Division Structures (number)	17
7	Washing Structure (number)	10
8	Wuzu Structure (number)	05
9	Cattle drinking trough (number)	05
10	Protection works (length of guide bunds R/S) (km)	4.50
11	Protection works (length of guide bunds L/S) (km)	4.50
12	Design Command Area (hectare)	694

1.3 Environmental Assessment

45. 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 projects[2] 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.

46. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the construction of Churri infiltration gallery at district Khuzdar is the “Balochistan Environmental Protection Act 2012”. This act also provides for IEE or EIA (as the case maybe) for projects under its clause 15.

47. 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,

[2] 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.”*

dams, irrigation & flood protection" and hence the environmental study is conducted and an IEE report is being prepared.

48. 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.**

49. 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.

50. 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.

51. 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.

52. 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.

53. 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 Mula River Basin Project.

54. 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.

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

1.4 More Specific Objectives of IEE Report

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

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

1.5 Scope of IEE

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

- Description of the Project:

58. 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:

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

- Legislative and Regulatory Considerations:

60. 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:

61. 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.

- Physical Environment:

62. 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.

63. Most of this information is from primary data collected during site visits & stakeholders' consultations and design report prepared by BWRDSP consultants. Monitoring and testing of major environmental parameters was done at subproject site of Mula River Basin have been made part.

- Biotic and Natural Environment:

64. 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.

- Socio-economic Environment:

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

34. Primary data was collected during site visits and stakeholder's consultation from the project feasibility report prepared by the Social team has been used.

- Potential Impacts of the Project:

35. 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.

36. Environmental impact studies represent a blend of technical information and analysis along with value judgements. 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.

37. A qualitative risk assessment methodology has been adopted for this project, comprising the Likelihood and Consequence values detailed in **Table 1** and **Table 2**.

Table 1: 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 2: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

38. On the basis of a likelihood and consequence matrix (**Table 3**), each hazard may be categorized into broad 'risk categories' and the required management approach for each risk category can be defined.

Table 3: 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

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

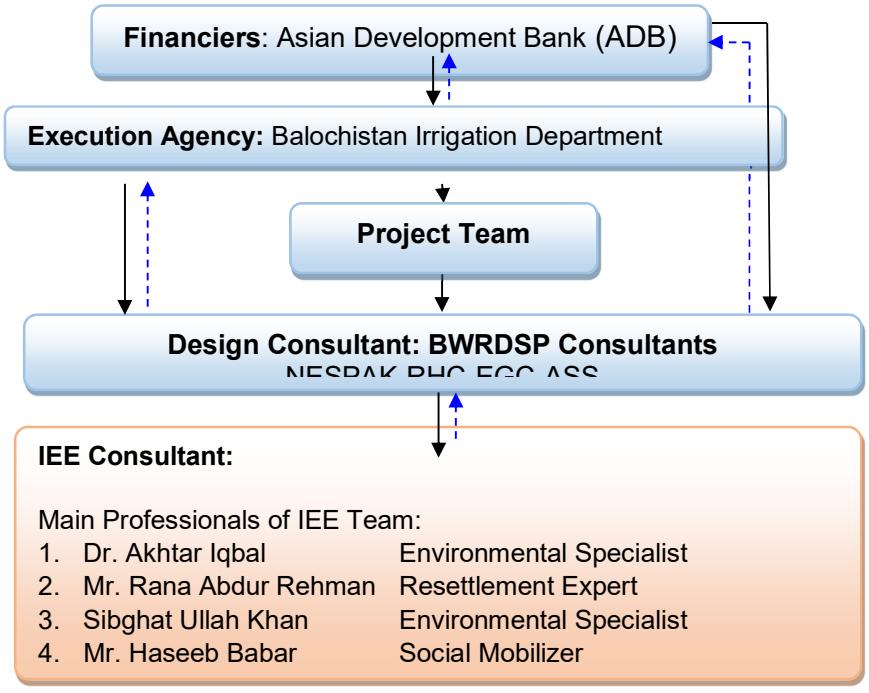
- Mitigation measures for Adverse Impacts:

40. 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:

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

1.6 IEE Team Arrangement



2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 General

47. 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

48. 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 policies3. 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.

49. The UN International Summit on Environment was held in 1992 in Rio de Janeiro, to highlight the importance of environment protection and to promote sustainable development. Pakistan also became a signatory of this summit, after which the Government of Pakistan developed a National Conservation Strategy (NCS), approved in March 1992. It was decided that all reports regarding strategies, policies and program for sustainable development will be drawn up on the basis of the NCS[4]. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP)[5].

50. The enactment of PEPA 1997 took up the key issues of PEPO and in addition provided for a considerable strengthening of institutions at the national and provincial level for the formulation, execution and enforcement of environmental policies and conferred broad-based enforcement powers to the EPA[6]. NEQS for municipal and liquid industrial effluent, industrial gaseous emissions and motor vehicle exhaust and noise, were issued by Pakistan EPA in 1994.

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

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

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

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

51. 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

52. 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.

53. 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

54. 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.

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

56. "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

57. 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.

58. 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.

59. 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.

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

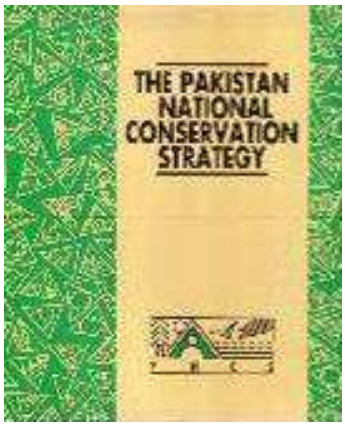
2.6 Environmental Legislations

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

2.6.1 National Regulations

62. 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



63. 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

64. The NCS specifies the basic guidelines for an integrated effort aimed at protecting the environment and the natural resources of the country. This broad framework provides a comprehensive point of reference for all agencies, departments, private sector companies, financial institutions, and donor agencies for undertaking systematic efforts to bring about an effective change for sustainable development[7].

2.6.2 Pakistan Environmental Protection Act, 1997

65. The PEPA 1997 is the apex environmental law of the country. Under section 12 of the Act, it is mandatory for the proponents of the projects[8] 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.

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

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

[8] 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."*

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

67. 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.

68. 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.

69. 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). The BID has obtained No Objection Certificate (NOC) from the EPA Balochistan in Novemebr 2020 that was mandatory requirement before project commencement.

70. 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

71. 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.

72. The Review of IEE and EIA Regulations 2000, prepared by Pak-EPA under the powers conferred upon it by PEPA-97, categorizes projects for IEE and EIA, respectively[9]. The proposed interventions under 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.

73. 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.
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.

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

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

74. 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.

75. 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

76. 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

77. 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

78. 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

79. 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

80. 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

81. 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

82. 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.

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

83. 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.

84. Other functions 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

85. 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”.

86. 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 BWRDSP Consultants have been essentially guided by these rules as enunciated in the “Outline of an Initial Environmental Examination Report”.

87. 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.

88. 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.

89. 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

90. 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.

91. 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 4.**

Table 4: 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 and economic benefits that are culturally appropriate and gender and intergenerationally inclusive.	There are no groups of people in the project area who could be categorized as indigenous people, therefore this policy does not apply to the proposed project.

2.8.3 Relevant International Treaties

- Convention on Biological Diversity

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

93. 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

94. 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.

- Government of Pakistan Guidance on Managing COVID-19 Risks

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

2.8.3 Comparison of International and Local Environmental Legislations

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

97. In order to select the most stringent standards applicable, a comparison of local (PEQS) and international i.e. International Financing Corporation (IFC)/ World Health Organization (WHO) and United States Environmental Protection Agency (USEPA)

regulations have been made, as shown in **Table 5** below. For air quality, comparison was only possible for pollutants having same averaging periods in PEQS, IFC and WHO. PEQS for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards, in the case of most pollutants. The applicable and most stringent parameters for each respective pollutant are highlighted in yellow.

98. Similar to the standards for air quality, the comparison of noise standards provided in **Table 6** clearly shows that PEQS for noise are more stringent in comparison to the WHO/IFC standards. The only exception is the daytime noise level standard for Industrial areas where the WHO/IFC standard is more stringent (70 dB (A)) in comparison to PEQS (75 dB (A)) and so for this particular parameter, the WHO/IFC standard will be used.

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

100. Similar to the standards for air and Noise quality, the comparison of Water quality standards provided in **Table 7** clearly shows that PEQS for biological and physical parameters of drinking water quality are same as for WHO standards except for Total hardness as CaCO3. PEQS for Chemical, Toxic inorganic and organic parameters are mostly similar/comparable zinc, residual chlorine, Phenolic compounds (as Phenols) mg/l, Poly-nuclear aromatic hydrocarbons (as PAHs) g/l. WHO for Lead and Zn are more stringent comparatively.

Table 5: Comparison of International and Local Air Quality Standards

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

Pollutants	USEPA		WHO/IFC		PEQS	
	Avg.Time	Standard	Avg.Time	Standard	Avg.Time	Standard
PM_{25}	Annual Mean	15 µg/m^3	1 yr	35 µg/m^3	Annual Average (IT-1*)	15 µg/m^3
	24 hrs	35 µg/m^3	24 hr	75 µg/m^3	24 hrs (IT-1*)	35 µg/m3
					1 hr	15 µg/m^3

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

Table 6: Comparison of International and Local Noise Standards

Category of Area/Zone	Limit in dB(A) Leq			
	PEQS		WHO/IFC	
	Day Time	Night Time	Day Time	Night Time
Residential area (A)	55	45	55	45
Commercial Area (B)	65	55	70	70
Industrial Area (C)	75	65	70	70
Silence Zone (D)	50	45	55	45

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

Table 7: Comparison of National and WHO Environmental Quality Standards for Drinking Water

Properties/Parameters	Standard values	WHO standards	Remarks
Biological			
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any	Most Asian countries also follow WHO standards

Properties/Parameters	Standard values	WHO standards	Remarks
		12-month period.	
Physical			
Colour	≤15TCU	≤15TCU	
Taste	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Odour	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Turbidity	<5NTU	<5NTU	
Total hardness as CaCO3	<500mg/l	---	
TDS	<1000	<1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	mg/Litre	mg/Litre	
Aluminum (Al) mg/l	≤0.2	0.2	
Antimony (Sb)	≤0.005 (P)	0.02	
Arsenic (As)	≤0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl-)	<250	250	
Chromium (Cr)	≤0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	mg/l	mg/l	
Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing countries
Fluoride (F)*	≤1.5	1.5	
Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤0.5	0.5	
Mercury (Hg)	≤0.001	0.001	
Nickel (Ni)	≤0.02	0.02	
Nitrate (NO3)*	≤50	50	
Nitrite (NO2)*	≤3 (P)	3	
Selenium (Se)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source		
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries
Organic			
Pesticides mg/l			PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted. **
Phenolic compounds (as Phenols) mg/l		0.002	
Poly-nuclear aromatic		0.01 (By	

Properties/Parameters	Standard values	WHO standards	Remarks
hydrocarbons (as PAHs) g/l		GC/MS methods)	
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

3. DESCRIPTION OF SUBPROJECT

95. The Churri sub-project is proposed on Sohinda River, a tributary of Mula River, in Zehri area. It is located in tehsil Zehri, District Khuzdar, Balochistan. The scheme lies in UTM Zone 42R at 28°35'48.22" Northing and 66°45'44.22" Easting. The proposed structure is an infiltration gallery. The sub-project is located north-east of Khuzdar at a distance of 137 km, that is 79 km north of Khuzdar via N-25 Highway to Levies Check Post, and then 58 km east to sub-project location.

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

3.1 Interventions at Projecr Site (Infiltration Gallery)

3.2.1 An Overview of Existing Irrigation System

97. In the subproject area, abundant land is available for agriculture but irrigation water is the limiting factor. The farmers are temporarily irrigating part of command area of the subproject through pumping of surface water from streams/nullah and number of springs and Karezes.

98. An infiltration gallery exists at proposed location. It diverts sub-surface water to an unlined channel. The arrangement provides 0.2 cumec to command area which does not meet total irrigation water requirement of area. The remaining irrigation water requirement is met through groundwater extraction.

3.2.2 Review of Pre-Feasibilty level Design

99. Prefeasibility study of the Churri Infiltration Gallery subproject was carried out by the TA-Consultants in 2018. The prefeasibility report indicates an annual water availability as 37.6 million cubic meters (MCM). The report mentions the construction of infiltration gallery at Sohinda River, irrigation channel (7062m) with allied structures, rehabilitation of existing channel and social structures.

100. Other works proposed in the prefeasibility study include construction of aqueduct, drop / fall structures. Social structures (i.e., Animal drinking structure, Washing structure, Water storage tank etc.) and protection bund. Total cost of the proposed infrastructure was estimated as PKR 286.78 million.

101. After detailed topographic survey of the subproject, infiltration gallery axis / location has been analysed to irrigate the proposed command area of 810 ha. Gallery is proposed at such location to ensure the full supply level – FSL of 1602.55. The length of proposed gallery is 280m.

102. .

103. To bring the proposed command area under command, layout of the infiltration gallery shifted towards upstream without affecting the existing Ali Zai command area on left river bank as shown in Error! Reference source not found..

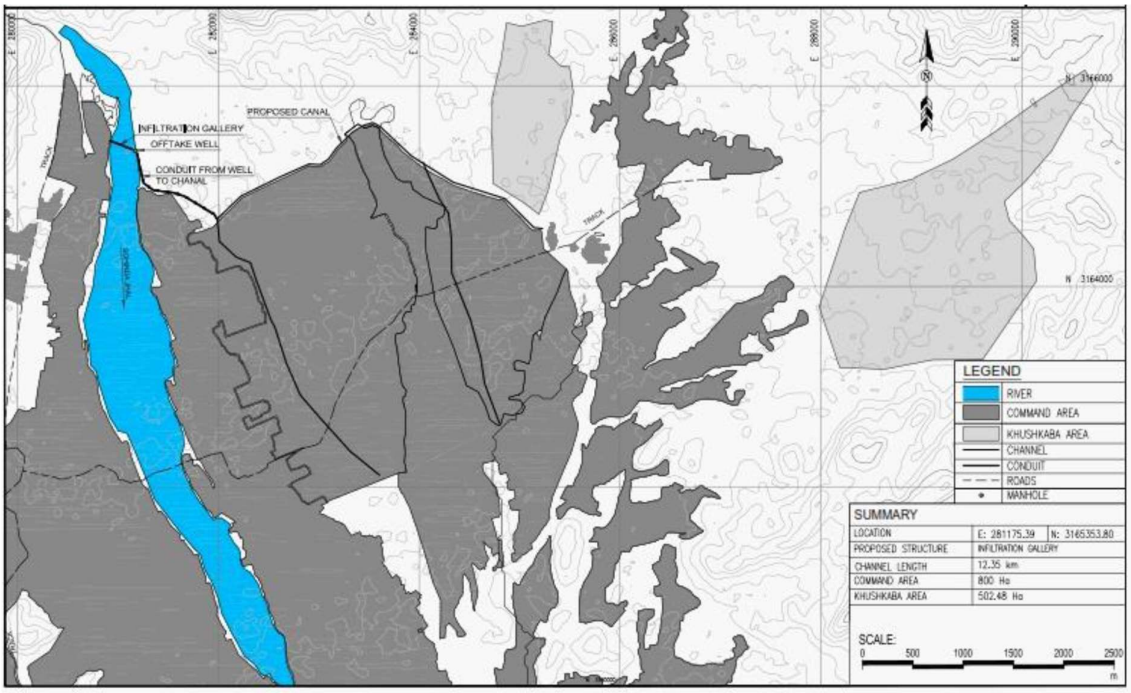


Figure 2: Layout Plan of Proposed Churri Infiltration Gallery

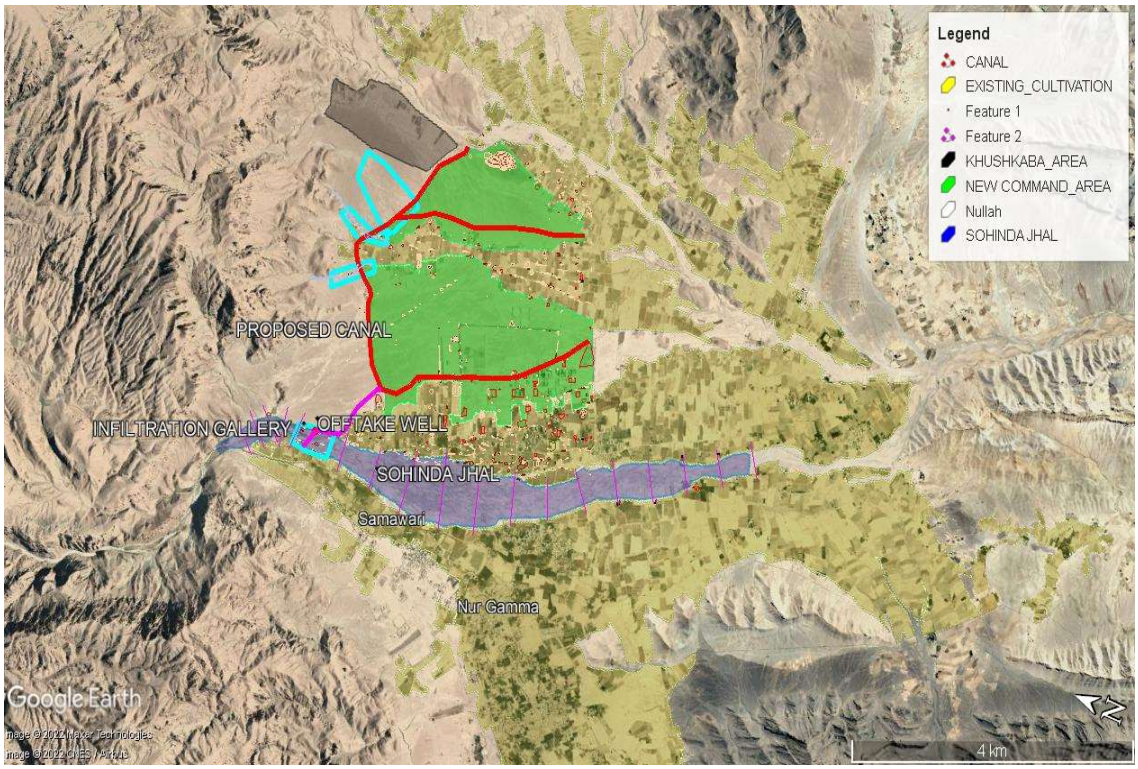


Figure 3: Layout of the Subproject

104. Salient features of the sub-project as given in the Pre-feasibility Study are given in Error! Reference source not found.**8**.

Table 8: Salient Features of subproject

Sr. No.	Parameter of Irrigation Component	Quantity of Irrigation Component
1	Construction of Infiltration Gallery	01
2	Length of Covered Channel (km)	2.885
3	Length of Open Channel (km)	4.177
4	Fall Structures (number)	03
5	Super Passage (number)	02
6	Outlets/Time Division Structures (number)	17
7	Washing Structure (number)	10
8	Wuzu Structure (number)	05
9	Cattle drinking trough (number)	05
10	Protection works (length of guide bunds R/S) (km)	4.50
11	Protection works (length of guide bunds L/S) (km)	4.50
12	Design Command Area (hectare)	694

3.2.3 Proposed Interventions

105. The field investigations and consultation with the stakeholders the following works have been identified:

i. Construction of an infiltration gallery across Sohinda River
ii. Construction of circular manhole/collecting chamber
iii. Construction of RCC conduit from collecting chamber
iv. Construction of irrigation channels from conduit up to command area
v. Construction of Irrigation Canal Structures

3.2.4 SELECTION OF DIVERSION STRUCTURE TYPE

106. Infiltration galleries are one of three methods used in Balochistan at present to abstract perennial flow from river beds, the other two being weirs and free intakes. Infiltration galleries are preferred over the other two alternatives in the following circumstances.

i. Where a free intake would be unreliable.
ii. Where the construction of a gallery would be a cheaper method of abstracting sub surface or surface perennial flow than a weir.
iii. Where it is not possible to found a weir on impermeable material, the weir cannot abstract subsurface flow. In such conditions a gallery provides an alternative to abstract the subsurface flow. This is illustrated on **Figure 4**, which shows the sub surface flow passing underneath rather than over a weir, an infiltration gallery constructed at Intermediate depth in the river bed and hence only tapping part of the sub surface flow and an infiltration gallery based on rock tapping all the sub surface flow.
iv. TA – Consultants also proposed infiltration gallery as diversion structure in their prefeasibility report.

107. For the subproject Infiltration gallery has been preferred over weir due to following reasons:

v. River behaviour is not stable specially left river bank.
vi. Cost of weir is much higher that infiltration gallery.
vii. River bed material is gravelly with deep depth of rock / impervious layer.

- **Infiltration gallery**

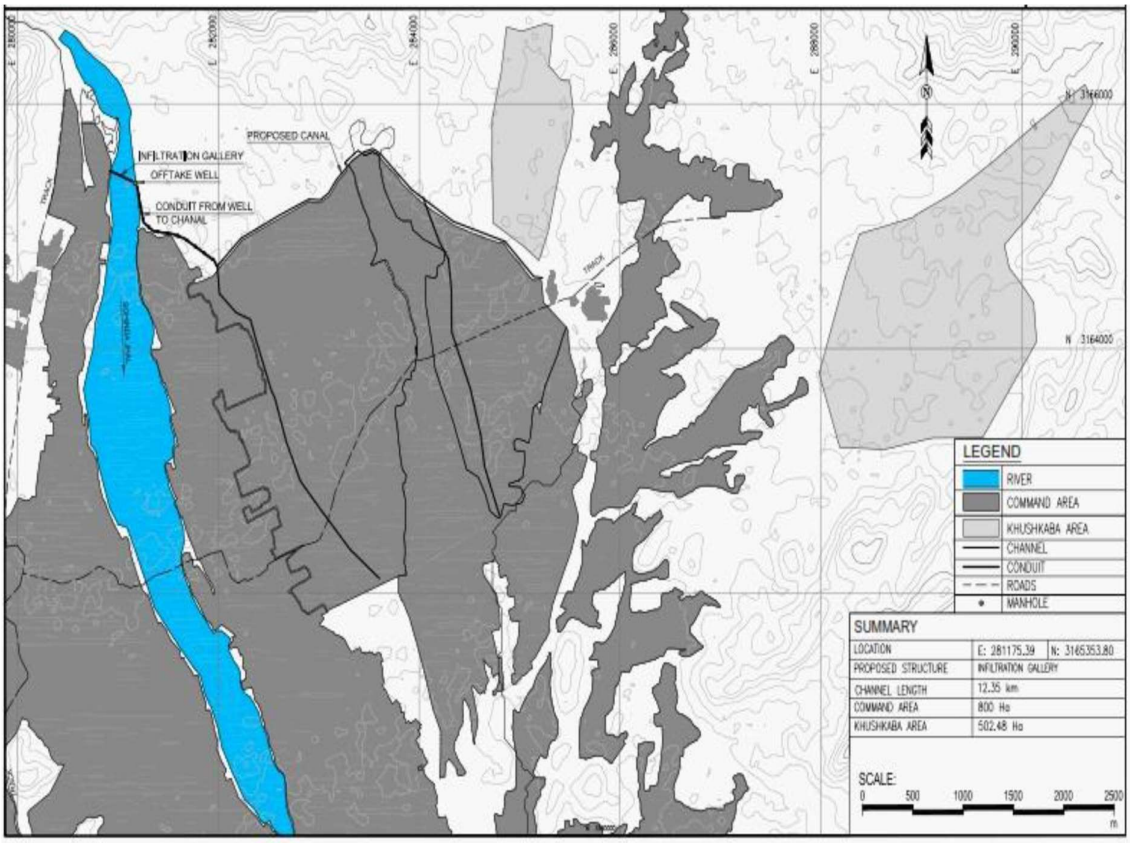
108. In Churri Infiltration Gallery Subproject, an infiltration gallery has been designed in bed of Sohinda River. Details of gallery design parameters are given in Table 9. It is connected to collection chamber (off-take well) and irrigation channels, which bring water to command area. Proposed gallery is 280 m long and placed perpendicular to river flow below ground surface (scour depth) of gallery.

.

Table 9: Details of Infiltration Gallery

Parameter	Adopted
Gallery Length (m)	280.00
Gallery Pipe Diameter (m)	0.71
Design Discharge (cumec)	0.31
Command Area (Ha)	810

Figure 4: Layout plan of proposed infiltration galleries at Churri Infiltration Gallery



❑ Irrigation Channel

109. The walk-through survey with the farmers and the other stakeholders the alignment of canals and scope of work assessed/checked in detail. Office bearers of the farmer's organizations of both main canal and its right branch participated in the walk-through survey as a predesign exercise. The other main purpose of the community consultation was to understand and better address the issues regarding resettlement, water use, social, and environmental challenges. The other criteria included topographic survey and services to the entire command area. The alignment of both canals was demarcated on the plan and corresponding longitudinal profiles were developed. The most economical alignment is the one that results in more or less equal cut and fill volumes, better hydraulic efficiency and maximum coverage of command area. In order to fix the canal alignment, several trials and adjustments were carried out. Canal bends should have been fixed according to the USBR guidelines but due to limitation of available land, to avoid additional land acquisition and to avoid resulting disputes, it was decided to use sub-optimal approach for the canal bends. Initial reach of the main canal followed the alignment on higher contour and designed as RCC conduit with cut and cover. The main canal has been designed as rectangular channel and provided with a cover where there are nullah flows. The Right branch is designed as open rectangular channel.

110. The design discharge of both canals is based on the crop water requirement and gross irrigation water requirement for the command area. The design discharge for main canal was estimated as 0.31 cumecs. The right branch takes off from RD 1+980 of main canal where a distributor structure has been provided. The right branch withdraws 0.12 cumecs of main canal discharge. Time division structures have been provided in both main canals and right branch as per irrigation requirements of the command area as shown in **Figure 5**.

Figure 5: Walk through survey of proposed subproject Command Area and community consultation

❑ Hydraulic Design

111. Hydraulic parameters of both canals have been determined from the internationally accepted Manning's formula for lined channels. The consultants have developed a spreadsheet program for hydraulic design of channel using Manning's formula. The program assists in design longitudinal-section and cross section through an iterative process for the canals under consideration. The design plan and profile are given in Volume-II of feasibility Report.

112. A rectangular cross section with plain concrete bed and stone masonry side walls is adopted for the both channels. A composite roughness coefficient of 0.020 has been adopted considering combined effects of concrete bed and stone masonry side walls. As a first estimate, bed slope was taken as average natural ground slope. In subsequent estimates, bed slope was adjusted such that average flow velocity was within recommended limits and the adopted slope resulted in minimum possible cut and fill volumes and maximum area that can be commanded. The maximum and minimum velocities adopted within permissible limits. These limits ensure that velocities are neither too low that encourages sediment deposition and weed growth, nor too high that it damages the lining. Design parameters of main canal and right branch are given in Table 10.

Table 10: Design Parameters of Main Channel

RD (Km)	Discharge (m3/s)	Manning "n"	Bed Slope m/m	Bed Width (m)	Flow Depth (m)	Velocity (m/s)
000 to 1+250	0.310	0.020	0.0040	0.75	0.39	1.05
1+250 to 1+980	0.310	0.020	0.0038	0.75	0.40	1.03
1=980 to 4+505	0.190	0.020	0.0025	0.75	0.33	0.78
4+505 to 5+420 (tail)	0.190	0.020	0.0018	0.75	0.37	0.69

Table 11: Design Parameters of Right Branch

RD (Km)	Discharge (m3/s)	Manning "n"	Bed Slope m/m	Bed Width (m)	Flow Depth (m)	Velocity (m/s)
000 to 0+700	0.130	0.020	0.0100	0.75	0.15	1.14
0+700 to 1+300	0.130	0.020	0.0050	0.75	0.19	0.90
1+300 to 1+642 (tail)	0.130	0.020	0.0025	0.75	0.25	0.70

- **Canal Structure**

113. A number of structures are proposed across each canal including road culverts, vertical drops, nullah crossings and off-takes. Community structures are also proposed along both channels for use of water by the local population, these include washing/wuzu structures and animal drinking structures.

- . **Time Division Structures / Nuccas**

114. Irrigation systems require flow regulating structures to allow timely and equitable supply of irrigation water to the farmers. Providing right structure type of right size at required locations in the scheme demands identification of feeding points to irrigate the area under its command. The feeding points will be finalized after extensive discussions with farmers.

115. Time division structures have been provided to divert the flow from main channel to water course. The structure comprises reinforced concrete walls and floor and gated openings to feed flow from main canal to water course. The gates used in these structures are simple steel sliding shutters. The size of the gate openings has been calculated using the weir formula.

116. Time division structures has been provided on each channel as per requirement of FO during walk-trough survey. Seventeen-time division structures including tail structure has been provided along the both canal length. Detail drawings of time division structure are given in Volume II of Feasibility Study

- **Gates (Steel Shutter)**

117. To regulate the flow from canal to water course steel shutter gates are provided to each time division structure. The gates are simple steel shutter, manufactured from one eighth inch thick steel plate. In order to prevent the gate from rusting both the gate and frame are hot dip galvanised after fabrication. The gates are fixed to the structure by means of a steel chain, one end of which is welded to the gate handle and the other is fixed to a steel ring embedded into the concrete of the structure. The chain must be long enough to able the gate to be used in more than one of the gate frames.

Source: Design Report

118. Total estimated cost of recommended plan is Rs 442.725 Million as given in **Table 12**.

Table 12: Project Cost

Bill No.	Description	Amount (Pak Rs.)
A	**Civil Works**	
Bill No.1	Infiltration Gallery	27,782,076
Bill No.2	Main Channel (Earth work,Lining and Structures)	248,265,674
Bill No.3	Right Channel (Earth work,Lining and Structures)	24,517,664
Bill No.4	Right and Left Protection Bunds	28,187,641
Bill No.5	Channel Rehabilitation	14,597,493
Bill No.6	General Items	18,720,000
Sub Total-A		362,070,549
B	**Mechanical Works**	
Bill No.7	Installation of Mechanical Equipment at Various RD's of Newly Proposed Minor Structures and Infiltration Gallery for Irrigation	2,421,557
Sub Total-B		2,421,557
C	**Command Area Development and Related Works**	
Bill No.8	Command Area Development	28,061,500
Bill No.9	Watershed Management	421,600
Bill No.10	Khushkaba Area	4,420,000

Sub Total-C		**32,903,100**
Total (A+B)		**397,395,205**
D	**Provisional Items**	
Bill No.11	Total for Daywork Schedule (Provisional Sum)	2,565,206
Bill No.12	Specified Provisional Sums	7,000,000
Provisional Sum for Physical Contingencies on works @ 6% (E)		11,921,856
Balochistan Sales Tax @ 6% (F)		23,843,712
Total Cost		**442,725,980**

3.2.5 PROPOSED CONSTRUCTION SCHEDULE

119. Mobilization for this project will include logistics of assembling all necessary plant and construction equipment, providing housing facilities with water sanitary and power utilities, training and organizing work forces and getting construction work underway. It is important that all works discussed under preliminary works including improvement of existing access road are completed prior to start of major civil works. The period for mobilization and preliminary works will extend over first 4 months of the contract period.

3.2.6 Construction of Infiltration Gallery & Associated Structures:

120. The meteorological and river flow data showed that best suited period for construction is from September to December. During this period river flows are low and interruptions in construction activities due to rain will be less frequent. Construction work may however continue with some interruptions in January to August. Values of monthly rainfall based on recorded data shows average monthly river flows based on estimated flows for sub-project. In formulating construction schedule it has been assumed that contract will be awarded in the first quarter of 2023.

121. Main factors which affect construction program are planning for material utilization (including procurement of perforated pipe and it's transportation to site) and proposed core subproject for diverting river flows during construction. In view of work load involved in construction of infiltration gallery and related works were proposed to be completed in a period of 9 months (beyond pre-construction and preparatory works) involving one main flood period. The river flows are proposed to be diverted through diversion channel which is aligned away from working site.

3.2.7 Construction Equipment

122. **Table 13** shows a tentative list of construction equipment required by the contractor to enable him to undertake this work and meet the prescribed schedule.

Table 13: List of Construction Equipment Required by the Contractor

Sr. No.	Description	No. Required
1	Bulldozer D8 with ripper (Blade capacity = 12.9 m³)	1
2	Motor Grader cat 14G or Equivalent	1
3	Front End Loader Bucket capacity = 6 m³	2
4	Sheep foot roller for core compaction (10-ton capacity)	2
5	Dump Trucks (capacity = 14 m³)	4
6	Mobile water tanker 500 gaLLTns	2
7	Hydraulic Excavator with 14” wide bucket	1
8	Concrete Batching Mixer	2
9	Concrete Vibrators	6
10	Centrifugal pumps ½ cfs	2
11	Hand compactors	3
12	Diesel generator	2
13	Jeeps	2

Source: Design Report

123. For construction of proposed Infiltration galleries and Rehabilitation irrigation channels, river protection works and flood protection works construction materials such as fine and coarse filters and stone for stone masonry are available in close vicinity of the project area. The period of construction is estimated as 18 months as per implementation plan. Construction Schedule has been given as Figure 5.

Figure 5:
Construction Schedule

BALICHISTAN WATER RESOURCE DEVELOPMENT SECTOR PROJECT
Mula River Basin
Churri Infiltration Gallery Subproject
Proposed Construction Schedule

No.		Component	TIME PERIODS (MONTHS)																	
			Mobilization	Preliminary Works			Construction of Civil Works													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1		**Mobilization**																		
2		**Preparatory Work**																		
3		**Construction of Churri Infiltration Gallery/ Associated Structures**																		
	i	Infiltration Gallery Pipe + Filter																		
	ii	Sump Well																		
	iii	Inspection Well																		
	iv	Outlet Conduit																		
	v	Protection Works																		
	vi	Mechanical Works																		
4		**Construction of Irrigation Channels**																		
	i	Excavation of Irrigationl Channels																		
	ii	Construction of Irrigation Channel																		
5		**Main Channel & Structures**																		
	i	Fall Structures																		
	ii	Superpassage																		
	iii	Outlets/ Time Division Structure																		
6		**Social Structures**																		
7		**Flood Protection Bunds**																		

4. ALTERNATE ANALYSIS

4.1 Project Need and Justification

4.1.1 Churri Infiltration Gallery

124. An infiltration gallery exists at proposed location of the subproject. It diverts sub-surface water to an unlined channel. The arrangement provides 0.2 cumec to command area which does not meet total irrigation water requirement of area. The remaining irrigation water requirement is met through groundwater extraction. In the subproject area, abundant land is available for agriculture but irrigation water is the limiting factor. The farmers are temporarily irrigating part of command area of the subproject through pumping of surface water from streams/nullah and number of springs and Karezes.

125. After implementation, the subproject will improve 115.0 ha of existing command area whereas 695.0 ha new area will be brought under cultivation. After construction of subproject, it will significantly improve the agricultural production and rural livelihood. In Churri Infiltration Gallery subproject, an infiltration gallery is proposed to divert subsurface flow to command area, which will assure extension of command area. The available perennial water will be utilized for irrigating extended command area so that farm income and livelihood of local people will be improved. The sub-project will also provide protection bunds along Sohinda River to channelize the river flow along the location of gallery. Availability of water round the year will increase productivity of area and enhance income generation activities in area.

4.2 No Project Alternative

4.2.1 Churri Infiltration Gallery

126. In the sub-project area, abundant land is available for agriculture but irrigation water is the limiting factor. The farmers are temporarily irrigating part of command area of the subproject through pumping of surface water from streams/nullah and number of springs and Karezes.

127. An infiltration gallery exists at proposed location. It diverts sub-surface water to an unlined channel. The arrangement provides 0.2 cumec to command area which does not meet total irrigation water requirement of area. The remaining irrigation water requirement is met through groundwater extraction.

4.3 Interventions at Churri Infiltration Gallery

4.4.1 Alternatives

128. The following two options were considered at Churri Infiltration gallery subproject:

- 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.

129. It was duly noted during field investigations that the surface water would not be available during the entire year however the subsurface water (river back flow) is available all year round hence the selection of an Infiltration gallery across the entire river bed has been proposed.

130. The objective of the project is to provide more irrigation water to the existing and available command area in villages of the project area.

131. The sub-project will also provide with the flood protection bund (2 No.) along some reaches of command area to preserve it from flood water. The provision of permanent infrastructure will improve system efficiency by reducing losses and conveyance times between the source and outlets. Availability of water round the year will increase productivity of the area and enhance income generation activities in the area.

132. **Table 14** below provides comparison of alternatives with respect to cost, design and environment:

Table 14: Comparison of Alternatives

Parameters	Weir	Infiltration Gallery
Cost	Costly	Cheaper
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.

133. Comparison of alternative as mentioned in **Table 16** shows that the infiltration gallery is the best alternative with respect to cost and availability of water for whole year.

5. ENVIRONMENTAL & SOCIAL BASELINE CONDITIONS

134. Spatial project boundary is defined as the specific site area that includes the areas of construction and operation and the zones of influence around the project site i.e. physical, biological and socioeconomic. The area of influence around the proposed sub-project interventions are attached **Annexure - 5**. It specifically includes the construction area and the land adjacent to it. The adjacent land includes any area that is directly disturbed by the construction and operational activities of the project. The project boundary may vary for different major areas covered under physical, biological and socioeconomic environment depending upon the areas of influence. This chapter describes the environmental setting of the proposed interventions.

135. The data presented in the following sections has been collected from both secondary and primary sources. For secondary data acquisition, the project team contacted the relevant departments and gathered the required information. Primary data was collected during reconnaissance surveys and detailed visits during March 2020. The secondary data was also verified and visual observations were made during these visits.

5.1 Physical Resources

5.1.1 Geology

136. The proposed Churri infiltration gallary area is surrounded by rocks of Jurassic to Cretaceous age, which are overlain by the derived material of these rocks. The lithologigical units exposed in the Nur Gama Samawari to Pandran area catchment consist of both consolidated rocks and unconsolidated sediments. Consolidated rocks in the area belong to various Formations and their units, which range in age from Jurassic to Cretaceous and are mainly of sedimentary origin. The northwestern part of the Indo-Pakistan subcontinent was a passive carbonate platform during the breakup of Gondwanaland and its ensuing northward drift (Jurassic-Paleocene).

137. The major unconsolidated deposits mapped during the geological mapping of site area include passive stream/nullah bed deposits and active stream/nullah bed deposits (SBD/NBD) which are termed as recent and subrecent alluvium deposits along with fine matrix (embedded). The recent alluvium consists of gravel, cobble and boulders with minor sand and silt/clay. The gravel-boulders are rounded to subrounded, poorly sorted and of limestone and sandstone sedimentary origin. The subrecent alluvium consist of gravel, cobble and boulders with minor sand and silt/clay in the form of matrix and layers.

5.1.2 Topography

138. Areas adjacent to sub-project location, including some parts of command area, have underlying Eocene sedimentary rocks. High mountains having steep slopes are found in upstream of sub-project. The terrain is generally flat in sub-project area and is suitable for

agriculture. At location of proposed infiltration gallery is narrow and only 270 m wide. The river slope in this reach is 1:125.

5.1.3 Land Use

139. The project area is located in the district of Khuzdar, Baluchistan province having mainly perennial irrigated agriculture. The gross area (G.A) of the project is determined as 1125.0 ha, out the of gross area, the culturable commanded area (CCA) is 809.5 ha (72.0%) and the remaining 315.5 ha (28.0%) area is “Not Available for Cultivation”. Area Not Available for Cultivation is occupied by roads, graveyards, gravel or stony, land, and residential locations

5.1.4 Soil in Command Area

140. There are different types of soil in the area are known as matt, karkats, rikpoad, halli and sarah. Among them, matt is the best and richest, consisting of silt washed down from the hills. The highly clay content found in Karkat and is supposed also fit for agriculture. It is harder, cracks when dry and requires breaking up after ploughing, but needs less water than matt. Both matt and karkat are suitable for spring crops and are found in Surab, Gidar, Pandran, parts of Baghwana, Tutak, Nal, Kalo, Karkh, Korask and Jan. Rikpad is a light sandy soil appears in somewhere in Wad. Wheat, barley and jaur grow well on it, but the crops are considered inferior to those grown on matt or karkat. It is well suited for melons, onions and vegetables in general. Halli is a gravely soil, found in the irrigated areas of Surab and Khuzdar on the skirts of the hills and along the banks of the rivers. It is recommended for cultivation of vegetables, but the crops grown on it are thin and require great care. Sorah or salt land is the poorest soil of all and is found in large tracts at Hisar, Zehri, Gidar, Nondrav valley and between Mir-na-Shaher and Bajoi in Baghwana.

5.1.5 Seismicity

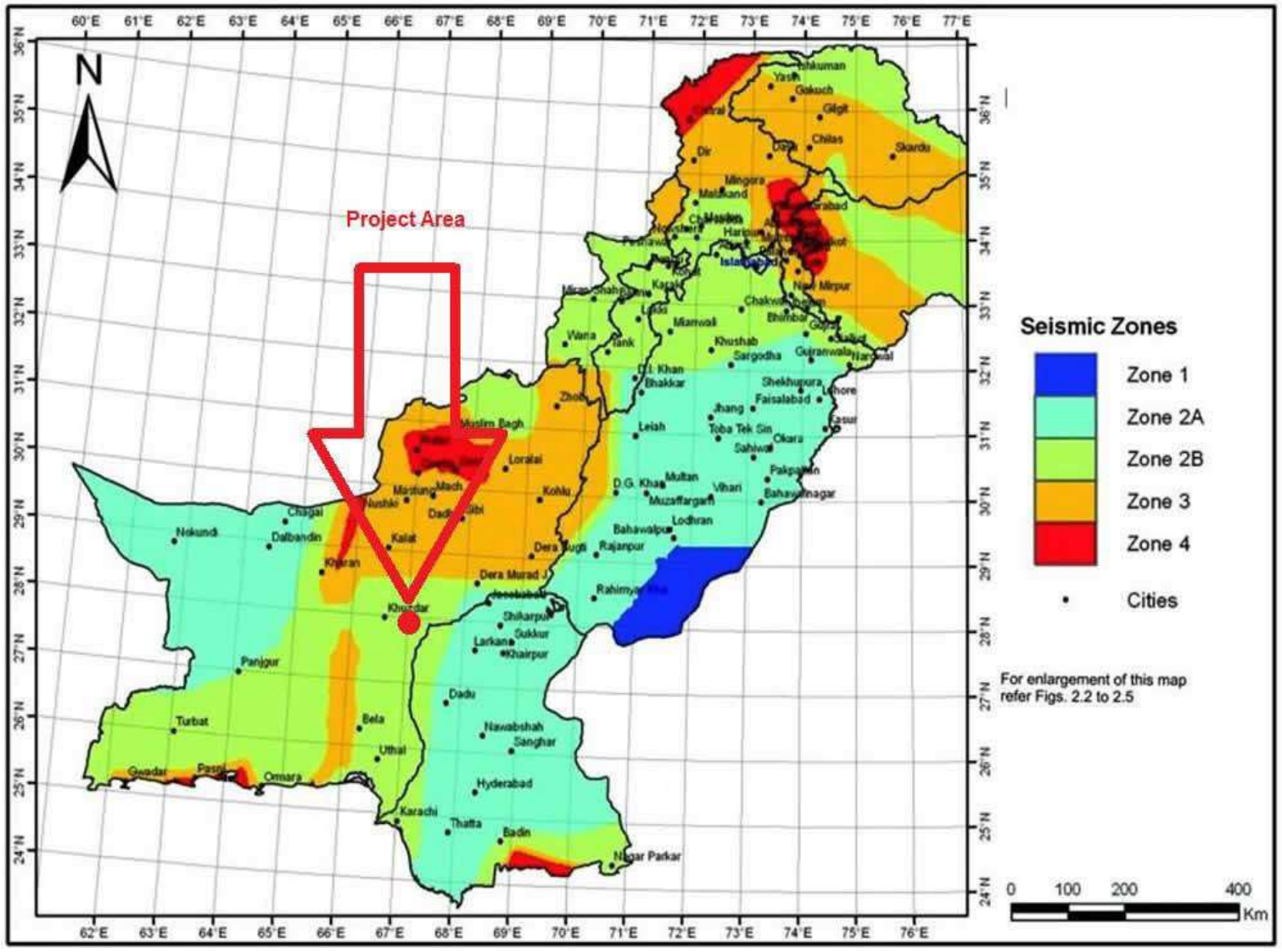
141. The entire province of Balochistan lies in a seismically active region. The province has experienced devastating earthquakes in the past. A powerful earthquake with a magnitude of 7.0 on the Richter scale was recorded on May 31, 1935 and devastated Quetta town and resulting in 35,000 fatalities.

142. Again, on the Nov 28th, 1945, an earthquake measuring 8.6 on the Richter scale hit Balochistan killing almost 4,000 people.

143. A history of recorded earthquakes is attached as **Annexure - 6**.

144. The seismic zoning map of Pakistan, indicates that the project area lies in the **zone 2B**. This zone is liable to MSK VI or less and is classified as the Low Damage Risk Zone. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macroseismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence. The updated Seismic Zoning Map of Pakistan is shown below as **Figure 6.**

Figure 6: Seismic Zoning Map of Pakistan



Source: Geological Survey of Pakistan

5.1.6 Climate of the Project Area

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

146. The catchment area of Churri is mostly influenced by climatic station of Kalat. A brief of the various climatic parameters of both the meteorological stations have been described hereunder:

Precipitation

147. Mean monthly rainfall data and the number of rainy days recorded at the Kalat Met Station are given in **Table 15.** The average annual rainfall of the area is about 216 mm (8.50 inches), while on the average the maximum monthly rainfall is 40.9 mm during the month of January and a minimum of 0.6 mm in September. The maximum rainfall occurs during the months of December to March, which is about 69% of the annual rainfall. Summer rains generally occur during the months of July and August, whereas, September is normally the months with least precipitation. The distribution of average monthly rainfall is shown in **Figure 7** below.

Table 15: Mean Monthly Rainfall in Kalat

Month	Mean Monthly Rainfall (mm)	Rainy Days (No.)
January	40.9	3.3
February	37.3	3.3
March	31.6	3.8
April	8.4	2.1
May	4.2	1.1
June	8.9	1.1
July	21.9	2.2
August	11.8	1.3
September	0.6	0.1
October	4.4	0.1
November	6.6	0.5
December	39.4	1.9
Annual	**216.0**	**20.8**

Source (Pakistan Meteorological Department)

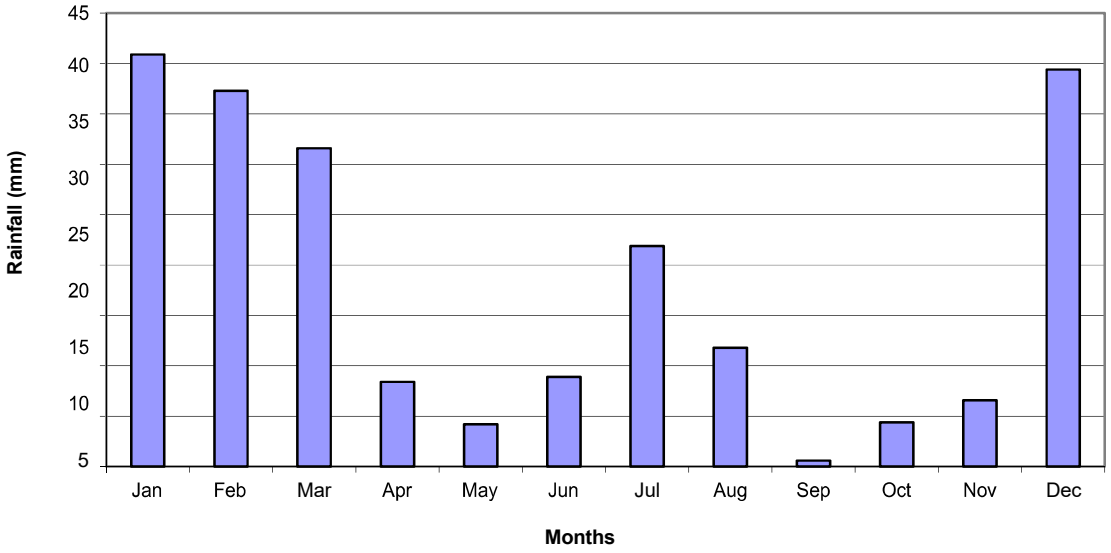


Figure 7: Monthly Distribution of Rainfall at Kalat

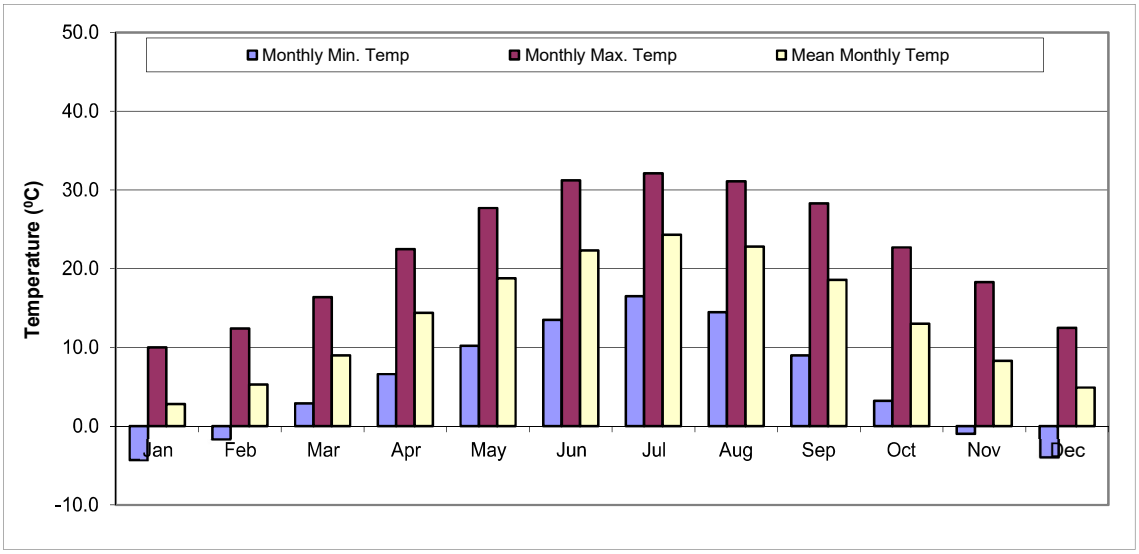
5.1.7 Temperature

148. The mean daily temperature ranges from (July being the hottest month) 22.3oC to 24.3oC in the summer season (June to August) and 2.8oC to 5.3oC in winter season (December to February). Mean monthly temperature in July rises to a highest value of 24.3oC and falls to the lowest value of 2.8oC in January. June, July and August are the hottest months in summer season. December, January and February are the coldest months in winter season. The monthly averages of minimum, maximum and mean daily temperatures are given in **Table 16** and shown graphically in **Figure 8** below.

Table 16: Mean Monthly Temperatures in Kalat

Month	Temperature (oC)		
	Min	Max	Mean
January	-4.3	10	2.8
February	-1.7	12.4	5.3
March	2.9	16.4	9.0
April	6.6	22.5	14.4
May	10.2	27.7	18.8
June	13.5	31.2	22.3
July	16.5	32.1	24.3
August	14.5	31.1	22.8
September	9.0	28.3	18.6
October	3.2	22.7	13.0
November	-1.0	18.3	8.3
December	-3.9	12.5	4.9

Figure 8: Mean Monthly Temperatures Kalat



5.1.8 Relative Humidity

149. The relative humidity data at 00:00, 03:00 and 12:00 hours was collected from PMD. Mean monthly relative humidity is given in **Table 17**. At 00:00 hr the relative humidity varies from lowest value of 48.7 % in June to highest value of 76.8 % in January. At 12:00 hr the lowest value is 19.3 % in June to highest value of 44.7 % in January.

Table 17: Mean Monthly Relative Humidity in Kalat

Month	Relative Humidity (%)		
	00:00 hr	03:00 hr	12:00 hr
January	76.8	75.1	44.7
February	74.2	72.1	43.6
March	71.5	65.0	37.6
April	63.0	52.2	28.5
May	54.2	42.2	21.8
June	48.7	39.6	19.3
July	57.8	50.2	26.2
August	58.4	50.9	23.3
September	53.5	43.7	20.6
October	57.0	46.7	23.2
November	64.7	57.9	27.2
December	72.3	69.5	39.0

5.1.9 Wind Speed

150. The mean monthly wind speed in knots is given in **Table 18**. The data reveals that at 00:00 hours, the wind speeds are generally lower while higher wind speeds are recorded at 03:00 and 12:00 hours. During summers wind speeds are generally higher than wind speeds in winters.

Table 18: Mean Wind Speed at Synoptic Hours in Kalat

Month	Mean Wind at Synoptic Hours (Knots)		
	00:00	03:00	12:00
January	1.1	1.3	3.8
February	1.1	1.3	3.9
March	0.9	1.3	4.3
April	0.7	1.2	4.5
May	0.5	1.1	4.4
June	0.5	0.7	3.9
July	0.6	0.7	4.1
August	0.4	0.6	3.4
September	0.5	0.8	3.3
October	0.6	0.9	3.4
November	0.7	0.9	2.8
December	0.8	1.1	3.2

5.1.10 Hydrology and Floods

151. The hydrological assessments covered the estimation of water availability and design flood at the infiltration gallery site. Total catchment area at Churri Infiltration Gallery Subproject site is 1072.5 square kilometers. The water availability was estimated both from stream flow data and rainfall-runoff modelling using satellite-based data. The study used the average annual rainfall of 216 mm and rainfall-runoff factor for Zhob and Gomal basins as 0.10-0.12. This worked out average annual runoff volume at Churri Infiltration Gallery site as 18.5 million cubic meter (MCM) which includes 12.5 MCM as baseflow which results an average annual gross estimated water availability of 31 MCM.

152. In addition to the above, the command area of Churri Infiltration Gallery Subproject is being fed by the flows of Sohinda river.

153. For estimation of flood flow, one-day annual maximum rainfall data record of Kalat was used for a period from 1971 to 2022 (46 years) with few missing years. Rainfall Frequency Analysis was carried out using Gumbel's Extreme Value Type-1 Distribution and Log Pearson Type-III. Results by Gumbel Extreme Value Type I best fit. Using the rainfall depth for various return periods, its temporal distribution over the catchment areas and on the basis of Synthetic Unit Hydrograph technique, the estimated peak flood is given in **Table 19.**

Table 19: Estimated Peak Floods at Churri Infiltration Gallery

Return Period	Estimated Peak Floods	
(Years)	(ft3/s)	(m3/s)
25	39,093	1,107
50	49,636	1,406
100	60,457	1,712

5.1.11 Water Quality

154. Surface water is being used as drinking water throughout the project area. Surface water quality testing results are as under.

Table 20:: Summary of Ground Water Quality

#	Parameter	UoM	Mula River (Kharzan-Hatachi) 313763.63E 3104294.59 N	NEQS	WHO/IFC
1	Turbidity	NTU	BDL	<5	<5
2	Total Suspended solids	mg/L	BDL	<1000	<1000
3	Total Dissolved Solids	mg/L	357	<1000	<1000
4	pH		7.99	6.5-8.5	6.5-8.5
5	Aluminum	mg/L	BDL	≤ 0.2	0.2
6	Antimony	mg/L	BDL	≤0.005	0.02
7	Arsenic	mg/L	BDL	≤0.005	0.01
8	Barium	mg/L	BDL	0.7	0.7
9	Boron	mg/L	BDL	0.3	0.3
10	Cadmium	mg/L	BDL	0.01	0.003
11	Chromium	mg/L	BDL	≤ 0.05	0.05
12	Copper	mg/L	BDL	2	2
13	Lead	mg/L	BDL	≤ 0.05	0.01
14	Manganese	mg/L	BDL	≤ 0.5	0.5
15	Nickel	mg/L	BDL	≤ 0.02	0.02
16	Mercury	mg/L	BDL	≤ 0.001	0.001
17	Selenium	mg/L	BDL	0.01	0.01
18	Zinc	mg/L	BDL	5.0	3

5.1.12 Ambient Air Quality

155. Air quality in the project area is fairly clean. There are no significant sources of air pollution in the area. The other major source of air pollution is minute vehicular emissions on the road, dust arising from winds and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or katcha access roads.

156. Industries and commercial areas are fairly far away from the project site. Domestic sources of air pollution, such as emissions from wood stoves in some households, are a minor source of air pollution. During site visits, air quality test was done. The result reveals that the air quality of the area is under permissible limits (Table 21).

157. Ambient air quality parameter as per site conditions only includes Suspended Particulate Matters was spot monitored on Mula River at Kharzan-Hatachi. Table 4-6 below shows average 24 hours' results. The equipment used for air monitoring is Hazdust EPAM 5000 and test method is USEPA PM10, 2.5 method 201a. The results range from 0 to 15 µg/m3 details are presented in Annexure – 7 of this report.

Table 21: Results of Ambient Air Quality

S. No.	Location	Test Results (µg/Nm3)	NEQS/WHO (avg. 24 hrs. µg/m3)
1	Mula River	BDL	500

Source: Monitored in the Project Area by Laboratory Team

158. The results presented in **Error! Reference source not found.** clearly depicts that the ambient air quality of the Project Area is clean as the values of all monitored parameters are far below the values of NEQS.

5.1.13 Ambient Noise

159. Under this assignment, ambient noise level was measured on Mula River at Kharzan-Hatachi which range between 32-41 dB(A). This range corresponds to a low-level noise atmosphere of the rural areas, associated with some of vehicular traffic. The details of the analysis are presented in Annexure – 2 of this report.

160. Ambient noise levels were measured and the average 2 hours monitoring results are given as following in **Table 22**. Noise monitoring was done with a type 1 noise meter.

Table 22: Summarized Results of Noise Monitoring

S. No.	Location	Noise Level dB(A)	NEQS / WHO Day Time	NEQS / WHO Night Time
1	Mula River	32	55	45

ource: Monitored in the Project Area by Laboratory Team

5.1.14 Protected Sites

161. As per assessment during the baseline surveys there are no protected sites and protected forests within or close to the potential impact zone of this scheme.

5.2 Ecological Resources

- **Flora**

162. The major forest type is Sub Tropical Broad-Leaved Evergreen Scrub forests in District Zhob. These forests occupy the altitudes between 2500 to 5500 feet elevation.

Table 23: Floristic List of District Khuzdar

#	Taxon	Family	Life form	Vernacular name
01	Acacia nilotica	Fabaceae	Tree	Babbur
02	Acacia sengal	Fabaceae	Shrub	Babbur
03	Prosopis cineraria	Fabaceae	Tree	Kandi
04	Prosopis glandulosa	Fabaceae	Shrub	Kandi
05	Prosopis juliflora	Fabaceae	Shrub	Devi
06	Tamarix sultanii	Tamaricaceae	Shrub	Kirri
07	Zizyphus nummularia	Rhamnaceae	Shrub	Ber
08	Aerva javanica	Amarantheaceae	Shrub	Gujo
09	Periploca aphylla	Ascalpidaceae	Shrub	
10	Capparis decidua	Capparidiaceae	Shrub	
11	Haloxylon recurvum	Amarantheaceae	Shrub	
12	Suaeda fruiticosa	Amarantheaceae	Shrub	
13	Suaeda ferinosa	Amarantheaceae	Shrub	
14	Grewia domaine	Malvaceae	Shrub	
15	Alhaji marorum	Fabaceae	Shrub	
16	Salvadora oleoides	Salvadoraceae	Shrub	
17	Salvadora persica	Salvadoraceae	Shrub	
18	Heliotropium sp	Boragenaceae	Shrub	Merin
19	Calligonum polygonoides	Polygonaceae	Shrub	
20	Rhazya stricta,	Apocynaceae	Shrub	
21	Euphorbia caducifolia	Euphorbiaceae	Shrub	
22	Commiphora mukal	Burseraceae	Shrub	Gugul
23	Inula montaine	Asteraceae	Herb	Kulumurak
24	Inula grantoides	Asteraceae	Herb	Kulumurak

25	Grewia tenex	Malvaceae	Shrub	Chill
26	Phoenix dyctylefera	Palmea	Tree	Khajoor
27	Cymbopogon sp	Poaceae	Grass	
28	Cenchrus sp	Poaceae	Grass	
29	Aristida sp	Poaceae	Grass	Nadak
30	Chrysopogon sp	Poaceae	Grass	
31	Sericostoma	Boraginaceae	herb	

- **Fauna**

163. Fauna of the project area includes

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

23	Francolinus pondicerianus	Grey Partridge	Bird	
24	Pseudibis papillosa	Black Ibis	Bird	Reported
25	Corvus ruficollis	Brown-necked Raven	Bird	
26	Varanus griseus knoiecznyi	Indian desert monitor	Reptile	
27	Naja	Indian Cobra	Reptile	Common
28	Ablepharus pannonicus	Easter dwarf skink	Reptile	
29	Eristicophis macmahonii	Leaf nose viper	Reptile	

5.1.15 Archaeology and Cultural Heritage

164. Sites of importance in regard to cultural heritage are not reported from the specific area of the project.

5.1.16 Agriculture

165. At present, agricultural productivity is low in sub-project due to inadequate irrigation system. The existing cropped area is 115 ha with 14% cropping intensity followed by cropping pattern wheat – rabi vegetables – cotton – melon and small number of orchard. The yield and production are not good enough to support landowner to enhance agricultural productivity.

5.3 Social Environment

5.3.1 Ethnicity and Tribes

166. In the studied killies, the main caste was Zahri and other caste were Musyami, Zarakzai, Jattak, Lotani, Kani, Dayan and Kumbrani.

5.3.2 Religion

167. 100 percent of the population was Muslims.

5.3.3 Literacy Ratio

168. A person was treated as literate if he or she could read newspaper and write a simple letter in any language. According to the current socio-economic survey, the literacy rate of the studied killies was less than 2 percent.

5.3.4 Mother Tongue

169. Barohi is a main language spoken by the surveyed communities of the project area.

5.3.5 Main Occupation and monthly Income of the Respondents

170. Out of total respondents, the main occupation of about 84 % respondents was farming and livestock rearing. Few respondents were serving in Government department as school teachers.

5.3.6 Socail Amenities

171. The facility of electricity is available in the project area. The villages in the command area are connected with the roads. The Rural Health Center, Dispensary, Private Practitioner, veterinary Dispensary, Bank and Police station/post, are available in the Kahan and Jag soor Town. The schools at primary, middle and high level for boys and girls are available and inter college also under construction in the villages of the command area.

5.3.7 Construction Components and Land Acquisition

172. For the sustainable and smooth water flow, the following structures are proposed for the Churri Infiltration Gallery subproject provided in Table 24. The data also shows the requirement of land acquisition to construct different structures.

Table 24: Project Components and LAR Impact of Churri Infiltration Gallery Subproject

Sr. No.	Parameter of Irrigation Component	Quantity of Irrigation Component	LAR Impacts
	Type of Structure		
1	Construction of Infiltration Gallery	01	No LAR Impacts
2	Length of Covered Channel (km)	2.51	No LAR Impacts
3	Length of Open Channel (km)	4.51	No LAR Impacts
4	Fall Structures (number)	03	No LAR Impacts
5	Proportional Distributor (number)	01	No LAR Impacts
6	Super Passage (number)	02	No LAR Impacts
7	Outlets/Time Division Structures (number)	16	No LAR Impacts
8	Washing Structure (number)	10	No LAR Impacts
9	Cattle drinking trough (number)	05	No LAR Impacts
10	Protection works (length of guide bunds R/S) (m)	450	No LAR Impacts
11	Protection works (length of guide bunds L/S) (m)	450	No LAR Impacts
12	Design Command Area (hectare)	694	No LAR Impacts
13	Watershed Area (sq.km)	1072	No LAR Impacts

5.3.8 Stakeholder Consultation

173. The consultations comprised issues/concerns, suggestions included questioning and answering conducted with respondents of different schemes were almost similar because except Siri Toi dam project, all other sub projects are to be rehabilitated and for decades, the irrigators included females of the farming communities have built a patterned behaviour towards agriculture practices, irrigation supplies and shortage, cropping pattern and its related activities that formulated their permanent behaviour of concerns and pressing needs. Thus, during consultation, similar environment was observed regarding concerns and pressing needs of the contacted communities.

- **Consultation with Male Respondents**

174. Public consultation plays a vital role in studying the affect and impacts of the subproject on the stakeholders. These consultations have vital role in obtaining the views and perception of the possible affected community for preparing the useful and sustainable policy to implement the sub-project. In this regard, consultations were conducted with the local people residing in the adjacent villages in the subproject area of different locations/reaches of the Sardar Akhter scheme. The discussions focused on impacts of the rehabilitation works on the local communities' interests related to irrigation supplies. A photograph of the male/females' consultations is provided in Appendix-8.1.

175. The people of the area were pleased to know about the proposed sub-project. Rehabilitation and strengthening of Sardar Akhter channel will be favourable for the local communities and their infrastructures. They were of the view that with the rehabilitation works, their agriculture and other related businesses will be improved and they can flourish their livelihoods. The important general objectives of the consultation process were:

- Consult local communities to share information related to the project and interventions proposed in the sub-projects and sharing with the local communities the mitigation measures included in the project design to address the potential impacts;
- Create awareness among the local communities about the project and share the benefits of the subprojects for the local communities and promoting good will towards the project among the communities;
- Create awareness in local communities about their participation in the project activates;
- Brief Grievance Redressal Mechanism (GRM) and participation of local communities in Grievance Redressal Committees and an evolving mechanism for resolution of social and environmental problems,
- Get support from the local communities in land acquisition and successful implementation of the project;
- Assess positive and adverse impact of intervention related to the subprojects on the local communities;
- Assess social facilities in the subproject areas and need assessment;

- Record concerns of the local communities related to the project activities, mitigation measures and suggestion for improvement of the project;
- Consult with FOs to assess their role in irrigation management in the present scenario- need assessment for improvement in their functioning and formation of new FOs;
- Mobilize farming communities for high value agriculture (HVA) proposed in the Project and sustainability of the project.
- Create awareness about Trainings of Farmers on solar power pumping, drip irrigation system, crops and orchards management.
- Assess activates of the Local NGOs and working in the sub-projects areas to create linkage with project development activities;
- Create awareness among women about the project, and their participation in the project activates proposed for the gender development.
- Conduct needs assessment to determine the communities' choices of domestic water supply locations, washing facilities, water collection points, and other facilities;
- Identify potential female activists in the project catchment areas to harmonize with the project initiatives;
- Assess women's participation in income generation in the subproject areas and brief them about the income generation activates proposed in the Project. Assess role of women in agriculture and livestock rearing activities;
- Disclose Gender Action Plan (GAP) and to brief activities proposed for the women participation and development;
- Brief Grievance Redressal Mechanism (GRM) and participations of women in the GRCs;
- Create awareness about their participation in training activities- kitchen gardening and value-added crops;
- Identifications of key person from the communities;
- Assess gender issues in the area; and
- Assess need of women related to skill trainings and their preferences.

176. Public Consultations included meetings and interviews were conducted with the local residents, farmers, women and other stakeholders. The consultations were carried out in accordance with the IR policy of ADB's SPS 2009 and its outcome is discussed in the proceeding sections. Consultations were also held with the PMO, BID and the design teams. The list of consultation meetings is given in **Table 25** .

Table 25: Concerns and Remarks of respondents

Concerns	Response
Where is the proposed site of infiltration gallery?	Proposed location of infiltration gallery was briefed and with the help of Map and location physically also visited with the community people.
Is the solar tube well component part of the sub-project?	Participants were briefed about the criteria for selection of site for the solar tube. They were briefed about the requirement of depth of water table in the area. Participants were also briefed

	about pilot sites selected in the project areas.
Where the cattle ghats and washing points will be constructed?	Suitable sites for the cattle ghats will be proposed by the communities for the easy access of cattle from the surrounding areas. Locations of washing points will also be selected with gender consultations near the village.
What is the purpose of gender consultations?	Gender consultations are mandatory for ADB funded project. Moreover, trainings for females on kitchen gardening and safe drinking water has been proposed. Participation of women in Grievance Redressal Committees is also necessary. Gender Consultations are being conducted to aware the women about their participation in the project components.
What is the route of the new water channel?	Route of the proposed water channels were briefed with map and with the help of GPS.
Will compensation against damages of crops and trees will be provided?	All damages (crops, trees and structures) will be valued and compensated according to the ADB SPS-2009.
Due to construction of canal crossing will become a problem to travel other side.	Road & foot bridges will be provided at different location to cross the canal for their mobility..
Construction activities will disturb the people by noise pollution and dust.	Remedial measures will be adopted to minimise the adverse effects during construction.
The local people, particularly the children and women, may get injuries or even fatalities.	To enhance safety of local people the contractor should use protective devices, including wire mesh containment, displaying warning signs along the work site, blowing sirens, etc.
Which type of the canal has been proposed?	Lined canal has been proposed. It will reduce seepage, losses of irrigation water and make irrigation system more efficient.

- **Gender Consultation**

177. No economic growth is possible without due participation of women in the economic activities as they constitute more than half of Pakistan's population. Ever-increasing responsibilities and lesser opportunities along with narrow exposure have always been a great challenge for women of Pakistan. Women are held responsible for doing home all home chores, upbringing children and feed families. In rural areas, women work side-by-side with men. They do home chores, farming, harvesting and manage livestock to supplement the

income of the families. In spite of all this, most of times their efforts and struggle are taken for granted. They are hampered by persistent gender inequities that limit their access to decent work, which they need as a vehicle for economic empowerment, social advancement and political participation.

178. The gender and social Consultation revealed extreme poverty in the area. Women used to handle all the chores and outside regarding limited agriculture and livestock with their partners. The participants were pleased with the proposed irrigation project. They think that their land will become fertile and valuable with the supply of surface irrigation water. All were working as housewives. High-priority needs demanded by the community were clean drinking water as it was most distinctive need of the community because they have to fetch water from on every day basis for drinking purpose. The females did not know about the irrigation project in details. They were explained the project, project objectives and ADB IR policy. The following were the objectives of Gender Consultation:

- Create awareness among the women about gender activities provided in the GAP and ensure their participation;
- Identification of potential female activists in the project catchment areas to harmonize with the project initiatives;
- Assessment of opportunities to develop and implement gender specific intervention in the project ;
- Create awareness among women about the subprojects and it components and involvement and role of the local women in the activities related to the women development proposed in the project;
- Conduct needs assessment to determine the communities' choices of domestic water supply location, washing facilities, water collection points and other like facilities;
- Role of women in income generation activities and decision making (Agriculture, Livestock raring and any other);
- Need Assessment related to skill trainings;
- Assessment of gender issues and in the subprojects areas; and
- Gender concerns related to the subprojects and suggestions to get maximum benefits from the project.

❑ ***Pressing Needs of Women***

179. During consultations women expressed following pressing needs:

- Supply of clean drinking water and sanitation facilities;
- Participation of women in income generation activates;
- Provision and up gradation of medical and educational facilities;
- Provision of electricity in the village; and
- Skill trainings centers to enhance skills on income generation activities

❑ ***Concerns Raised by Female Participants***

180. Following concerns raised by the participants:

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

❑ ***Mitigation Measures to Address the Concerns***

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

6. ASSESSMENT OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 General

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

6.2 Impact Assessment Methodology

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

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

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

6.3 Scoping of Impacts

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

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

6.4 Notion of Significance

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

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

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

6.5 Environmental Screening

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

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

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

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

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

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

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

269. **Table 26** below presents the screening of activities for proposed infiltration gallery, new canal and irrigation system during design, construction and O&M phases.

Table 26: Screening of Activities

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Churri Infiltration Gallerie (a) Construction of infiltration galleries, (b) Construction of water conveyance system and associated structures)							
A. Implementation & Construction Phase							
Construction contractor mobilization and Establishment of campsite and machinery/ equipment Yard		✓			✓		• Changes in land use pattern • Influx of external work force • Social conflicts • Workshop facilities may spread oils & chemicals • Deterioration of air quality due to machinery & equipment • Noise • Land degradation due to solid waste disposal of camp site • Water contamination • Loss of vegetation • Health and Safety issues& including COVID-19 related
Security and Safety Risks		✓			✓		• Delay in project execution
Transportation of construction material		✓			✓		• Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues including COVID-19 related • Damage to infrastructure

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Earthen works		✓			✓		• Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues & including COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material
Concrete and Form works		✓			✓		• Noise pollution • Air pollution • Health and safety issues • Blocked of access due to construction works
B. Operation & Maintenance Phase							
Conflicts caused by unavailability or improper distribution of water in the area		✓			✓		• Social issue
Use of water for drinking purposes		✓			✓		• Health issues • Social issues
Periodic cleaning and maintenance of the system		✓			✓		• Solid waste generation
Increase of agricultural lands		✓			✓		• Loss of pastoral lands

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Community Participation for management and operation of the irrigation system		✓			✓		• Social issues • System sustainability
Use of fertilizers & pesticides		✓			✓		• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff
Disruption to wildlife		✓			✓		• Conservation issues
Risk due to Natural Hazard i.e. flooding and earthquakes		✓			✓		• System sustainability

6.6 Assessment of Risk – Environmental Aspects

270. 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.

271. The anticipated environmental impacts due to project is based on the methodology provided in chapter 1 of this report presented below in **Table 27**.

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

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

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

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

Table 27: Anticipated Environmental Impacts Assessment

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
Churri Infiltration Galleries(Construction of infiltration gallery, lining of covered channel, social structures and time division structures)				
A. Implementation and Construction Phase				
Construction contractor mobilization and Establishment of campsite and machinery/ equipment Yard	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	B-2	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.	B-1
	Workshop facilities may spread oils & chemicals	B-2	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.	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Deterioration of air quality due to machinery & equipment	B-2	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.	B-1
	Noise Pollution	B-2	Equipment with high levels shall be fitted with noise reduction devices Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured Avoid night time activity	B-1
	Land degradation due to solid waste disposal of camp site	B-2	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	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			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	B-2	Waste management plan to be prepared for appropriate disposal of sewage – such as septic tank and soaking pits	B-1
	Loss of vegetation	B-2	The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	B-1
	Health and Safety issues	B-2	Protective fencing to be installed around the Camp to avoid any accidents Firefighting equipment shall be made available at the camps The camp staff shall be provided firefighting training.	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			All safety precautions shall be taken to transport, handle and store hazardous substances, such as fuel Health & safety plan & SOP to manage COVID-19 risks should be prepared by contractor and get it approved by supervision consultant	
Security and Safety Risks	Delay in project execution	C-3	Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks	C-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			and dangers of large construction sites	
Transportation of construction material	Soil erosion and contamination	B-2	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	B-1
	Air pollution	B-2	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	B-1
	Noise pollution	B-2	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.	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Health and Safety issues	B-2	Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic Project drivers shall be trained on defensive driving. Vehicle speeds near / within the communities shall be kept low, to avoid safety hazard and dust emissions.	B-1
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
Construction Works	Soil erosion and contamination	B-2	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.	B-1
	Loss of natural vegetation	B-2	Compensatory tree plantation (five times the trees cut down for construction) should be carried out	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			at appropriate locations within the project area	
	Site overburden	B-2	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.	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Borrow pit management	B-2	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.	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Damage to infrastructure	B-2	All damaged infrastructure shall be restored to original or better condition.	B-1
	Sites of Historical, Cultural, Archeological or Religious Significance	B-2	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	B-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			of the construction activities at such sites.10 Graveyards shall not be disturbed during the construction activities including movement of the project vehicles and obtaining borrow material for construction.	
	Noise pollution	B-2	Equipment with high levels shall be fitted with noise reduction devices Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured Avoid night time activity	B-1
	Air pollution	B-2	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.	B-1

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

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Blocked of access due to earth works and stockpiling of excavated material	B-2	A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.	B-1
	Health and Safety issues	B-2	Demarcation tapes to be installed around the construction site to avoid any unauthorized entry Personal protective equipment should be made available at site and the usage of the PPEs should be ensured. Health & safety plan & SOP to manage COVID-19 risks should be prepared by contractor and get it approved by supervision consultant	B-1
B. Operation and Maintenance Phase				
Conflicts caused by unavailability or improper distribution of water in the area	Social issues	C-3	Agreements between different communities/tribes Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e. when flow is higher or lower than normal. From the outset water management rules and regulations must incorporate ways to tackle such	C-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			issues as water scarcity and surplus flows. Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures. This needs to be done on collaborative basis with irrigation and agriculture department where communication system among farmers, water user association and department is assured. Farmers in downstream areas should be compensated in case they lose their water rights. All villages deprived of Project's water rights should be compensated for drinking water supply schemes otherwise very soon all villages and settlements will be deserted as underground water may not be fit for drinking purpose for every village and it would probably not be within the financial or technical capacity of local population to initiate such schemes on their own.	
Use of water for drinking purposes	Health issues	C-3	Proper treatment system shall be provided	C-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
			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.	
Periodic cleaning and maintenance of the system	Solid waste generation	C-3	Ensure proper disposal of waste at designated landfill/disposal sites.	C-1
Increase of agricultural lands	Loss of pastoral lands	C-3	Stall feeding practices for livestock, so that remaining pastoral lands are available for wild animals.	C-1
Community Participation for management and operation of the irrigation system	Social issues and System sustainability	C-3	Ensure community participation in management and operation of the irrigation system Training of community	C-1
Disruption to wildlife	Conservation issues	C-3	Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. It will be the responsibility of BIPD to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.	C-1
Use of fertilizers & pesticides	Banned fertilizer & pesticides will cause health issues	C-3	Concerted efforts by the department of agriculture to disseminate information regarding sustainable	C-1

Activity / Issue	Potential Impact	Assessment of Risk	Mitigation Measures	Residual Impacts
	Contamination of fresh water through surface runoff		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 15** of this report	
Risk due to Natural Hazard i.e. flooding and earthquakes	System sustainability	C-3	Emergency Response Plan for Infiltration Gallery will be followed which is attached as **Annexure – 12** of this report.	C-1

7. ENVIRONMENTAL MANAGEMENT PLAN

7.1 Environmental Management Plan (EMP)

7.1.1 General

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

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

277. This EMP addresses all the significant impacts that are identified during the impacts identification process of the EIA at Feasibility Level as well as due to minor modifications in Feasibility Design at the Detail design stage . It should be amended in consultation with the concerned regulatory authority, in this case BEPA, if any issue has been overlooked or if any need would arise as the project continues.

7.1.2 Structure of EMP

278. The contents of this chapter are given below:

- Regulatory Requirements
- Purpose & Need of the EMP
- Objectives of the EMP
- Scope of the EMP
- Institutional Arrangement for Implementation of EMP
  - Institutional Arrangements for Implementation of EMP during Construction Phase
    a. Role and Responsibilities of the Functionaries involved in EMP Implementation
    b. Reporting Mechanism
    c. Non-Compliance of the EMP
  - Institutional Arrangements for Implementation of EMP during Operation Phase
    a. Role and Responsibilities of the Functionaries involved in EMP Implementation
    b. Reporting Mechanism
- Environmental Mitigation Plan
- Environmental Monitoring Plan
- Implementation of EMP
  - NOC and other Approvals

  - Stakeholder Coordination
  - Trainings
  - Communication & Documentation
- Grievance Redressal Mechanism (GRM)
- Environmental Management Cost
- Change Management

7.1.3 Regulatory Requirements

279. This EMP refers to the applicable legal framework given earlier as Chapter 2 for the proposed project for the protection of the environment.

7.1.4 Purpose & Need of the EMP

280. Primarily, the purpose of this EMP is to serve as a quick reference for the consultants, contractor as well as the proponents to implement the proposed mitigation measures effectively and to monitor the overall environmental performance of the project. Furthermore, to house the procedure, which the proponent follows to implement and maintain this EMP. The need of the EMP is mentioned as follows:

- Ensure that attention is paid to the actual environmental effects arising from construction, and operation of the proposed project;
- Ensure that anticipated impacts are maintained within the levels predicted;
- Ensure that unanticipated impacts are managed or mitigated before they become a problem; and
- Ensure that environmental management brings about real environmental benefits and achieves environmental sustainability, rather than the Environmental Approval Process being a mere paper chase to secure a development approval[11].

7.1.5 Objectives of the EMP

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

7.1.6 Scope of the EMP

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

- Construction Phase; and
- Operation Phase.

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

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

7.1.7 Institutional Arrangements for Implementation of EMP during Construction Phase

284. The key players involved during construction stage of the proposed project are the PMO, the Contractor and the Supervisory Consultants (SCs). The organizational setup for implementation of EMP is given below **Figure 9:**

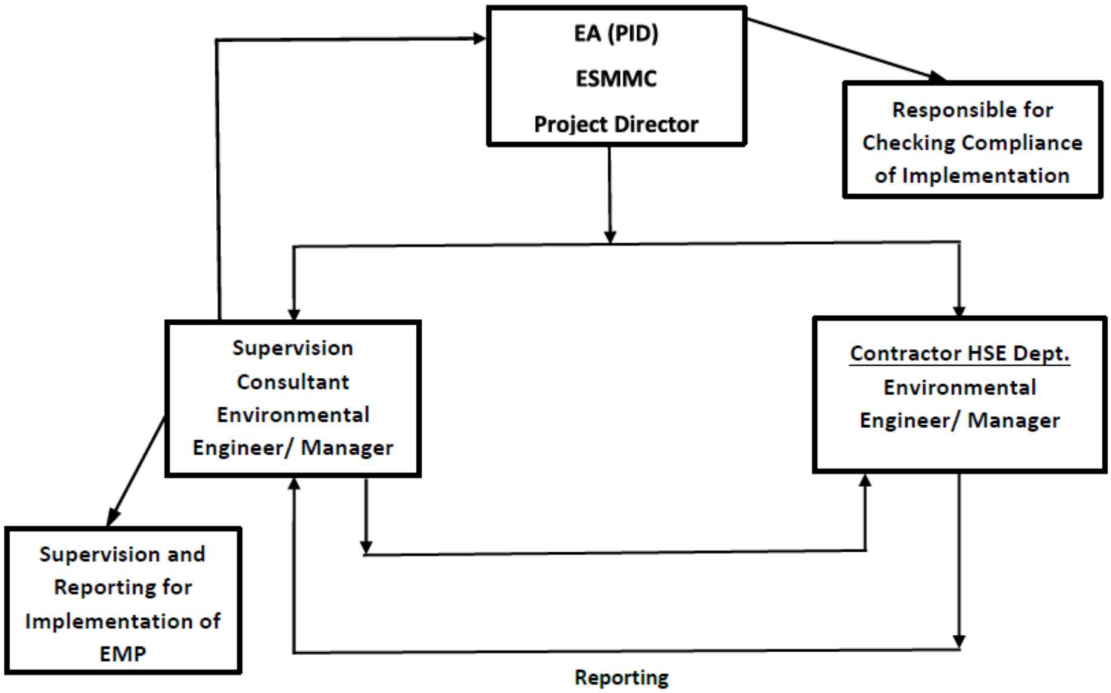


Figure 9: Organizational Setup for the Implementation of SSEMP at Construction Phase

285. The roles, remits and responsibilities of these organizations are outlined below.

- **Roles and Responsibilities**

a) Project Management Unit through SC's Environment Specialist-PMO Support

286. Project Management Unit is responsible for assuring implementation of SSEMP/EMP through SC's Environment Specialist of PMO Support. This includes the following:

- Ensuring that required environmental training is provided to the concerned staff.
- Carrying out random site visits to the construction site to review the environmental performance of the construction contractors.
- Review monitoring reports for the progress of environmental related activities.

- Make sure that the construction contractor is implementing the additional measures suggested by the supervision consultant in environmental monitoring reports.
- To assist contractor for obtaining necessary approval from the concerned departments.
- Maintaining interference with the other lined departments / stakeholders.
- Reporting to Balochistan EPA Punjab on status of EMP Implementation.
- Reporting to ADB on status of EMP implementation.

b) Supervisory Consultant: Resident Engineer

287. Resident Engineer (RE) Roles and Responsibilities

- To oversee the performance of construction contractor to make sure that the construction contractor is carrying out the work in accordance with the tender design and follow the specifications;
- Ensuring that the day to day construction activities are carried as per EHS method statement and in safe manner.
- Strong coordination with the construction contractor and PMO.

c) Supervisory Consultant: Environmental Specialist-Field

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

- Directly reporting to R.E
- Preparing training materials and implementing programs
- Ensure the implementation of the mitigation measures suggested in the EMP.
- To supervise and monitor environmental activities being performed at site
- To organize periodic Environmental Training programs and workshops for the Consultants and Contractor's staff.
- Periodic reporting as mentioned in the EMP.
- Suggest any additional mitigation measures if required.

d) Construction Contractor: Environmental Engineers / Managers

289. Its contractor contractual obligation to appoint site Environmental Engineer / Manager with relevant educational back ground and experience. Contractor Environmental Engineer / Manager will carry out the following activities.

- Implementation of mitigation measures and SSEMP recommendations at construction sites.
- Plan, manage, monitor and coordinate the entire construction phase in term of HSE.
- Take account of health and safety risk to everyone effected by the work.
- Liaise with the client and consultant for the duration of the project to ensure that all the risks are effectively managed.
- Maintain and practice good housekeeping and keep everything at work in its proper place.
- Ensure suitable welfare facilities are provided from the start of project and maintained throughout the construction phase.
- Contractor will be bound through contract to take action against all the special and general provision of contract document.

- Ensure the provision of Personal Protective Equipment (PPE), conduct the environmental, health & safety training to the workers / Labour and coordinate with Environmental Engineer of SC.

❑ Reporting Requirements

290. Performance monitoring, reporting and auditing will be carried out to ensure compliance with the requirements of ESMP, commitments in the EIA and overall ESMS. Monthly, Semi-annual and annual reports will be generated by the contractor Environment Specialist and subsequently will be reviewed by the SC Environment Specialist and PMO Support Environment Specialist. During the construction phase, contractor will undertake Semi-annual reporting to the PMO as a contractual requirement.

291. Contractor will ensure that all the necessary reports are produced and submitted in a timely fashion in order to achieve on-going regulatory compliance throughout the construction phase of the Project. Meeting regulatory reporting requirements also forms part of the scope for any internal audits and management review.

❑ Non-Compliance of the EMP

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

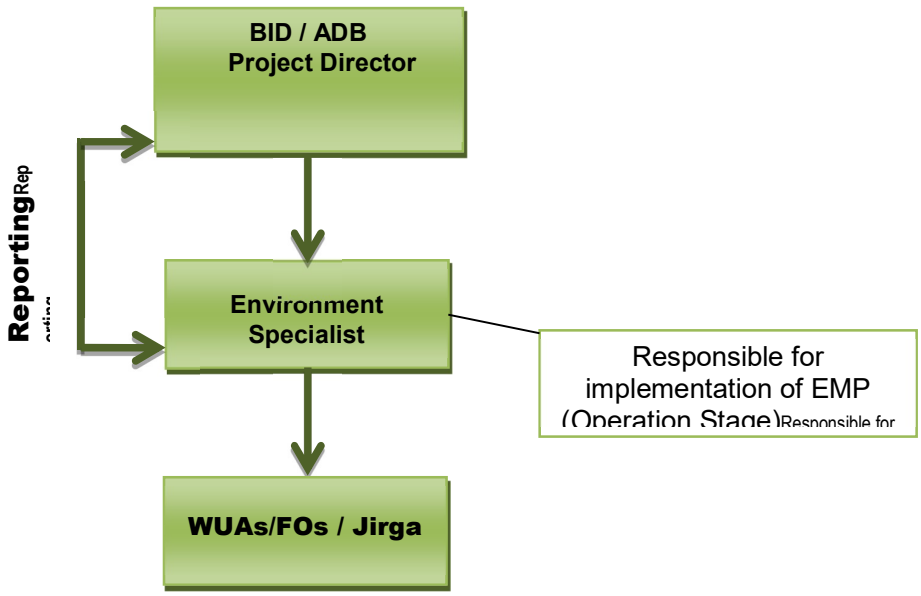
❑ Institutional Arrangement for Implementation of EMP during Operation Phase

293. The key players involved operation of the proposed project are the BID, BEPA, Water User Associations (WUA)& Farmer Organizations (FOs) or Jirga. The roles, remits and responsibilities of these organizations are outlined below. The following staff will be involved in the implementation of EMP. Organizational setup for implementation of EMP is also given below **in Figure 10:**.

- WUA and FOs, or Jirga; and

- BID, Environmental Engineer/Scientist.

Figure 10: Institutional Setup for Operation Phase



❑ **Roles and Responsibilities**

a) Environmental Engineer/Scientist

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

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

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

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

Environmental Management Plan

296. Potential impacts and their mitigation measures are devised against the project activities to minimize their significance. Responsibilities for the collection and analysis of data as well as the reporting requirements have been outlined in **Table 28**. Implementation of environmental impact mitigation measures during construction is to avoid and reduce short- and long-term potential environmental impacts. Incorporation of environmental impact mitigation considerations into the tender and contract documents is a fundamental pre-requisite for effective implementation of the EMP.

Table 28: Environmental Management and Monitoring Plan

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Churri Infiltration Gallery (Construction of infiltration galleries; lining of covered channel, open channel lining, social structures and time division structures)					
A. Implementation and Construction Phase					
Construction contractor mobilization and Establishment of campsite and machinery/ equipment Yard	• 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	• 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. • Residents of village shall be employed for the construction phase (mostly for unskilled jobs).	• Monthly rent receipts. • Development & implementation of policy on local employments • Employment record	• Strict compliance monitoring on fortnightly basis • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Workshop facilities may spread oils & chemicals	• Proper disposal of used oil and chemical waste in	• Visual inspection	• Daily monitoring report • Quarterly Reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		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.			• Monitoring by Supervision Consultant
	• Deterioration of air quality due to machinery & equipment	• 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.	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are, SOx, CO, VOCs and NOx. • Evidence of measurement records.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant PM
	• Noise Pollution	• Equipment with high levels shall be fitted with noise reduction devices • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the source. The duration of sampling	• Fortnightly monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured • Avoid night time activity	shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)		
	• Land degradation due to solid waste disposal of camp site	• 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.	• Visual inspection	• Weekly monitoring reports • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed			
	• The water resources, both surface and subsurface, may get polluted from hazardous construction materials, wastewater effluent, solid waste, silt from construction and soil erosion, etc.	• Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade quality. • The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements. • Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Project Director, BWRDP. • Water required for construction shall be used in such a way that the water availability and supply to nearby communities remain unaffected. Surface water shall be used after taking NOC from local government	• Monitoring compliance to NEQS of Surface water quality on monthly basis for, Dissolved Oxygen, pH and Electric Conductivity (EC) with portable DO meter, pH meter and EC meter • Waste management plan in place • Photographic record	• Fortnightly monitoring reports • Quarterly Water Quality Monitoring reports	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Loss of vegetation	• The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	• Use of LPG cylinders at campsite	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Protective fencing to be installed around the Camp 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 including SOP's to manage COVID-19 risks should be prepared by contractor and get it approved by supervision consultant	• Use of personal protective equipment at campsite • Health & safety plan including SOP's to manage COVID-19 risks in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
Security and Safety Risks	• Delay in project execution	• Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and	• Minutes of meetings of community consultation • Dissemination material	• Monthly reporting	• Contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		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			

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
Transportation of construction material	• Soil erosion and contamination	• 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.	• Log of vehicle and equipment repairs	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Air pollution	• 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	• Route maps of vehicle movement • Log of vehicle maintenance • Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are CO, NOx, SOx, PM10.	• Fortnightly monitoring reports • Quarterly Air quality monitoring report	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Noise pollution	• 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.	• Log of vehicle movement time • Visual inspections of the vehicles • Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009)	• Fortnightly monitoring reports • Quarterly Noise Monitoring reports	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
			• The sampling shall be done twice on monthly basis at 7m from the potential source.		
	• Health and Safety issues	• Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic • Project drivers shall be trained on defensive driving • Vehicle speeds near / within the communities shall be kept low, to avoid safety hazard and dust emissions.	• Visual inspections • Training record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Photographic records • Infrastructure restoration records	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
Construction Works	• Soil erosion and contamination	• Material borrowing and disposal plan should be prepared • Cultivation fields should be avoided for borrowing material to the extent possible	• Evidence of plan in place. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		• 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.			
	• Loss of natural vegetation	• Compensatory tree plantation (five times the trees cut down for construction) should be carried out at appropriate locations within the project area	• Evidence of plantation. • Photographic record	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Site overburden	• 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	• Visual inspections • Monitoring Particulate Matter PM_{10}	• Daily monitoring reports • Fortnightly monitoring reports of PM_{10} • Quarterly Reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		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	• 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	• Monthly rent receipts.	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		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.			
	• Damage to infrastructure	• All damaged infrastructure shall be restored to original or better condition.	• Visual inspections • Photographic records	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
			• Infrastructure restoration records		• Monitoring by Supervision Consultant
	• Sites of Historical, Cultural, Archeological or Religious Significance	• 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,	• Evidence of training provided to contractor staff. • Evidence of maps in place with these sites shown. • Record of appropriate action taken in case of chance find. • Photographic record of chance find	• Immediately after chance find, to be reported in next quarter.	• Execution by construction contractor • Monitoring by Supervision Consultant

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		and their advice is sought before resumption of the construction activities at such sites.[12] • Graveyards shall not be disturbed during the construction activities including movement of the project vehicles and obtaining borrow material for construction.			
	• Noise pollution	• Equipment with high levels shall be fitted with noise reduction devices • Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed • Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured • Avoid night time activity	• Monitoring compliance to NEQS for noise (SRO 72 (KE) / 2009) • The sampling shall be done twice on monthly basis at 7m from the potential source.	• Fortnightly monitoring reports • Quarterly Noise quality monitoring reports	• Execution by construction contractor • Monitoring by Supervision Consultant

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

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
	• Air pollution	• 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.	• Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are CO, NOx, SOx, PM10. • Evidence of measurement records.	• Fortnightly monitoring reports • Quarterly Air Quality Monitoring reports	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Blocked of access due to earth works and stockpiling of excavated material	• A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.	• Traffic diversion plan	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant
	• Health and Safety issues	• Demarcation tapes to be installed around the construction site to avoid any unauthorized entry • Personal protective equipment should be made available at site and the usage of the PPEs should be ensured. • Health & safety plan including SOP's to manage COVID-19 risks should be prepared by contractor and	• Use of personal protective equipment • Health & safety plan including SOP's to manage COVID-19 risks in place	• Fortnightly monitoring reports • Quarterly reporting	• Execution by construction contractor • Monitoring by Supervision Consultant

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

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

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

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
		aforementioned measures, the impact would be finally of low significance.			
Use of fertilizers & pesticides	• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff	• Concerted efforts by the department of agriculture to disseminate information regarding sustainable use of fertilizers will help in keeping the use at an optimal level; • Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed; and • Use of restricted pesticides identified by WHO shall not be allowed. The list of restricted pesticides is attached as **Annexure 15** of this report	• Visual inspection • Monitoring records • Market survey for availability of AN and CAN fertilizers	• Monthly monitoring and quarterly reporting	• Agriculture department
Risk due to Natural Hazard i.e. Flooding and Earthquakes	• System sustainability	• Emergency Response Plan for Breaching of Infiltration Gallery will be followed which is attached as **Annexure – 12** of this report.	• Training record of emergency response plan	• Monthly monitoring and quarterly reporting	• Irrigation Department

7.1.8 Planning for Implementation of EMP

297. NOC and Other Approvals

- ***BEPA Approval Process***

298. The BID has obtained No Objection Certificate (NOC) from the Balochistan EPA that was mandatory requirement before project commencement (**Annexure 10)** .

- ***Stakeholder Coordination***

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

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

301. During construction, BID will have to implement both EMP. For EMP, an exclusive Environmental & Social Management and Monitoring Cell (ESMMC) will be established. Project Information Centre will be also established for liaison with key stakeholders through continuous process of information disclosure, consultation and participation.

7.2 Environmental Training Needs Assessment

302. In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. An environmental and social training and Technical Assistance (TA) program is to be carried out before the implementation of the project.

303. Contractor’s environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective

environmental protection measures. A suitable training program is proposed to train the Contractor(s) staff who will be involved in the Construction Phase and the professional staff from the proponent involved at the operational stage of the project.

304. The supervision / training consultant will organize training courses for Proponent and Contractor staff to train them in specialized areas such as air and noise pollution monitoring and water quality monitoring etc. The details of this training program are presented in **Table 29.**

Table 29: Personnel Training Program

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

7.3 Communication & Documentation

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

- ***Data Recording and Maintenance***

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

- ***Database***

307. The database may include the following information:

- Training programs;

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

- ***Meetings***

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

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

7.4 Grievance Redressal Mechanism

310. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation. APs will be fully informed of their rights and of the procedures for addressing complaints whether verbally or in writing during consultation, survey, and time of compensation. A detailed project spefic GRM is in **Annexure 11**.

311. A Grievance Redress Committee (GRC) will be established at both project and field level. GRC at project level will include the Project director, representative of PIU/ BIPD, Social Safeguards staff of BIPD, representatives of APs/ or local community and representatives of concerned FO (if any).

7.5 Environmental Management Cost

312. The budget presented in **Table 30** will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

Table 30: Environmental Management Cost

i. Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Components	Parameters	Monitoring Location	No. of Samples/unit	Frequency	Responsibility	Cost Rs
During Construction Period (1.5 Year)						
Air quality	CO, NOx, SOx, PM_{10}	Construction site, batching plant site, and access road/borrow area, nearby village (SC will guide)	4 (Total= 32)	Quarterly	Proponent1 (though Environmental lab)	700,000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals	Nearby Construction site	1 (Total=12)	Quarterly	Proponent (though Environmental lab)	184,000
Surface Water Quality	Physical-chemical parameters, biological contamination, heavy metals	Nearby Construction site and community	4 (Total= 24)	Quarterly	Proponent (though Environmental lab)	368,000
Noise Level		Construction site,camp site, access roads, nearby community	4 (Total= 24)	Quarterly	Proponent (though Environmental lab)	48000
A. Sub-Total						**Rs.13,00000**
During Operation & Maintenance Period(one year)						
Air quality	CO, NOx, Sox, PM_{10}	PMU will guide	2 (Total = 4)	Bi-annually	Proponent(BID)	50000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals		1 (Total = 2)	Bi-annually	Proponent(BID)	28,000
Surface Water Quality	Physical-chemical parameters, biological contamination, heavy metals		2 (Total = 4)	Bi-annually	Proponent(BID)	56,000
Noise Level			4 (Total = 8)	Bi-annually	PMU, BWRDP	16,000
B. Sub-Total	**Rs. 1,50000**					
Total (A+B)=	**Rs. 14,50000**					

ii. Cost of Proponent

Sr. No	Description	Amount
1	Environmental Monitoring cost for construction & operation period (from Table 8-4)	
4	Training & Community Engagement Cost	
Total Cost		

iii. Cost of Contractor

Sr. No	Description	Amount
1	Contractor Environmental Engineer salary @ Rs. 80,000/month	
2	Health & safety measures (including First Aid)	
3	Noise monitoring, Dissolved Oxygen, pH and Electric Conductivity (EC) of the water Monitoring on Monthly Basis[2]	
Total Cost		

Total EMP Cost = Rs

SC= Supervision Consultant, PMU: Project Management Unit

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

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

8. CONCLUSIONS AND RECOMMENDATIONS

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

8.1 Conclusions

314. Environmental study criteria adopted for this study has been carried out for all phases of each project components. The phases considered are as follows:

- Impacts during Construction Phase; and
- Impacts during Commissioning & Operation Phase.

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

316. “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 of the negative impacts in the long term. Overall, the project causes higher positive impacts under the physical, ecological and socio-economic criterions and should be approved for implementation.”

8.2 Findings and Recommendations

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

318. No Objection Certificate for the proposed sub-project interventions under Balochistan Environmental Protection Act 2012 has been granted by BEPA.

319. The Sub-project does not involve any land acquisition or resettlement impacts as the rehabilitation works includes the improvement of existing channels owned by the BID and the land is already owned by the Government. No indigenous persons reside or will be affected by the proposed interventions in the areas of influence.

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

321. 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.

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

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

324. Construction of sub-project 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.

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

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

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

328. 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.

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

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

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

ANNEXURES

Annexure 1: REA (Rapid Environmental Assessment (REA) checklist for urban development and water supply)

Country/Project Title:	Pakistan/Balochistan Water Resources Development Project

Environmental Checklist for Churri Infiltration Gallery sub-project

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Sitting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area		☒	
Wetland		☒	
Mangrove		☒	
Estuarine		☒	
Buffer zone of protected area		☒	
Special area for protecting biodiversity		☒	
B. Potential Environmental Impacts Will the Project cause			
Loss of precious ecological values (e.g. Result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?	☒		
Conflicts in water supply rights and related social conflicts?	☒		EMP will provide measures to avoid conflicts by adopting local and traditional water rights mechanism already exists in the area.
Impediments to movements of people and animals?	☒		Project design shall include facilities for easy access of people and animals.
Potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		☒	
Insufficient drainage leading to salinity intrusion?		☒	
Over pumping of groundwater, leading to salinization and ground subsidence?		☒	
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		☒	
Dislocation or involuntary resettlement of people?		☒	
Potential social conflicts arising from land tenure and land use issues?	☒		

SCREENING QUESTIONS	Yes	No	REMARKS
Soil erosion before compaction and lining of canals?	☒		
Noise from construction equipment?	☒		Noise control measures to be specified in the emp. Impacts are transient.
Dust?	☒		Dust control measures to be specified in the emp. Impacts are transient.
Labor-related social problems especially if workers from different areas are hired?	☒		Control measures to be specified in the emp. Impacts are transient.
Waterlogging and soil salinization due to inadequate drainage and farm management?	☒		Project design shall ensure proper drainage design.
Leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		☒	
Reduction of downstream water supply during peak seasons?	☒		
Soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	☒		
Soil erosion (furrow, surface)?	☒		
Scouring of canals?	☒		
Logging of canals by sediments?	☒		
Clogging of canals by weeds?	☒		
Seawater intrusion into downstream freshwater systems?		☒	
Introduction of increase in incidence of waterborne or water related diseases?	☒		

Annexure 2:Pakistan Environmental Protection Act (PEPA), 1997 and National Environmental Quality Standards (NEQS)

Pakistan Environmental Protection Act (PEPA), 1997

The Pakistan Environmental Protection Act 1997 was passed by the National Assembly of Pakistan on September 3, 1997, and by the Senate of Pakistan on November 7, 1997. The Act received the assent of the President of Pakistan on December 3, 1997.
The text of the Environmental Protection Act 1997 is as follows:

Act No. XXXIV of 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development.

Whereas it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development and for matters connected therewith and incidental thereto; It is hereby enacted as follows:

1) Short Title, Extent and Commencement

(1) This Act may be called the Environmental Protection Act 1997.
(2) It extends to the whole of Pakistan.
(3) It shall come into force at once.

2) Definitions

In this Act, unless there is anything repugnant in the subject or context:

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes:

(a) impairment of, or damage to, human health and safety or to biodiversity or property;
(b) pollution; and

(c) any adverse environmental effect as may be specified in the regulation.

(ii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry, residues from the use of fertilizers, pesticides and other farm chemicals;

(iii) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(iv) "biodiversity" or "biological diversity" means the variability among living organizations from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems;

(v) "council" means the Pakistan Environmental Protection Council established under section 3;

(vi) "discharge" means spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(x) "environment" means-

(a) air, water and land;
(b) all layers of the atmosphere;
(c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships;
(e) buildings, structures, roads, facilities and works;
(f) all social and economic conditions affecting community life; and
(g) the inter-relationships between any of the factors in sub-clauses (a) to (f)

(xi) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xii) " Environmental Magistrate" means the Magistrate of the First Class appointed under section 24;

(xiii) "Environmental Tribunal" means the Environmental Tribunal constituted under section 20;

(xiv) Exclusive Economic Zone" shall have the same meaning as defined in the

Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xv) "factory" means any premises in which industrial activity is being undertaken;

(xvi) "Federal Agency" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

(xvii) "Government Agency" includes-

(a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;
(b) a development or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government;
(c) a Provincial Environmental Protection Agency; and
(d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government;

(xviii) "hazardous substance" means-

(a) a substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and
(b) any substance which may be prescribed as a hazardous substance;

(xix) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;

(xx) "historic waters" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xxi) "hospital waste" includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

(xxii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesizing, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

(xxiii) "industrial waste" means waste resulting from an industrial activity;

(xxiv) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment;

(xxv) "local authority" means any agency set-up or designated by the Federal Government or a Provincial Government by notification in the official Gazette to be a local authority for the purposes of this Act;

(xxvi) "local council" means a local council constituted or established under a law relating to local government;

(xxvii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxviii) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxix) "National Environmental Quality Standards" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4;

(xxx) "noise" means the intensity, duration and character from all sources, and includes vibrations;

(xxxi) "nuclear waste" means waste from any nuclear reactor or nuclear or other nuclear energy system, whether or not such waste is radioactive;

(xxxii) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxiii) "pollution" means the contamination of air, land or water by the discharge or emission or effluents or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xxxiv) "prescribed" means prescribed by rules made under this Act;

(xxxv) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes;

(a) construction or use of buildings or other works;
(b) construction or use of roads or other transport systems;
(c) construction or operation of factories or other installations;
(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like; (e) any change of land use or water use; and
(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems; factories or other installations;

(xxxvi) "proponent" means the person who proposes or intends to undertake a project;

(xxxvii) "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8;

(xxxviii) "regulations" means regulations made under this Act;

(xxxix) "rules" means rules made under this Act;

(xl) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xli) "standards" means qualitative and quantitative standards for discharge of effluents and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations made thereunder;

(xlii) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(xliii) "territorial waters" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xliv) "vessel" includes anything made for the conveyance by water of human beings or of goods; and

(xlv) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3) Establishment of the Pakistan Environmental Protection Council-

(1) The Federal Government shall, by notification in the official Gazette, establish a Council to be known as the Pakistan Environmental Protection Council consisting of;

(i) Prime Minister or such other person as the Prime Minister may nominate in this behalf. **Chairperson**

(ii) Minister Incharge of the Ministry or Division dealing with the subject of environment. **Vice Chairperson**

(iii) Chief Ministers of the Provinces. **Members**

(iv) Ministers Incharge of the subject of environment in the provinces. **Members**

(v) Such other persons not exceeding thirty-five as the Federal Government may appoint, of which at least twenty shall be non-official including five representatives of the Chambers of Commerce and Industry and Industrial Associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educationists. **Members**

vi) Secretary to the Government of Pakistan, in-charge of the Ministry or Division dealing with the subject of environment **Member/Secretary**

(2) The Members of the Council, other than ex–officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of three years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings as and when necessary, but not less than two meetings shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council or any of its committees may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4) Function and Powers of the Council

(1) The Council shall-

(a) co-ordinate and supervise enforcement of the provisions of this Act;

(b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;
(c) approve the National Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources; (e) coordinate integration of the principles and concerns of sustainable development into national development plans and policies; and
(f) consider the National Environment Report and give appropriate directions thereon.

(2) The Council may, either itself or on the request of any person or organization, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any specified aspect of environment.

5) Establishment of the Pakistan Environmental Protection Agency

(1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency, to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.

(2) The Federal Agency shall be headed by a Director General, who shall be appointed by the

Federal Government on such terms and conditions as it may determine.

(3) The Federal Agency shall have such administrative, technical and legal staff as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.
(4) The powers and function of the Federal Agency shall be exercised and performed by the

Director General.

(5) The Director General may, be general or special order, delegate any of these powers and functions to staff appointed under
sub-section (3)

(6) For assisting the Federal Agency in the discharge of its functions, the Federal Government shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6) Functions of the Federal Agency

(1) The Federal Agency shall-

(a) administer and implement the provisions of this Act and the rules and regulations made thereunder;

(b) prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;
(c) take all necessary measures for the implementation of the national environmental policies approved by the Council;
(d) prepare and publish an annual National Environment Report on the state of the environment;
(e) prepare or revise, and establish the National Environment Quality Standards with approval of the Council; Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure;
(f) ensure enforcement of the National Environmental Quality Standards;
(g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette, in consultation with the Provincial Agency concerned; Provided that

(i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;
(ii) where standards are less stringent than the National Environmental Quality Standards, prior approval of the Council shall be obtained;
(iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;

(h) co-ordinate environmental policies and programmes nationally and internationally;
(i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
(j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
(k) certify one or more laboratories as approved laboratories for conducing tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation, for the purposes of this Act;
(l) identify the needs for, and initiate legislation in various sectors of the environment;
(m) render advice and assistance in environmental matters, including such information and data available with it as may be required for carrying out the purposes of this Act;
Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;
(n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
(o) provide information and guidance to the public on environmental matters;
(p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
(q) promote public education and awareness of environmental issues through mass media and other means, including seminars and workshops;
(r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
(s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
(t) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and

(u) perform any function which the Council may assign to it.

(2) The Federal Agency may-

(a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;
(b) request any person to furnish any information or data relevant to its functions;

(c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
(d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including:

(i) incentives, prizes, awards, subsidies, tax exemptions, rebates and depreciation allowances; and
(ii) taxes, duties, cesses and other levies;

(e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
(f) provide or arrange, in accordance with such procedures as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7) Powers of the Federal Agency

Subject to the provisions of this Act, the Federal Agency may-

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable;
(b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
(c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations made thereunder;
(d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
(e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
(f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
(g) enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;
(h) take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
(i) arrange for test and analysis of the samples at a certified laboratory;
(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (i) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate; and

(k) establish a National Environmental Coordination Committee comprising the Director-General as its chairman and the Director-Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter–provincial co-ordination in environmental policies;

8) Establishment, Powers and Functions of the Provincial Environmental Protection Agencies

(1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.
(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the

Provincial Government on such terms and conditions as it may determine.

(3) The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.
(4) The powers and functions of the Provincial Agency shall be exercised and performed by the

Director-General.

(5) The Director-General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).
(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9) Establishment of the Provincial Sustainable Development Funds

(1) There shall be established in each Province a Sustainable Development Fund.

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely;

(a) grants made or loans advanced by the Federal Government or the Provincial Governments;
(b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and
(c) contributions from private organizations, and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for:

(a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the

sustainable development of resources and for research in any specified aspect of environment; and

(b) any other purpose which in the opinion of the Board will help achieve environmental objectives and the purpose of this Act.

10) Management of the Provincial Sustainable Development Fund

(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of:

i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department. **Chairperson**

(ii) such officers of the Provincial Governments not exceeding six as the Provincial Government may appoint, including Secretaries in charge of the Finance, Industries and Environment Departments. **Members**

(iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non-governmental organizations, and major donors. **Members**

(iv) Director-General of the Provincial Agency. **Member/Secretary**

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to:

(a) sanction financial assistance for eligible projects;

(b) invest moneys held in the Provincial Sustainable Development Fund in such profit- bearing Government bonds, savings schemes and securities as it may deem suitable; and (c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of project financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts, and performance evaluation based on the progress reports.

11) Prohibition of Certain Discharges or Emissions

(1) Subject to the provisions of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub- clause (i) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12) Initial Environmental Examination and Environmental Impact Assessment

(1) No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof.

(2) The Federal Agency shall;

(a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or
(b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to:

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director-General of the Federal Agency is of the opinion that the request for confidentiality
is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or it's proponent; or
(ii) international relations, national security or maintenance of law and order, except with the consent of the Federal Government; or

(iii) matters covered by legal professional privilege.

(4) The Federal Agency shall communicate is approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

(5) Subject to sub-section (4) the Federal Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-section (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Federal Agency shall maintain separate Registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at

all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

13) Prohibition of Import of Hazardous Waste

No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive

Economic Zone and historic waters.

14) Handling of Hazardous Substances

Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except;

(a) under a licence issued by the Federal Agency and in such manner as may be prescribed;

or

(b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15) Regulation of Motor Vehicles

(1) Subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.
(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.
(3) Where a direction has been issued by the Federal Agency under sub-section (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16) Environmental Protection Order

(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring or has occurred in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order. (2) In particular and without prejudice to the generality of the foregoing power, such measures may include:

(a) immediate to stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceeding initiated against him under this Act or the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deems necessary, and may recover the costs of taking such measures from such person as arrears of land revenue.

17) Penalties

(1) Whoever contravenes or fails to comply with the provisions of section 11, 12, 13, or section

16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues: Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction issued by the Council or by the Federal Agency or Provincial Agency shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention, or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-section (1) and (2), the Environmental Tribunal and Environmental Magistrate shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence, and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Tribunal is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Tribunal may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-section (1) or sub-section (2), and had been previously convicted for any contravention under this act, the Environmental Tribunal or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder:

(a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;

(b) sentence him to imprisonment for a term which may extend upto two years; (c) order the closure of the factory;

(d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act; Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste.

(e) order, such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and

(f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorized by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.
(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.
(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of the is Act.

18) Offences by Bodies Corporate

Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance or, is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation:

For the purpose of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19) Offences by Government Agencies, Local Authorities or Local Councils

Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention alongwith the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20) Environmental Tribunals

(1) The Federal Government may, by notification in the official Gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.
(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.
(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the chairperson.
(5) An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehearany witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.
(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.
(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution of, the Environmental Tribunal.
(8) The terms and conditions of service of the Chairperson and members of the Environmental

Tribunal shall be such as may be prescribed.

21) Jurisdiction and Powers of Environmental Tribunals

(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.
(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.
(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub- section (2) except on a complaint in writing by:

(a) the Federal Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Federal Agency or the Provincial Agency concerned of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in the Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).
(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).
(6) In all matters with respect to which no procedure has been provided for in this Act, the

Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure,

1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorized in this behalf by the Director-General of the Federal Agency or Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists of his having been involved in contravention punishable under sub-section (1) of section 17:
Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal
Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant, he shall be released from custody, failing which he shall be taken or sent without delay to the officer-in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purposes of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.
(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22) Appeals to the Environmental Tribunal

(1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act and rules or regulations made thereunder may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.
(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23) Appeals from Orders of the Environmental Tribunal

(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.
(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24) Jurisdiction of Environmental Magistrates

(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of

1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.
(2) An environmental Magistrate shall be competent to impose any punishment specified in sub-section (2) and (4) of section 17.
(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub- section (1) except on a complaint in writing by:

(a) the Federal Agency, Provincial Agency, or Government Agency or local council; and

(b) any aggrieved person.

25) Appeals from Orders of Environmental Magistrates

Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions, whose decision thereon shall be final.

26) Power to Delegate

(1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations made thereunder to any Provincial Government, any Government Agency, local council or local authority.
(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations made thereunder to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27) Power to give Directions

In the performance of their function under this Act:

(a) the Federal Agency and Provincial Agencies shall be bound by the directions give to them in writing by the Federal Government; and
(b) a Provincial Agency shall be bound by the directions give to it in writing by the Provincial Government.

28) Indemnity

No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Councils, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisors, committees or consultants of the Federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29) Dues Recoverable as Arrears of Land Revenues

Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations made thereunder shall be recoverable as arrears of land revenue.

30) Act to Override Other Laws

The provisions of the Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31) Power to Make Rules

The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental agreements, specified in the Schedule to this Act.

32) Power to Amend the Schedule

The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

33) Power to Make Regulations

(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.
(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for:

(a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;
(b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
(c) appointment of officers, advisors, experts, consultants and employees;

(d) levy of fees, rates and charged in respect of services rendered, actions taken and schemes implemented;
(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which, section 12 applies;

(g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;
(h) providing procedures for handling hazardous substances; and

(i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34) Repeal, Savings and Succession

(1) The Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983) is hereby repealed.
(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, order passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired, liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.
(2) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties,
assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE
(See Section 31)

1. International Plant Protection Convention, Rome, 1951.

2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome 1956.

3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the

Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.

4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World

Heritage Convention), Paris, 1972.

6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.

8. Convention on the Law of the Sea, Montego Bay, 1982.

9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.

10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988.

12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.

13. Convention on Biological Diversity, Rio De Janiero, 1992.

14. United Nations Framework Convention on Climate Change, Rio De Janiero, 1992

National Environmental Quality Standards (NEQS)

National Ambient Air Quality Standards

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st January 2009	Effective from 1st January 2012	
Sulphur Dioxide (SO^2)	Annual Average*	80µg/m^3	80µg/m^3	-Ultraviolet Fluorescence method
	24 hours**	120µg/m^3	120µg/m^3	
Oxides of Nitrogen as (NO)	Annual Average*	40µg/m^3	40µg/m^3	-Gas Phase Chemiluminescence
	24 hours**	40µg/m^3	40µg/m^3	
Oxides of Nitrogen as (NO^2)	Annual Average*	40µg/m^3	40µg/m^3	-Gas Phase Chemiluminescence
	24 hours**	80µg/m^3	80µg/m^3	
O^3	1 hour	180µg/m^3	130µg/m^3	-Non dispersive UV Absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µg/m^3	360µg/m^3	-High Volume Sampling, (Average flow rate not less than1.1m3/minute).
	24 hours**	550µg/m^3	500µg/m^3	
Respirable Particulate Matter.PM_{10}	Annual Average*	200µg/m^3	120µg/m^3	-β Ray absorption method
	24 hours**	250µg/m^3	150µg/m^3	
Respirable Particulate Matter.$PM_{2.5}$	Annual Average*	25µg/m^3	15µg/m^3	β Ray absorption method
	24 hours**	40µg/m^3	35µg/m^3	
	1 hour	25µg/m^3	15µg/m^3	
Lead(Pb)	Annual Average*	1.5µg/m^3	1 µg/m^3	-ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m^3	1.5µg/m^3	
Carbon Monoxide(CO)	8 hours**	5 mg/m^3	5mg/m^3	-Non Dispersive Infra Red (NDIR) method
	1 hour	10mg/m^3	10mg/m^3	
Annual arithmetic mean of minimum104 measurements in a year taken twice a week 24 hourly at uniform interval.				
24 hourly/ 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but Not on two consecutive days.				

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm3, UNLESS OTHERWISE DEFINED)

S. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
1	Smoke	Smoke opacity not to exceed	40%or2 Ring-lemann Scale	40%or2 Ring-lemann Scale or equivalent smoke number
2	Particulate matter ([1])	(a) Boilers and furnaces:		
		(i) Oil fired	300	300
		(ii)Coal fired	500	500
		(iii)Cement Kilns	200	300
		(b)Grinding, crushing, clinker coolers and related processes, metallurgical processes, Converters, blast furnaces and cupolas.	500	500
3	Hydrogen Chloride	Any	400	400
4	Chlorine	Any	150	150
5	Hydrogen Fluoride	Any	150	150
6	Hydrogen Sulphide	Any	10	10
7	Sulphur Oxides ([2])([3])	Sulfuric acid/Sulphonic acid plants	400	5000
		Other plants except Power plants operating on oil and coal	400	1700
8	Carbon Monoxide	Any	800	800
9	Lead	Any	50	50
10	Mercury	Any	10	10
11	Cadmium	Any	20	20
12	Arsenic	Any	20	20
13	Copper	Any	50	50
14	Antimony	Any	20	20
15	Zinc	Any	200	200

S. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
16	Oxides of Nitrogen (^{3})	Nitric acid manufacturing unit	400	3000
		Other plants except power plants operating on oil or coal:		
		Gas fired	400	400
		Oil fired	-------	600
		Coal fired	-------	1200

Explanations:

1. Based on the assumption that the size of the particulate is 10 microns or more.
2. Based on 1 percent sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated.
3. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards: -

A. Sulphur Dioxide

Sulphur Dioxide Background levels Micro-gram per cubic meter ug/m^3 Standards

Background Air Quality (SO_2 Basis)	Annual Average	Max.24 hours Interval	Criterion I Max. SO_2 Emission (Tons per Day per plant)	Criterion II Max. Allowable ground level increment to ambient (ug/m^3)
				(One Year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100ug/m^3 linear interpolations should be used.

** No projects with sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of nitrogen oxides, expressed as NO_2 should not be exceed the following:-

Annual Arithmetic Mean 100ug/m^3 (0.05ppm)

Emission levels for stationary source discharges, before mixing with the atmosphere, should be maintained as follows:-

For fuel fired steam generators, as Nanogram (10-gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	260

Note:-Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible through excess air mixing blowing before emitting in to the environment.

[FileNo.14(3)/98-TO-PEPC]

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/L, UNLESS OTHERWISE DEFINED)

S. No.	Parameter Standards	Value
1.	Temperature	40^{o}C
2.	pH value (acidity/basicity)	6-10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20^{o}C	80mg/L
4.	Chemical Oxygen Demand (COD)	150 mg/L
5.	Total Suspended Solids	150 mg/L
6.	Total Dissolved Solids	3500 mg/L
7.	Oil and Grease	10 mg/L
8.	Phenolic compounds (as phenol)	0.1 mg/L
9.	Chloride(asCl^{-})	1000mg/L
10.	Fluoride (as F^{-})	20mg/L
11.	Cyanide (asCN^{-})	2mg/L
12.	An-ionic detergents (2) (as MBAS) (5)	20mg/L
13.	Sulphate($SO4^{2-}$)	600mg/L
14.	Sulphide (S^{2-})	1.0mg/L
15.	Ammonia (NH_3)	40mg/L
16.	Pesticides, herbicides, fungicides and	0.15mg/L
17.	insecticides Cadmium (4)	0.1mg/L
18.	Chromium (4) (trivalent and hexavalent)	1.0 mg/L
19.	Copper (4)	1.0mg/L
20.	Lead (4)	0.5mg/L
21.	Mercury (4)	0.01mg/L
22.	Selenium (4)	0.5mg/L
23.	Nickel (4)	1.0mg/L
24.	Silver (4)	1.0mg/L
25.	Total toxic metals	2.0 mg/L
26.	Zinc	5.0mg/L
27.	Arsenic	1.0mg/L
28.	Barium	1.5mg/L
29.	Iron	2.0mg/L
30.	Manganese	1.5mg/L
31.	Boron	6.0mg/L
32.	Chlorine	1.0mg/L

Explanations:

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

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MOTOR VEHICLE EXHAUST AND NOISE

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

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Drinking Water Standards

Parameters	WHO Standards	GOP Standards
pH @ 25 °C	6.8-8.5	6.8-8.5
Color	Non objectionable/Acceptable	Non objectionable/Acceptable
Odor	Non objectionable/Acceptable	Non objectionable/Acceptable
Aluminium (Al)	≤0.2mg/L	0.2mg/L
Antimony (Sb)	≤0.005mg/L	0.02mg/L
Barium (Ba)	0.7mg/L	0.7mg/L
Cadmium (Cd)	0.01	0.003
Chloride (Cl)	<250	250
TDS	<500mg/L	<500mg/L
Turbidity	<5NTU	<5NTU
Chromium (Cr)	<0.05mg/L	≤0.05mg/L
Copper (Cu)	<2mg/L	2mg/L
Arsenic (As)	<0.01mg/L	≤0.05mg/L
Total Coliform	0.0cfu/100 ml	0.0cfu/100 ml
E-Coli	0.0cfu/100 ml	0.0cfu/100 ml

Annexure 3: Pakistan EPA Review of IEE and EIA Regulations, 2000

S.R.O. 339 (1)/2001. - In exercise of the powers referred by section 33 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), Pakistan Environmental Protection Agency, with the approval of the Federal Government is pleased to make the following Rules, namely : -

1. Short title and commencement

(1) These regulations may be called the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

(2) They shall come into force at once.

2. Definitions

(1) In these regulations, unless there is anything repugnant in the subject or context –

(a) "Act" means the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997);
(b) "Director-General" means the Director-General of the Federal Agency;
(c) "EIA" means an environmental impact assessment as defined in section 2(xi);
(d) "IEE" means an initial environmental examination as defined in section 2(xxiv); and
(e) "section" means a section of the Act.

(2) All other words and expressions used in these regulations but not defined shall have the same meanings as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any category listed in Schedule I shall file an IEE with the Federal Agency, and the provisions of section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule II shall file an EIA with the Federal Agency, and the provisions of section 12 shall apply to such project.

5. Projects not requiring an IEE or EIA

(1) A proponent of a project not falling in any category listed in Schedules I and II shall not be required to file an IEE or EIA:

Provided that the proponent shall file.

(a) an EIA, if the project is likely to cause an adverse environmental effect;

(b) for projects not listed in Schedules I and II in respect of which the Federal Agency has issued guidelines for construction and operation, an

application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

(2) Notwithstanding anything contained in sub-regulation (1), the Federal Agency may direct the proponent of a project, whether or not listed in Schedule I or II, to file an IEE or EIA, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under Regulation 23.

(3) The provisions of section 12 shall apply to a project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

6. Preparation of IEE and EIA

(1) The Federal Agency may issue guidelines for preparation of an IEE or an EIA, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.

(2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA any departure therefrom.

7. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA, a non-refundable Review Fee to the Federal Agency, as per rates shown in Schedule III.

8. Filing of IEE and EIA

(1) Ten paper copies and two electronic copies of an IEE or EIA shall be filed with the Federal Agency.

(2) Every IEE and EIA shall be accompanied by –

(a) an application, in the form prescribed in Schedule IV; and

(b) copy of receipt showing payment of the Review Fee.

9. Preliminary scrutiny

(1) Within 10 working days of filing of the IEE or EIA, the Federal Agency shall –

(a) confirm that the IEE or EIA is complete for purposes of initiation of the review process; or

(b) require the proponent to submit such additional information as may be specified; or

(c) return the IEE or EIA to the proponent for revision, clearly listing the points requiring further study and discussion.

(2) Nothing in sub-regulation (1) shall prohibit the Federal Agency from requiring the proponent to submit additional information at any stage during the review process.

10. Public participation

(1) In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.

(2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.

(3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.

(4) The Federal Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.

(5) All comments received by the Federal Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.

(6) The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

(1) The Federal Agency shall make every effort to carry out its review of the IEE within 45 days, and of the EIA within 90 days, of issue of confirmation of completeness under Regulation 9.

(2) In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit views of the sectoral Advisory Committee, if any, constituted by the Federal Government under sub- section (6) of section 5.

(3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.

(4) The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

12. Decision

On completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form prescribed in Schedule V in the case of an IEE, and in the form prescribed in Schedule VI in the case of an EIA.

13. Conditions of approval

(1) Every approval of an IEE or EIA shall, in addition to such conditions as may be imposed by the Federal Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE/EIA, unless any variation thereto have been specified in the approval by the Federal Agency.

(2) Where the Federal Agency accords its approval subject to certain conditions, the proponent shall –

(a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form prescribed in Schedule VII;

(b) before commencing operation of the project, obtain from the Federal Agency written confirmation that the conditions of approval, and the requirements in the IEE/EIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

14. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Federal Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Federal Agency to provide the requisite confirmation or otherwise within 15 days of receipt of the request, with complete information, from the proponent.

(3) The Federal Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

15. Deemed approval

The four-month period for communication of decision stipulated in sub-section (4) of section 12 shall commence from the date of filing of an IEE or EIA in respect of which confirmation of completeness is issued by the Federal Agency under clause (a) of sub-regulation (1) of Regulation 9.

16. Extension in review period

Where the Federal Government in a particular case extends the four-month period for communication of approval prescribed in sub-section (5) of section 12, it shall, in consultation with the Federal Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

17. Validity period of approval

(1) The approval accorded by a Federal Agency under section 12 read with Regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) If construction is commenced during the initial three year validity period, the validity of the approval shall stand extended for a further period of three years from the date of issue.

(3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.

(4) The proponent may apply to the Federal Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Federal Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Federal Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

18. Entry and inspection

(1) For purposes of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA prior to, during or after commencement of construction or operation of a project, duly authorized staff of the Federal Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.

(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Federal Agency for this purpose and pursuant thereto.

19. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Federal Agency on completion of construction of the project.

(2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.

(3) To enable the Federal Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Federal Agency may require.

20. Cancellation of approval

(1) Notwithstanding anything contained in these Regulations, if, at any time, on the basis of information or report received or inspection carried out, the Federal Agency is of the opinion that the conditions of an approval have not been complied with, or that the information

supplied by a proponent in the approved IEE or EIA is incorrect, it shall issue notice to the proponent to show cause, within two weeks of receipt thereof, why the approval should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Federal Agency may, after giving the proponent an opportunity of being heard:

(i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or

(ii) cancel the approval.

(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.

(4) Action taken under this Regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

21. Registers of IEE and EIA projects

Separate Registers to be maintained by the Federal Agency for IEE and EIA projects under sub-section (7) of section 12 shall be in the form prescribed in Schedule VIII.

22. Environmentally sensitive areas

(1) The Federal Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) Notwithstanding anything contained in Regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Federal Agency.

(3) The Federal Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

23. Environmental Assessment Advisory Committee

For purposes of rendering advice on all aspects of environmental assessment, including guidelines, procedures and categorization of projects, the Director-General shall constitute an Environmental Assessment Advisory Committee comprising –

(a)	Director EIA, Federal Agency	…	Chairman
(b)	One representative each of the Provincial Agencies	…	Members
(c)	One representative each of the Federal Planning Commission and the Provincial Planning and Development Departments	…	Members

(d) Representatives of industry and non-Governmental organizations, and legal and other experts … Members

24. Other approvals

Issue of an approval under section 12 read with Regulation 12 shall not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.

SCHEDULE I
(*See* Regulation 3)

List of projects requiring an IEE A.

Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms with total cost more than Rs.10 million
2. Projects involving repacking, formulation or warehousing of agricultural products

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 200 KW
3. Transmission lines less than 11 KV, and large distribution projects
4. Oil and gas transmission systems
5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
6. Waste-to-energy generation projects

C. Manufacturing and processing

1. Ceramics and glass units with total cost more than Rs.50 million
2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than Rs.100 million
3. Man-made fibers and resin projects with total cost less than Rs.100 million
4. Manufacturing of apparel, including dyeing and printing, with total cost more than Rs.25 million
5. Wood products with total cost more than Rs.25 million

D. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million
2. Crushing, grinding and separation processes
3. Smelting plants with total cost less than Rs.50 million

E. Transport

1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metalled roads) with total cost less than Rs.50 million

2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers

2. Irrigation and drainage projects serving less than 15,000 hectares

3. Small-scale irrigation systems with total cost less than Rs.50 million

G. Water supply and treatment

Water supply schemes and treatment plants with total cost less than Rs.25 million

H. Waste disposal

Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

I. Urban development and tourism

1. Housing schemes

2. Public facilities with significant off-site impacts (e.g. hospital wastes)

3. Urban development projects

J. Other projects

Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of Regulation 5

SCHEDULE II
(*See* Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 200 MW
3. Transmission lines (11 KV and above) and grid stations
4. Nuclear power plans
5. Petroleum refineries

B. Manufacturing and processing

1. Cement plants
2. Chemicals projects
3. Fertilizer plants
4. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of Rs.100 million and above
5. Industrial estates (including export processing zones)
6. Man-made fibers and resin projects with total cost of Rs.100 M and above
7. Pesticides (manufacture or formulation)
8. Petrochemicals complex
9. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.10 million
10. Tanning and leather finishing projects

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs.50 million and above

D. Transport

1. Airports

2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs.50 million and above

3. Ports and harbor development for ships of 500 gross tons and above

4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above

2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment

Water supply schemes and treatment plants with total cost of Rs.25 million and above

G. Waste Disposal

1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)

2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism

1. Land use studies and urban plans (large cities)

2. Large-scale tourism development projects with total cost more than Rs.50 million

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

1. Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.

2. Any other project likely to cause an adverse environmental effect

SCHEDULE III
(See Regulation 7)

IEE/EIA Review Fees

Total Project Cost	IEE	EIA
Upto Rs.5,000,000	NIL	NIL
Rs.5,000,001 to 10,000,000	Rs.10,000	Rs.15,000
Greater than Rs.10,000,000	Rs.15,000	Rs.30,000

SCHEDULE IV

[*See* Regulation 8(2)(a)]

Application Form

1.	Name and address of proponent		Phone: Fax: Telex:	
2.	Description of project			
3.	Location of project			
4.	Objectives of project			
5.	IEE/EIA attached?	IEE/EIA :	Yes/No	
6.	Have alternative sites been considered and reported in IEE/EIA?		Yes/No	
7.	Existing land use		Land requirement	
8.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA) Meterology (including rainfall) Ambient air quality Ambient water quality Ground water quality	<u>Available</u> Yes/No Yes/No Yes/No Yes/No	<u>Measured</u> Yes/No Yes/No Yes/No Yes/No
9.	Have estimates of the following been reported?	Water balance Solid waste disposal Liquid waste treatment	<u>Estimated</u> Yes/No Yes/No Yes/No	<u>Reported</u> Yes/No Yes/No Yes/No
10.	Source of power		Power requirement	
11.	Labour force (number)	Construction: Operation:		

<u>Verification.</u> I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.

Date: _____

Signature, name and _____
Designation of proponent
(with official stamp/seal)

SCHEDULE VI
[*See* Regulation 12]

Decision on EIA

1. Name and address of proponent _____

_____

2. Description of project _____

3. Location of project _____

4. Date of filing of EIA _____

5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –

(a) to accord its approval, subject to the following conditions:

_____
_____

or (b) that the proponent should submit an EIA with the following modifications-

_____
_____

or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

_____
_____

[Delete (a)/(b)/(c), whichever is inapplicable]

Dated _____

Tracking no.___

Director-General
Federal Agency
(with official stamp/seal

SCHEDULE VII
[*See* Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Federal Agency bearing tracking no._____ dated _____, and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA.

Date: _____

Signature, name and _____
Designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

(1) _____

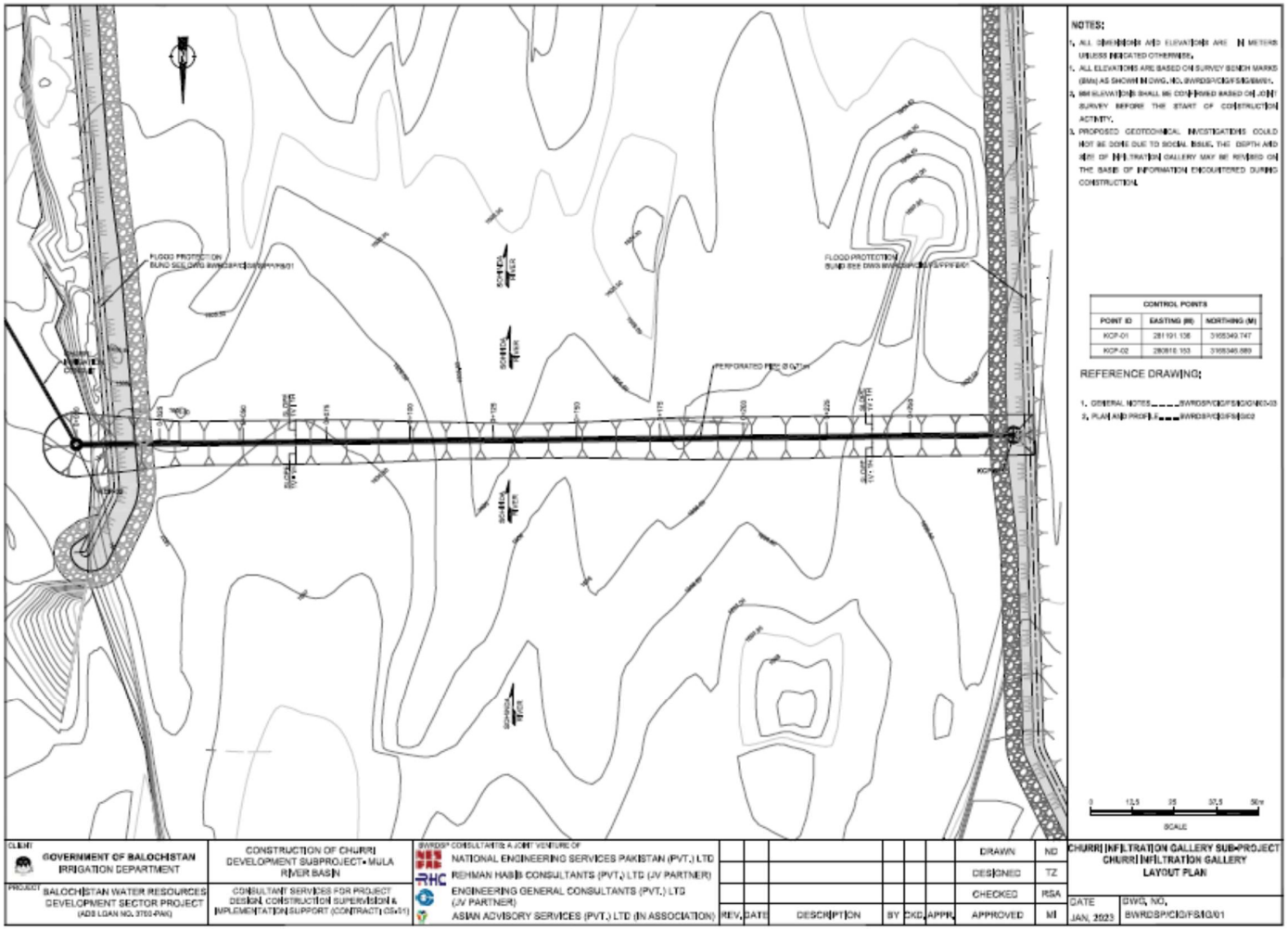
(2) _____

SCHEDULE VIII
(*See* Regulation 21)
Form of Registers for IEE and EIA projects

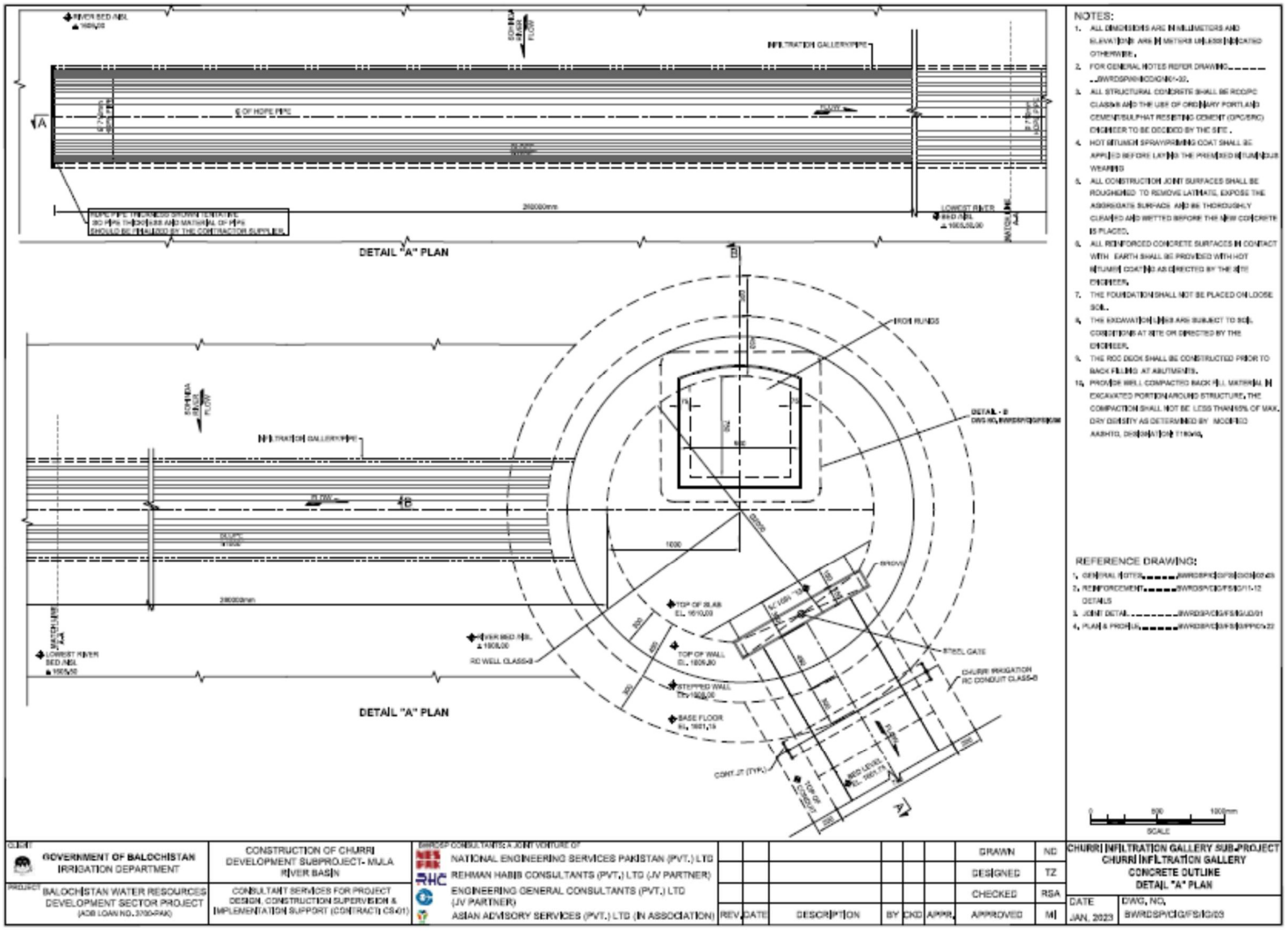
S. No.	Description	Relevant Provisions
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I and II)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Project capital cost	
9.	Date of receipt of IEE/EIA	
10.	Date of confirmation of completeness	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	
13.	Conditions of approval/reasons for refusal	
14.	Date of Undertaking	
15.	Date of extension of approval validity	
16.	Period of extension	
17.	Date of commencement of construction	
18.	Date of issue of confirmation of compliance	
19.	Date of commencement of operations	
20.	Dates of filing of monitoring reports	
21.	Date of cancellation, if applicable	

Annexure 4: Drawings and Cross-sections of the Churri Infiltration Gallery

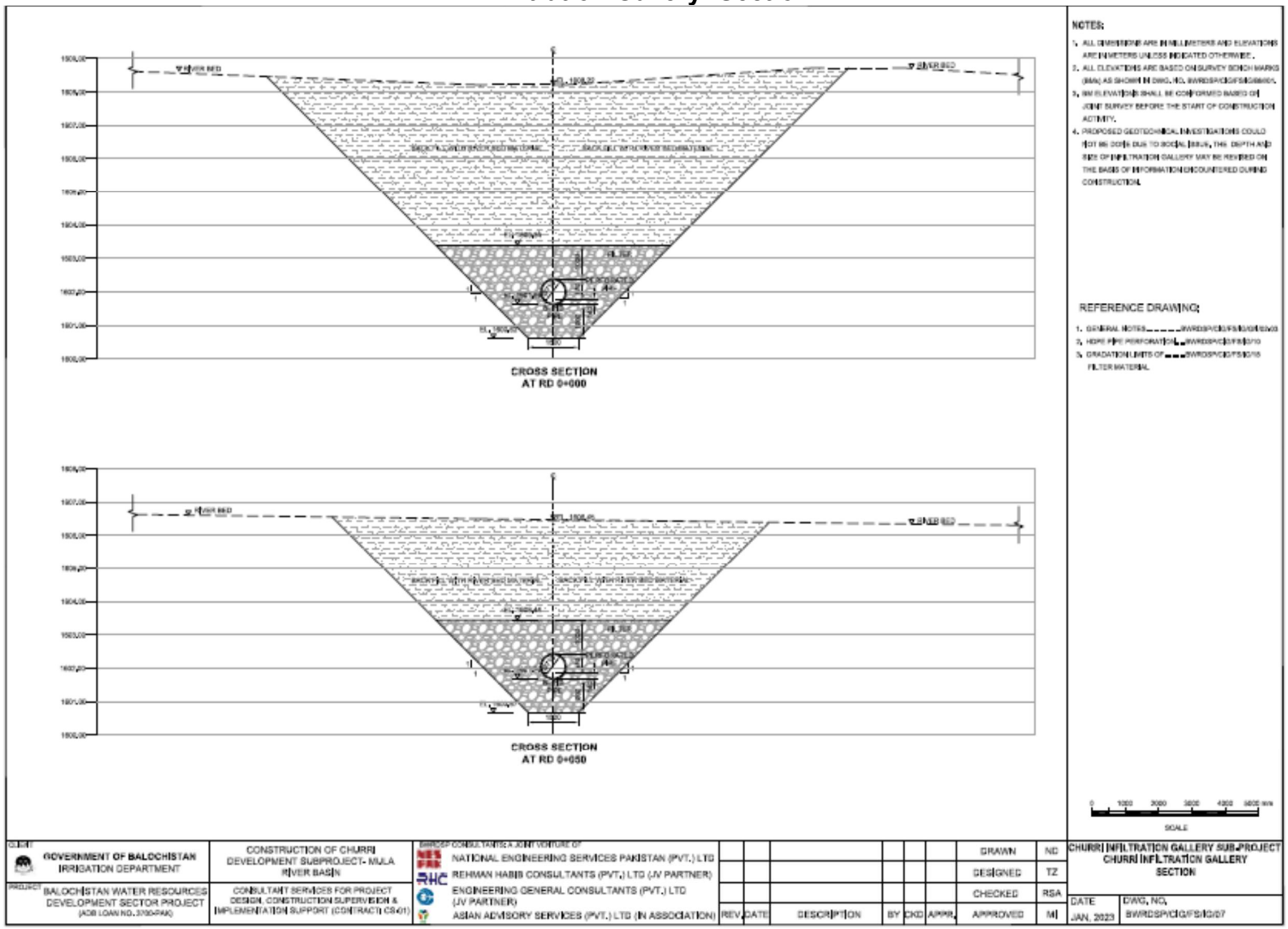
General Layout Plan



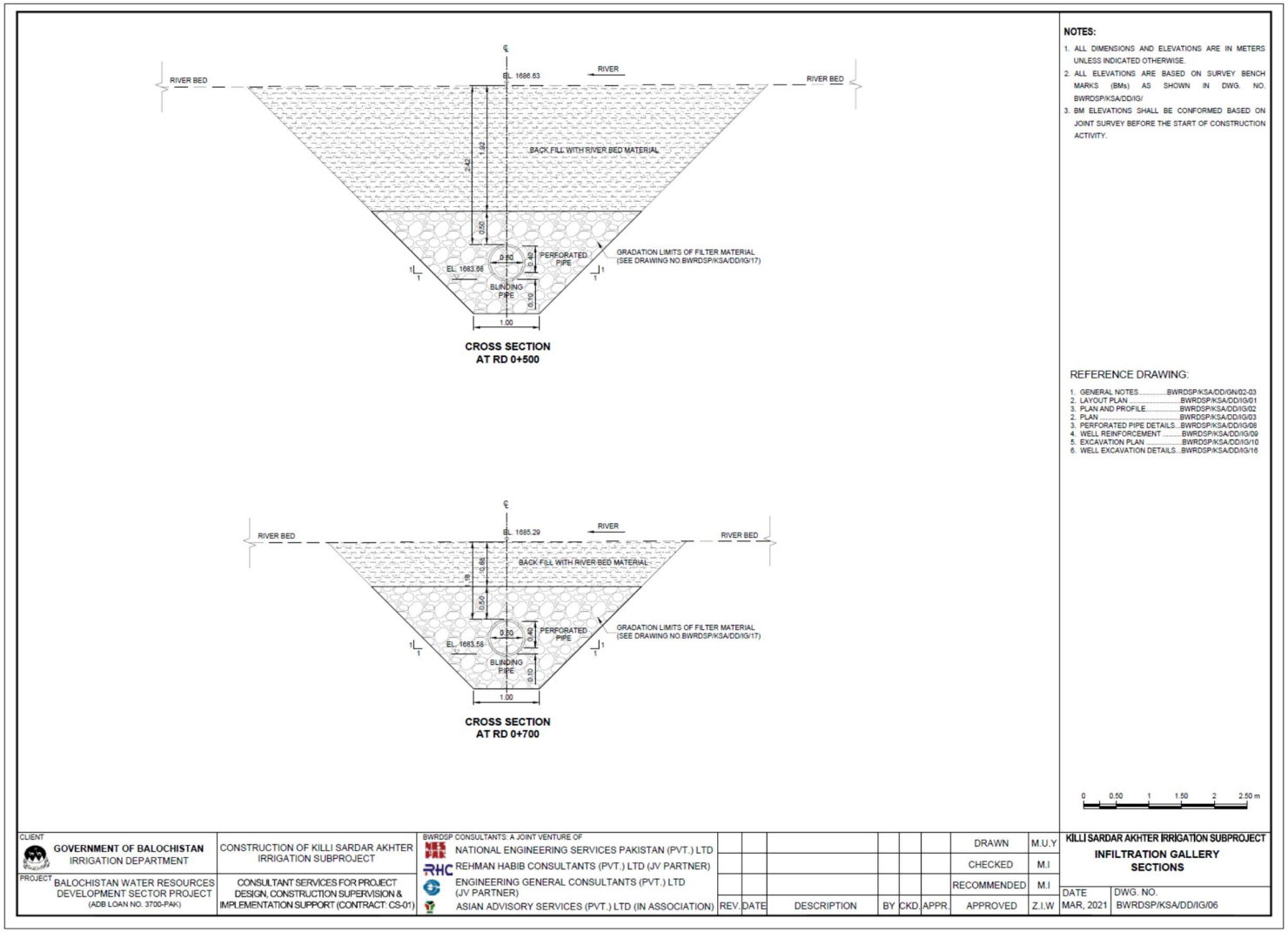
Infiltration Gallery- Concrete Outline Detail Plan A



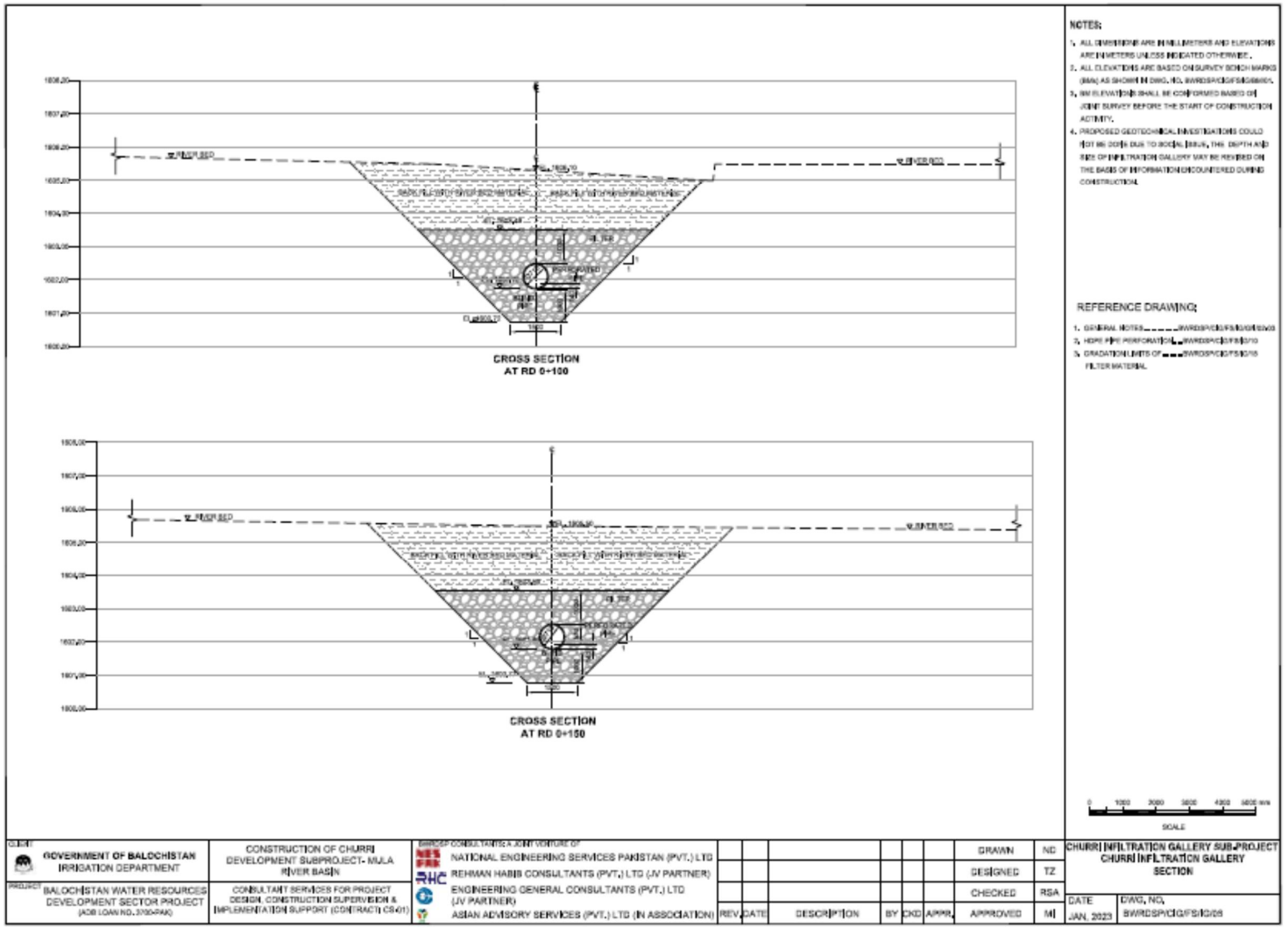
Infiltration Gallery- Section



Infiltration Gallery- Sections



Infiltration Gallery- Section



Annexure 5: A history of recorded earthquakes in Balochistan

Year	Place	Intensity at R/Scale
1909	Kech	7.2
1987	Quetta, Chaman	5.6
1935	Quetta, Mach	7.0
1990	Quetta, Kalat, Khuzdar, Mastung, Kalat, Nushki, Surab	5.8-6.1
1935	Quetta, Mastung, Kalat	7.5
1992	Khuzdar, Nal, Quetta	5.7
1941	Quetta	5
1993	Quetta/Pishin, Makran/Gwadar	5.7
1945	Pasni/Makran	8.6
1995	Quetta	5.2
1952	Loralai	5.8
1996	Quetta	5.3
1954	Khuzdar, Nal, Wadh	5.7
1997	Quetta, Mastung, Mach, Sibi, Harnai	5-6.2
1955	Quetta	6
1998	Quetta, Dalbandin	5.3
1956	Kalat, Barkan	6
1999	Barkan	5.2
1957	Khuzdar	5.5
2000	Quetta, Sibi, Ziarat, Harnai and Duki	6
1975	Quetta	5.4
2002	Balochistan Boarder	6
1978	Quetta, Nushki	5.3
2003	Naukundi, Musa Khail	5.3
1983	Khuzdar	6.5
2004	Sibi	5.5
1986	Khuzdar	5.4

Source: Data extracted from Meteorological Department – Quetta Station

Annexure 5: Lab Results

PERAC RESEARCH & DEVELOPMENT FOUNDATION

TEST REPORT — Page 07 of 12

Customer's Name	M/s NEC Consultant (Pvt) Ltd	**Test Report No**	2421F/2016-2017
Customer's Ref	E-mail	**Reporting Date**	08-06-2017
Date	05-05-2017	**Sample Code**	7006
Sample Description	**Surface Water (Hatachi-Khizran Infiltration gallery)**	**Sampling Date**	16-05-2017

TEST METHOD	METHOD TITLE	TEST RESULTS
HACH-8237	Turbidity, NTU	Nil
APHA-209C	Total Suspended Solids, mg/L	Nil
APHA-209B	Total Dissolved Solids (TDS), mg/L	357
D-1293	pH @ 25 °C	7.99
	Chemical	
By AA	Aluminum (Al) , mg/L	Nil
By AA	Antimony (Sb), mg/L	Nil
By AA	Arsenic (As), mg/L	Nil
By AA	Barium (Ba), mg/L	Nil
By AA	Boron (B), mg/L	Nil
By AA	Cadmium (Cd), mg/L	Nil
By AA	Chromium (Cr), mg/L	Nil
By AA	Copper (Cu), mg/L	Nil
By AA	Lead (Pb), mg/L	Nil
By AA	Manganese (Mn), mg/L	Nil
By AA	Nickel (Ni), mg/L	Nil
APHA-320	Mercury (Hg), mg/L	Nil
By AA	Selenium (Se), mg/L	Nil
By AA	Zinc (Zn), mg/L	Nil

Prepared by | Section In charge (E) | Head R&ASD

The analyses based on Sample (s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment (E.& O.E.). We have no responsibility and warranty or representation in connection with which such report is used.

Rev. No. 0 | Dated: 21-01-2000 | F-10-05

7-B, Korangi Industrial Area, Adjecent NRL, Karachi-74900
Ph: +(92-21) 35121857, 35121805, 35054669-72, Fax: +(92 21) 35054745
Website : www.prdlab.com E-mail: info@prdlab.com, prd@cyber.net.pk

PERAC RESEARCH & DEVELOPMENT FOUNDATION

TÜV AUSTRIA

TEST REPORT

Customer's Name	M/s NEC Consultant (Pvt) Ltd	**Test Report No**	2421J/2016-2017
Customer's Ref	E-mail	**Reporting Date**	08-06-2017
Date	05-05-2017	**Sample Code**	7010-7019
Sample Description	**Noise Analysis**	**Sampling Date**	16-05-2017

TEST RESULTS

Code #	LOCATION	Noise dB (A) By Analyzer
7010	Chutta	38
7011	Wandari	41
7012	Khadri	35
7013	Jhalaro	36.2
7014	Acharwand	37
7015	Sinjori	36
7016	Hatachi Khizran Infiltration Gallery	32
	NEQS Limits	**85**

Prepared by | **Section In charge (E)** | **Head R&ASD**

The analyses based on Sample (s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment (E.& O.E.). We have no responsibility and warranty or representation in connection with which such report is used.

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7-B, Korangi Industrial Area, Adjecent NRL, Karachi-74900
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Website : www.prdlab.com E-mail: info@prdlab.com, prd@cyber.net.pk

PERAC RESEARCH & DEVELOPMENT FOUNDATION

TEST REPORT

Page 12 of 12

Customer's Name	M/s NEC Consultant (Pvt) Ltd	**Test Report No**	2421K/2016-2017
Customer's Ref	E-mail	**Reporting Date**	08-06-2017
Date	05-05-2017	**Sample Code**	7020-7029
Sample Description	**SPM, µg/Nm^3 Analysis**	**Sampling Date**	16-05-2017

Code #	LOCATION	TEST RESULTS
7020	Chutta	12
7021	Wandari	14
7022	Khadri	15
7023	Jhalaro	11
7024	Acharwand	Nil
7025	Sinjori	4
7026	Hatachi Khizran Infiltration Gallery	Nil

Prepared by | **Section In charge (E)** | **Head R&ASD**

The analyses based on Sample (s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment (E.& O.E.). We have no responsibility and warranty or representation in connection with which such report is used.

Rev. No. 0 | Dated: 21-01-2000 | F-10-05

7-B, Korangi Industrial Area, Adjocent NRL, Karachi-74900
Ph: +(92-21) 35121857, 35121805, 35054669-72, Fax: +(92 21) 35054745
Website : www.prdlab.com E-mail: info@prdlab.com, prd@cyber.net.pk

Annexure 6: Photographs of Consultations

Consultation in Jaga Sur Village

Consultation in Kahan Village

	

Annexure 7: BEPA NOC

BALOCHISTAN ENVIRONMENTAL PROTECTION AGENCY

"Environment is a commonality we all equally share and Its protection is a commonality we all must equally strive for"

NO.DG/EPA/2020/7685-88/ Dated: Quetta 27th November, 2020

ENVIRONMENTAL APPROVAL

To

The Project Director
Balochistan Water Resource Development Sector Project
Government of Balochistan
Irrigation Department

Project Description: **Construction of Sub-Projects proposed under BWRDS Project for Mula River Basin**

Location of Project: District Khuzdar

Date of filling of EIA: 08-10-2020

After comprehensive assessment of subject Environmental Impact Assessment (EIA) Report, the Balochistan Environmental Protection Agency has decided to accord Environmental Approval in favor of the Project Director BWRDS Project for construction of sub-projects proposed under BWRDS project for Zhob River Basin subject to following terms and conditions laid down in Section 17 & 18 of EIA/IEE Regulations 2000 :-

1. The Proponent shall ensure compliance of the National Environmental Quality Standards (NEQS) for ambient air, noise, liquid and waste generated during construction and operation activities of the project.
2. Mitigation Measures suggested in the EIA Report and Environmental Management Plan (EMP) shall be strictly adhered to minimize any negative impacts on soil, ground water, air and biological resources of the Project area.
3. Complete code of Health, Safety and Environment (HSE) shall be developed which should include efficient parameters at specific work place. For this purpose HSE setup should be established and supervised by designated HSE officer at senior level with sufficient administrative and technical authority to perform the assigned function properly. The proponent shall ensure that the operating instructions and emergency response actions are made available to every worker/laborer/commuter at site.
4. Natural flow of water should not be disturbed and the project be executed/carried out within the time frame prescribed as per schedule. The schedule shall be submitted to this office prior to the commencement of the activities.
5. Watershed management practices should be adopted in the catchment areas.
6. Monitoring shall be carried out during the entire period of the Project activities. Monitoring Reports shall be submitted to EPA Balochistan on monthly basis.
7. Compensation shall be provided to the inhabitants in case of loss of agricultural land, crop, property etc. in accordance with the rates prescribed in the Provincial Land Acquisition Act. All conflicting issues regarding compensation, etc, should be settled amicably before the start of the project activities. A Resettlement Action Plan shall be submitted to this office in due course of time.

8. Any change in the approved project shall be communicated to Balochistan Environmental Protection Agency and approval of the same shall be obtained from this Agency.

9. An emergency Response Plan should be established to address the natural and DDMA anthropogenic hazards/catastrophe in coordination with Provincial Disaster Management Authority (PDMA).

10. The proponent shall ensure to take effective measures (installation of protection walls, Gabion walls etc.) for land stabilization and prepare a comprehensive plantation plan at pre-identified dumping sites after land leveling by consulting with relevant authorities.

11. The proponent / Contractor shall make sure the safety and security of wild animals and their habitats at the project site and its environs with the prior consultation and strictly adhering to the guidelines of concerned wildlife authorities.

12. The proponent shall ensure that emission level of machinery Are within permissible limits and ensure that work shall not be carried out at night hours.

13. The proponent shall plant 500,000 indigenous forest tress in consultation with Forest Department. The Forest Department shall also take measures for protection and maintenance of these trees and maintain their proper record.

The proponent shall ensure that the farmers of tail shall not be affected due to the project oration. Proper share of the water should be made available without any deviation.

The proponent shall redress the objection / concerns of neighbors/ stakeholder on priority basis (if any at any stage).

16. Maximum skilled and unskilled jobs after fulfilling the eligibility criteria shall be given to the local community.

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27/11/20

17. The proponent shall ensure availability of downstream E-Flow during construction and operational phases of the project as per design and maintain record thereof.

18. Given to the geology, topography, terrain and demography of the project areas, pre-identified sites shall be utilized for quarrying purpose so that the issues like land degradation, soil erosion, sedimentation of water bodies and potential threats to the human life & properties and public infrastructure could be avoided.

19. The proponent will install standby power generators (if required) adopting sound proofing techniques and it shall be equipped with chimney with proper height to discharge the hot gases / smoke.

20. After completion of project, project area (camp site, workshops, batching plant and stockpile sites) should be restored to its regional condition. For this purpose documentation in terms of videos and photographs should be kept in record.

21. The proponent shall, before commencing construction of the Project, acknowledge acceptance of the stipulated conditions by executing an Undertaking in the form prescribed in Schedule VII of Review of IEE/EIA Regulations 2000.

22. The proponent should ensure the compliance of COVID-19 SOPs for laborers/workers at camp site and construction site.

23. The proponent shall be liable for correctness and validity of information supplied to this Department by the Environmental Consultant.

24. The proponent shall be liable for compliance of Regulations 13, 14 and 19 of IEE / EIA Regulations, 2000, regarding approval, confirmation of compliance, entry, inspections and monitoring.

25. The Proponent shall facilitate BEPA's team during inspection and monitoring project activities.

26. This approval shall be treated as null and void if or any of the conditions mentioned in the approval, BEPA, 2012, Rules and Regulations, Guidelines and instructions is / are not complied with or committed by the proponent or his/her agent or employee.

27. This approval shall be valid (for commencement of construction) for the period of Three Years from the date of issue under the Regulation 17 of IEE/EIA Regulation, 2000.

28. This approval can be withdrawn at anytime without any prior notice if deemed necessary in the Public / National interest.

29. EPA reserves the right to impose any other condition based on its monitoring.

30. This approval does not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law in force.

7685-88
27/11/20

DIRECTOR GENERAL

Copy forwarded for information to:-

1. The Secretary Climate Change & Environment Department, Government of Balochistan, Quetta.
2. The Secretary Irrigation Department, Government of Balochistan, Quetta.
3. The Assistant Director EPA, district Khuzdar.
4. Office / Master file.

DIRECTOR GENERAL

Annexure 8: Grievance Redress Mechanism

1.1 Project Background

The Balochistan Water Resources Development Project (BWRDP) aims to support the Government in water sector planning, management and investment on water sector infrastructure in selected river basins. It will assist the government for investment to improve water storage and supply infrastructure at the Zhob and Mula River basins and improve agricultural farm productivity. The water resource and infrastructure development works will be implemented in territorial jurisdictions of Killa Saifullah, Zhob and Khuzdar Districts along Zhob and Mula River Basins, respectively.

The project will (a) construct new small dams and flood irrigation (spate) systems; (b) improve 300 km of canals, drains, and karezes (subsurface water channels); (c) develop a satellite-based water information system; and (d) build capacity of the local communities, the Balochistan Irrigation Department (BID), and the Agriculture and Cooperative Department (ACD). The indicative outcome of the BWRDP project will be to improve land and water resources, agricultural production and farm income of 10,000 rural households by (i) bringing 10,000 ha of new land under cultivation; (ii) improving 20,000 ha of irrigated land; and (iii) protecting 1,500 ha of watersheds.

BWRDP is a five (05) year project, where Asian Development Bank (ADB) provides $100 million sector loan and the Government of Balochistan funds $ 15 million for investment on water sector infrastructure, capacity building and project management components.

1.2 Sector Loan Subprojects

The BWRDP aims to develop water sector infrastructure for improved water supplies for irrigated agriculture and domestic uses; for better watershed management and capacity building of the EA and other stakeholders including the farming communities. From a long list of 351 subprojects for the Zhob (168 sub- projects) and Mula river basins (183 subprojects), 67 possible subprojects were shortlisted. This was further reduced to 20-30 potential subprojects using the following criteria: (i) water and land availability at the subproject level; and (ii) ratio of catchment area to the command area as an indirect indicator for the assessment of hydrologic endowment of the sub-project. Based on these criteria, 11 candidate subprojects (5 in Zhob and 6 in Mula) have been selected for inclusion in ADB's Sector loan including 3 core subprojects.

Of the 3 core subprojects, one is a dam subproject in Zhob River Basin is dam and two clusters of small subprojects in Mula River Basin. Based on the pre-feasibility survey, potential infrastructure development schemes finalized for financing under sector loan are shown in Table 1 below.

Table-1: Potential Schemes to be Included in the Sector Loan

No.	Subproject Name	River Basin
1	Ahmed Zai Perennial and Flood Irrigation Scheme (PIS+FIS)	Zhob River Basin

2	Sabakzai Dam Command Area Development	Zhob River Basin
3	**Siri Toi Dam**	**Zhob River Basin**
4	Killi Sardar Akhter Perennial Irrigation Scheme (PIS)	Zhob River Basin
5	Farmers Managed PIS/FIS Scheme Improvement	Zhob River Basin
6	Churri Infiltration Gallery	Mula River
7	Pashta Khana and Garambowad PIS	Mula River
8	Karkh Valley Development Scheme	Mula River
9	Kharzan Hatachi Infiltration Gallery	Mula River
10	Manyalo, Raiko and Rind Ali PIS	Mula River
11	Farmer's Managed PIS/FIS Scheme Improvement	Mula River

Note: Highlighted are the core subprojects

1.3 Grievance Redress Mechanism (GRM)

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

1.4 Principles

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

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

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

1.5 Objectives

The objectives of the GRM are to:

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

1.6 Structure of Grievance Redress Mechanism

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

1.6.1 Displaced Person Committees (DPCs)

For effective coordination in the field with DPs and community, DPCs will be established at the village level to maintain a close rapport with affected persons and local community throughout project implementation.

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

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

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

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

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

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

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

GRC will perform following functions:

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

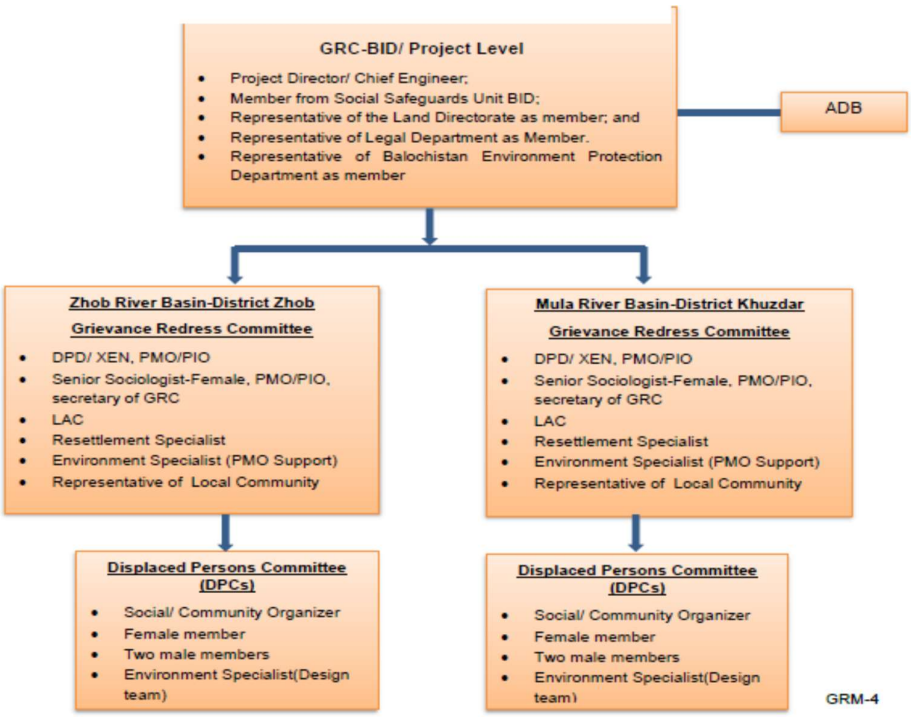
1.6.3 BID/ Project Level

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

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

This GRC-BID/project level, through authorized representative, will acknowledge the complainant about his complaint, scrutinize the record of the GRC-PMO/PIO/basin,

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



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

1.7 Grievance Redress Mechanism

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

1.7.1 Grievance Redress Procedure

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

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

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

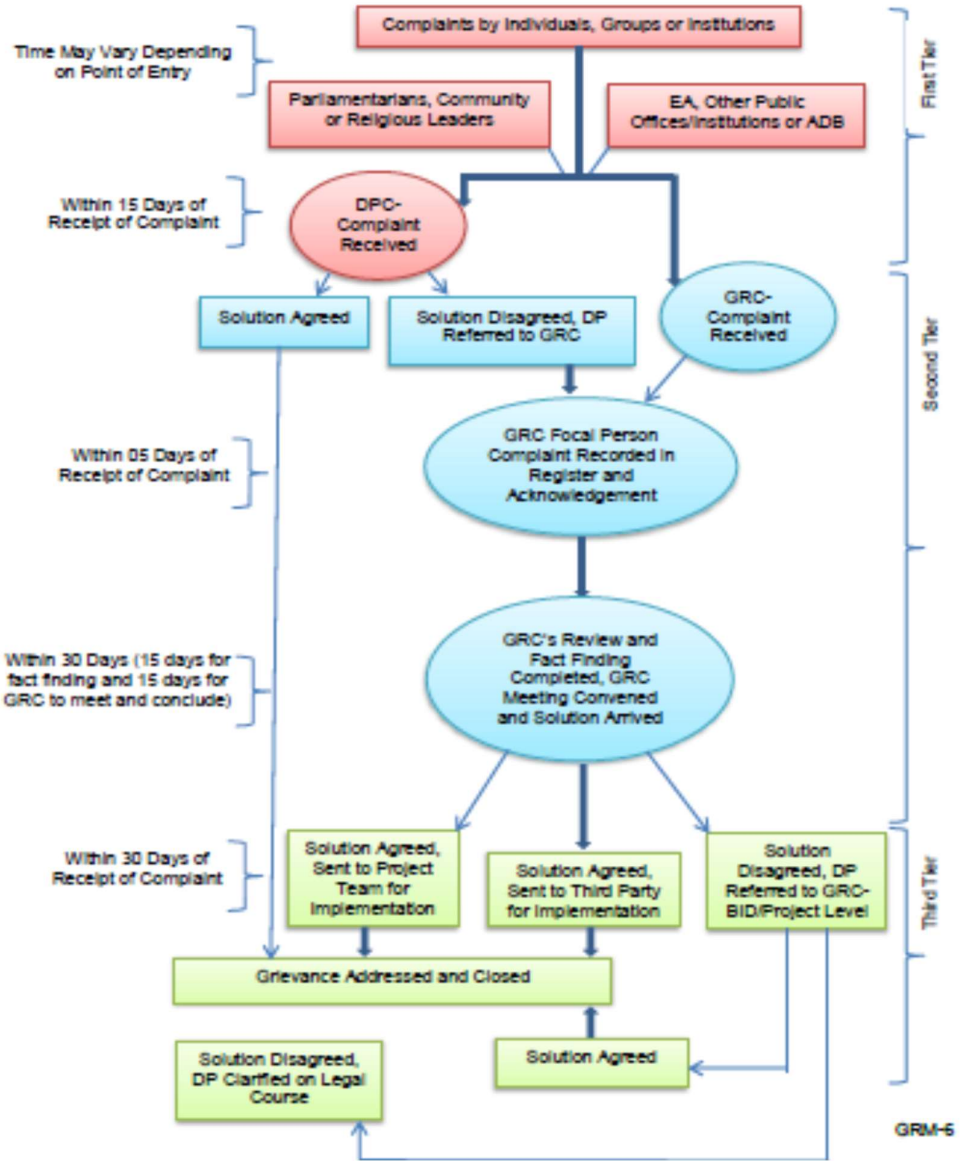
Disputes on land title, land compensation awarded and payable under law and apportionment of compensation will be dealt under the grievance redress mechanism provided in the LAA-1894. Environmental issues will be dealt according to Balochistan environmental protection act 2012 and ADB SPS 2009 guidelines. Any complaint received will be registered in the GRM and the DPs will be clarified on the process and supported to access the legal course. All other issues will be resolved through the project- based GRM. Community complaints and grievances will be addressed through two different processes as described in the following Table-2.

Table-2: Grievance Redressal Process

Land/Crop Compensation Issues	Project/ Other Issues (Including Environmental)

a. First, complaint resolution will be attempted at site (village level) through the involvement of the PMO/DPC/ FO. **b.** If unsettled, grievance can then be lodged to the GRC or DOR/LAC to proceed under law and communicate decision in least possible time. **c.** GRC will acknowledge the complaint within 5 days of complaint and after initial review and consultation with the LAC, within 15 days of receipt of complaint, the GRC will clarify the legal course of action and guide aggrieved persons to approach appropriate legal forum. PMO will coordinate with the land administration authorities including District Collector and LAC to request early resolution of the issue/complaint. **d.** In case the grievance pertains to awarded compensation, PMO will clarify with the DPs the process as set out in Section 18 to 22 of the LAA	**a.** First, complaints resolution will be attempted at site (village level) through the involvement of the PMO/DPC/FO. **b.** If unresolved, a grievance will be lodged to the GRC, which will acknowledge receipt of the complaint within 5 days. **c.** The GRC will conduct fact finding in 15 days of receipt of complaint and after review of fact findings reports and hearing the DPs in person will conclude its recommendations in 30 days of receipt of complaint. In case GRC could not decide in stipulated time, the reasons if any will be recorded and the grievance will be resolved in next 30 days. **d.** If the complainant is not satisfied, he can pursue further by submitting to the appropriate court of law.

Figure-2: Grievance Process and Time Frame


Complaints by Individuals, Groups or Institutions
Time May Vary Depending on Point of Entry
Parliamentarians, Community or Religious Leaders
EA, Other Public Offices/Institutions or ADB
First Tier
Within 15 Days of Receipt of Complaint
DPC-Complaint Received
Solution Agreed
Solution Disagreed, DP Referred to GRC
GRC-Complaint Received
Second Tier
Within 05 Days of Receipt of Complaint
GRC Focal Person Complaint Recorded in Register and Acknowledgement
Within 30 Days (15 days for fact finding and 15 days for GRC to meet and conclude)
GRC's Review and Fact Finding Completed, GRC Meeting Convened and Solution Arrived
Within 30 Days of Receipt of Complaint
Solution Agreed, Sent to Project Team for Implementation
Solution Agreed, Sent to Third Party for Implementation
Solution Disagreed, DP Referred to GRC-BID/Project Level
Third Tier
Grievance Addressed and Closed
Solution Disagreed, DP Clarified on Legal Course
Solution Agreed
GRM-6

Annexure 9: Emergency Response Plan for Damage of Infiltration Gallery

Infiltration Gallery is susceptible to damage from natural disasters such as flooding, earthquakes, landslide etc. In the event of a major disaster, the following is expected:

There is not enough source water available to meet demand,
There is a problem with the intake, or infiltration gallery, that does not allow enough water to be drawn

A natural disaster creating the situation when water from the source cannot be drawn, preventative measure are prescribed as follows:

- Regular inspection of intake for damage or clogging
- Regular inspection of intake failure

Causes	Preventive measures
Event: **CANAL BREACHING**	
Canal breaching	• Closing of gaps in flood walls by sand bags or other available methods; • Protection of river banks by sand bags, stone, or other available methods; • Counteracting piping which is the main cause of collapse of embankment and dykes etc.; • Protection of bridge piers, weirs, barrages and dams against erosion by rockfill, sand bags and other available methods; • Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land; • Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas; • Removing obstacles from active or potential flood ways, relief and flood bypass channels; and • Protection of structures exposed to strong wind wash action.
Event: **NOT ENOUGH SOURCE WATER AVAILABLE**	
Drought.	• Start water conservation measures as soon as water shortage becomes likely. • Plan the development and use of the water source,
Event: **POOR RAW WATER QUALITY DURING HEAVY RAINS**	
Heavy rain leading to high levels of turbidity	• Stabilise raw water quality (using, eg, infiltration gallery or raw water reservoir) to avoid periods of very poor quality. • Inspect catchment for signs of erosion and slips that will potentially be ongoing problems.

Causes	Preventive measures
Event: **CONTAMINATION OF THE RIVER OR STREAM**	
Contamination sources present in the catchment.	• Identify potential sources of contamination • Ensure that changes in land use (including urban developments) and the potential for contamination they create, are well monitored after commissioning of the source. • Restrict activities in the catchment that may contaminate the water. • Gather information about the hydrology of the catchment before undertaking development.
Event: **WATER QUALITY NOT IMPROVED BY INFILTRATION GALLERY**	
Sediment load in raw water too high.	• Establish levels of raw water quality that the gallery cannot handle, and turn the gallery pumps off when these are exceeded.
Poor infiltration gallery design.	• Take account of the range of possible raw water qualities when designing the gallery.
Event: **INFILTRATION GALLERY PRODUCES LESS WATER THAN IT WAS DESIGNED FOR**	
Clogged gravel packs in the infiltration gallery.	• Turn off the gallery under extreme conditions to minimise drawing sediment deep into the gravel packs. • Regular programme to scarify gravel pack with tractor mounted unit. (NB: If gallery is in the stream bed a resource consent will be required.) • Regular programme of cleaning gravel packs using compressed air lances.
Gravel packs and/or screen slots calcified or clogged with oxidised iron or manganese.	• Regular programme of cleaning gravel packs using compressed air lances
Event: **INFILTRATION GALLERY PRODUCES LESS WATER THAN IT WAS DESIGNED**	
Gallery clogged by tree roots.	• Avoid planting trees near the gallery.
Event: **TOO LITTLE WATER CAN BE DRAWN FROM THE INTAKE TO MEET DEMAND**	
Screens damaged or clogged.	• Regular inspection and cleaning of screens, intensified during times of flood. • Booms and screens to trap weed/algae.
Failure of the intake due to mechanical or structural failure.	• Regular preventive maintenance, as required by the conditions, and manufacturers' specifications: lubrication, component replacement, exercise valves. • Regular inspections of intake.
Catastrophic failure (eg, flood, slips or	• Intake inspections, regularly and directly after floods etc, with follow-up action if required for existing protection (eg, gabions, piling, screens and grates, etc).

Causes	Preventive measures
earthquake-related damage).	
Pump failure	• Maintenance according to manufacturers' recommendations. • Standby pump with auto-switch to alternate pumps. • Operate duty and standby pumps using an alternate 'number of days cycle'.
Power failure.	• Regular inspection of cabling, power lines and connectors. • Stand-by generator.
Vandalism/ sabotage.	• Construct a fence around the intake site.

Annexure 10: Emergency Response Plan for Flood Protection Bund

Flood-fighting measures are emergency measure deployed in the event when flood protection / control structures and flood proofing measures have failed or rendered ineffective with a sole objective of mitigating flood impacts

Reasons of Flooding:

- Failure of flood walls and embankments;
- Failure of land drainage systems causing flooding of agriculture land; and

Emergency Responses for flood-fighting in a typical case of failure of flood protection / control structures include the following:

- Closing of gaps in flood walls by sand bags or other available methods;
- Protection of river banks by sand bags, stone, or other available methods;
- Counteracting piping which is the main cause of collapse of embankment and dykes etc.;
- Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;
- Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;
- Removing obstacles from active or potential flood ways, relief and flood bypass channels; and
- Protection of structures exposed to strong wind wash action.

Annexure 11: Chance Find Procedure

Project routing does not envisage any archaeological site. However, in case of any chance find, the **Construction Contractor** will immediately report through **Chief Resident Engineer** of Supervision Consultant to **Deputy Commissioner (DC)** or his nominated representative, to take suitable further actions to preserve such antiques or sensitive remains; and contact the "**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan"** for further action.

Representative of the "**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan"** will visit the site and observed the significance of the antique, artifact & Cultural (religious) properties and significance of the project. The site visit report will be prepared and given to the **concerned official** of the **Archaeology Directorate**.

In case any artifact, antiques and sensitive remains are discovered, *Chance Find Procedures* should be adopted by Construction Contractors as follows;

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial archaeological department;
- The suggestion of the local communities and the concerned authorities will be suitable incorporated during taking the preventive measures to conserve the antique, artifact and Cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the Construction Contractor must immediately report the discovery to the **Chief Resident Engineer** of Supervision Engineer for onwards communication to **Deputy Commissioner (DC)**;
- Once authorization has been given by the responsible authorities (Archaeological Department), the Construction Contractor will be informed when works can resume.

Annexure 12: The List of Restricted Pesticides

Table 1. Extremely Hazardous (Class Ia) Technical grade Active Ingredients in Pesticides

mmon name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
icarb [ISO]	116-06-3	2757	C	S	I-S	1	0.93	DS 53; EHC 121; HSG 64; IARC 53; ICSC 94; JMPR 1993, 1996a
difacoum [ISO]	56073-10-0	3027	CO	S	R	1	0.3	DS 57; EHC 175; HSG 93
madiolone [ISO]	28772-56-7	3027	CO	S	R	1	1.12	DS 88; EHC 175; HSG 94
methalin [ISO]	63333-35-7	2588		S	R	1	2	
ium cyanide [C]	592-01-8	1575		S	FM	2	39	Adjusted classification; see note 1; ICSC 407
tafol [ISO]	2425-06-1			S	F	5	5000	Adjusted classification; see note 2; HSG 49; IARC 53; ICSC 119; JMPR 1978, 1986a; see note 3
orethoxyfos [ISO]	54593-83-8	3018	OP	L	I	1	1.8	Extremely hazardous by skin contact (D = 12.5 mg/kg); *ICSC 1681*
ormephos [ISO]	24934-91-6	3018	OP	L	I	2	7	*ICSC 1682*
orophacinone [ISO]	3691-35-8	2588		S	R	1	3.1	DS 62; EHC 175
enacoum [ISO]	56073-07-5	3027	CO	S	R	1	1.8	EHC 175; HSG 95
ethialone [ISO]	104653-34-1	2588		S	R	1	0.56	EHC 175
hacinone [ISO]	82-66-6	2588		S	R	1	2.3	EHC 175
lfoton [ISO]	298-04-4	3018	OP	L	I	1	2.6	DS 68; JMPR 1992, 1997a; *ICSC 1408*
l	2104-64-5	2783	OP	S	I	2	14	See note 4; ICSC 753
oprophos [ISO]	13194-48-4	3018	OP	L	I-S	2	D26	DS 70; JMPR 2000; *ICSC 1660*; *[Oral LD = 33 mg/kg]*
coumafen	90035-08-8	3027		S	R	1	0.25	EHC 175; ICSC 1267
achlorobenzene [ISO]	118-74-1	2729	OC	S	FST	5	D10000	Adjusted classification (notes 3 and 5); IARC 79; ICSC 895; *EHC 195*
rcuric chloride [ISO]	7487-94-7	1624	HG	S	F-S	1	1	See note 3; ICSC 979
vinphos [ISO]	26718-65-0	3018	OP	L	I	1	D4	DS 14; ICSC 924; JMPR 1998b; *[Oral LD = 3.7 mg/kg]*
athion [ISO]	56-38-2	3018	OP	L	I	2	13	See note 3; DS 6; HSG 74; IARC 30, Suppl. 7; ICSC 6; JMPR 1996b
athion-methyl [ISO]	298-00-0	3018	OP	L	I	2	14	See note 3; DS 7; EHC 145; HSG 75; ICSC 626; JMPR 1985c, 1996b

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Phenylmercury acetate [ISO]	62-38-4	1674	HG	S	FST	2	24	Adjusted classification; see notes 3 and 6; ICSC 540
Phorate [ISO]	298-02-2	3018	OP	L	I	1	2	DS 75; JMPR 1997b, 2005; *ICSC 1060*
Phosphamidon	13171-21-6	3018	OP	L	I	2	7	See note 3; DS 74; ICSC 189; JMPR 1987b
Sodium fluoroacetate [C]	62-74-8	2629		S	R	1	0.2	DS 16; *ICSC 484*
Sulfotep [ISO]	3689-24-5	1704	OP	L	I	1	5	ICSC 985
Tebupirimfos [ISO*]	96182-53-5	3018	OP	L	I	1	1.3	Extremely hazardous by skin contact (LD 9.4 mg/kg in rats)
Terbufos [ISO]	13071-79-9	3018	OP	L	I-S	1	c2	JMPR 1991, 2004

EHC = Environmental Health Criteria Monograph; DS = Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of

Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ia

1. Calcium cyanide is in Class Ia as it reacts with moisture to produce hydrogen cyanide gas. The gas is not classified under the WHO system (see Table 8).
2. Captafol is carcinogenic in both rats and mice.
3. The international trade of captafol, hexachlorobenzene, mercury compounds, parathion, parathion-methyl, and phosphamidon is regulated by the Rotterdam convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004. See Table 7, p. 51
4. EPN has been reported as causing delayed neurotoxicity in hens.
5. Hexachlorobenzene has caused a serious outbreak of porphyria in humans. The use and production of hexachlorobenzene is severely restricted by the Stockholm convention on persistent organic pollutants, which entered into force on 17 May, 2004. See http://www.pops.int/
6. Phenylmercury acetate is highly toxic to mammals and very small doses have produced renal lesions: teratogenic in the rat.

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION
See Pages 7 & 8, and the Appendix

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Acrolein [C]	107-02-8	1092		L	H	2	29	EHC 127; HSG 67; IARC 63; ICSC 90
Allyl alcohol [C]	107-18-6	1098		L	H	3	64	Highly irritant to skin and eyes; ICSC 95; *Adjusted classification (see note 3)*
Azinphos-ethyl [ISO]	2642-71-9	2783	OP	S	I	2	12	DS 72; JMPR 1974
Azinphos-methyl [ISO]	86-50-0	2783	OP	S	I	2	16	DS 59; ICSC 826; JMPR 1992*, 2009b*
Blasticidin-S	2079-00-7	2588		S	F	2	16	
Butocarboxim [ISO]	34681-10-2	2992	C	L	I	3	158	JMPR 1986a; *Adjusted classification (see note 3)*
Butoxycarboxim [ISO]	34681-23-7	2992	C	L	I	3	D288	*Adjusted classification (see note 3)*
Cadusafos [ISO]	95465-99-9	3018	OP	L	N,I	2	37	JMPR 1992
Calcium arsenate [C]	7778-44-1	1573	AS	S	I	2	20	EHC 18, 224; IARC 84; ICSC 765; JMPR 1969
Carbofuran [ISO]	1563-66-2	2757	C	S	I	2	8	DS 56; ICSC 122; JMPR 1997b, 2003b*, 2009a; See note 2.*
Chlorfenvinphos [ISO]	470-90-6	3018	OP	L	I	2	31	ICSC 1305; JMPR 1995b
3-Chloro-1,2-propanediol [C]	96-24-2	2689		L	R	3	112	*Adjusted classification (see notes 1 and 3)*
Coumaphos [ISO]	56-72-4	2783	OP	S	AC,MT	2	7.1	ICSC 422; JMPR 1991
Coumatetralyl [ISO]	5836-29-3	3027	CO	S	R	2	16	
Cyfluthrin [ISO]	*68359-37-5*		*PY*	*S*	*I*	*2*	*c15*	*JMPR 2008; See note 9, p. 8*
Beta-cyfluthrin [ISO]	*68359-37-5*		*PY*	*S*	*I*	*2*	*c11*	*JMPR 2008; See note 9, p. 8*
Zeta-cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c86	See note 9, p. 8; HSG 22; ICSC 246; *JMPR 2008; Adjusted classification (see note 3)*
Demeton-S-methyl [ISO]	919-86-8	3018	OP	L	I	2	40	DS 61, EHC 197; ICSC 705; JMPR 1990
Dichlorvos [ISO]	62-73-7	3018	OP	L	I	3	56	Volatile, DS 2; EHC 79; HSG 18; IARC 20, 53; ICSC 690; JMPR 1994; *Adjusted classification (see note 3)*
Dicrotophos [ISO]	141-66-2	3018	OP	L	I	2	22	ICSC 872
Dinoterb [ISO]	1420-07-1	2779	NP	S	H	2	25	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
DNOC [ISO]	534-52-1	2779	NP	S	I-S,H	2	25	JMPR 1965a; EHC 220; *ICSC 462*. See note 2.
Edifenphos [ISO]	17109-49-8	3018	OP	L	F	3	150	JMPR 1982. *Adjusted classification (see note 3)*
Ethiofencarb [ISO]	29973-13-5	2992	C	L	I	3	200	JMPR 1983. *Adjusted classification (see note 3)*
Famphur	52-85-7	2783	OP	S	I	2	48	
Fenamiphos [ISO]	22224-92-6	2783	OP	S	N	2	15	DS 92; ICSC 483; JMPR 1998b, 2003b
Flucythrinate [ISO]	70124-77-5	3352	PY	L	I	3	c67	JMPR 1986b; see note 9, p.8; *Adjusted classification (see note 3)*
Fluoroacetamide [C]	640-19-7	2588		S	R	2	13	*ICSC 1434.* See note 2
Formetanate [ISO]	22259-30-9	2757	C	S	AC	2	21	
Furathiocarb	65907-30-4	2992	C	L	I-S	2	42	
Heptenophos [ISO]	23560-59-0	3018	OP	L	I	3	96	*Adjusted classification (see note 3)*
Isoxathion [ISO]	18854-04-8	3018	OP	L	I	3	112	*Adjusted classification (see note 3)*
Lead arsenate [C]	7784-40-9	1617	AS	S	L	2	c10	*EHC 18*, 224; IARC 84; ICSC 911; JMPR 1969
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	2	36	JMPR 1987a
Mercuric oxide [ISO]	21908-53-2	1641	HG	S	O	2	18	ICSC 981; CICAD 50. See note 2
Methamidophos [ISO]	10265-92-6	2783	OP	S	I	2	30	HSG 79; ICSC 176; JMPR 1991, 2003b; See note 2
Methidathion [ISO]	950-37-8	3018	OP	L	I	2	25	JMPR 1998b; *ICSC 1659*
Methiocarb [ISO]	2032-65-7	2757	C	S	I	2	20	JMPR 1999
Methomyl [ISO]	16752-77-5	2757	C	S	I	2	17	DS 55, EHC 178; HSG 97; ICSC 177, JMPR 1989, 2002
Monocrotophos [ISO]	6923-22-4	2783	OP	S	I	2	14	See note 2; HSG 80; ICSC 181; JMPR 1996b
Nicotine [ISO]	54-11-5	1654		L		1	D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	2	50	JMPR 1997a
Oxamyl [ISO]	23135-22-0	2757	C	S	I	2	6	DS 54; JMPR 1986b, 2003b
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	3	65	JMPR 1990, 2003b; *Adjusted classification (see note 3)*
Paris green [C]	12002-03-8	1585	AS	S	L	2	22	Copper-arsenic complex
Pentachlorophenol [ISO]	87-86-5	3155		S	I,F,H	2	D80	See note 2; Irritant to skin; EHC 71; HSG 19; IARC 20, 53; ICSC 69

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD $_{50}$ mg/kg	Remarks
Propetamphos [ISO]	31218-83-4	3018	OP	L	I	3	106	*Adjusted classification (see note 3)*
Sodium arsenite [C]	7784-46-5	1557	AS	S	R	2	10	EHC 224; IARC 84; *ICSC 1603*
Sodium cyanide [C]	143-33-9	1689		S	R	2	6	ICSC 1118; CICAD 61
Strychnine [C]	57-24-9	1692		S	R	2	16	ICSC 197
Tefluthrin	79538-32-2	3349	PY	S	I-S	2	c22	See note 9, p. 8
Thallium sulfate [C]	7446-18-6	1707		S	R	2	11	DS 10, EHC 182; ICSC 336
Thiofanox [ISO]	39196-18-4	2757	C	S	I-S	2	8	
Thiometon [ISO]	640-15-3	3018	OP	Oil	I	3	120	DS 67; ICSC 580; JMPR 1980; *Adjusted classification (see note 3)*
Triazophos [ISO]	24017-47-8	3018	OP	L	I	3	82	JMPR 1994, 2003b; *Adjusted classification (see note 3)*
Vamidothion [ISO]	2275-23-2	3018	OP	L	I	3	103	JMPR 1989*; ICSC 758; Adjusted classification (see note 3)*
Warfarin [ISO]	81-81-2	3027	CO	S	R	2	10	DS 35, EHC 175; HSG 96; ICSC 821
Zinc phosphide [C]	1314-84-7	1714		S	R	2	45	DS 24, EHC 73; ICSC 602

EHC = Environmental Health Criteria Monograph; DS= Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ib

1. 3-Chloro-1,2-propanediol in nonlethal dosage is a sterilant for male rats. This compound is also known as alpha chlorhydrin.
2. The international trade of carbofuran, DNOC, fluoroacetamide, mercury compounds, methamidophos, monocrotophos and pentachlorophenol is regulated by the Rotterdam convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004. See Table 7, p. 51.
3. As a precautionary measure, the classification of certain liquid pesticides has been adjusted to avoid those pesticides being assigned to a less hazardous Class in the process of aligning the WHO Classification with the GHS. Details of how the WHO Classification has been aligned with the GHS Acute Toxicity Hazard Categories are described in the introductory notes for Part II.

THE FINAL CLASSIFICATION OF ANY PRODUCT
DEPENDS ON ITS FORMULATION
See Pages 7 & 8, and the Appendix

Table 3. Moderately Hazardous (Class II) Technical Trade Active Ingredients in Pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Acephate [ISO]	30560-19-1		OP	S	I	4	945	JMPR 1991, 2003b, *2006b; ICSC 748*
Acifluorfen [ISO]	50594-66-6			S	H	4	1370	Strong irritant to eyes
Alachlor [ISO]	15972-60-8	2588		S	H	4	930	See note 1; DS 86; IARC 19, 36, 63; ICSC 371
Alanycarb [ISO]	83130-01-2		C	S	I	4	330	
Allethrin [ISO]	584-79-2		PY	Oil	I	4	c685	See note 9, page 8; EHC 87; HSG 24; ICSC 212; JMPR 1965a
Ametryn [ISO]	834-12-8		T	S	H	4	110	
Amitraz [ISO]	33089-61-1			S	AC	4	800	ICSC 98; JMPR 1999
Anilofos [ISO]	64249-01-0		OP	S	H	4	472	
Azaconazole	60207-31-0			S	F	4	308	
Azamethiphos [ISO]	35575-96-3		OP	S	I	4	1010	
Azocyclotin [ISO]	41083-11-8	2786	OT	S	AC	3	80	JMPR 1990, 1995b, *2006b*
Bendiocarb [ISO]	22781-23-3	2757	C	S	I	3	55	DS 52
Benfuracarb [ISO]	82560-54-1	2992	C	L	I	3	205	
Bensulide [ISO]	741-58-2	2902		L	H	3	270	ICSC 383
Bensultap [ISO]	17606-31-4			S	I	4	1100	
Bentazone [ISO]	25057-89-0			S	H	4	1100	HSG 48; ICSC 828; JMPR 1999, 2005
Bifenthrin	82657-04-3	3349	PY	S	I	3	c55	JMPR 1993
Bilanafos [ISO]	71048-99-2			S	H	3	268	
Bioallethrin [C]	584-79-2		PY	L	I	4	c700	See note 2; note 9, p. 8; ICSC 227
Bromoxynil [ISO]	1689-84-5	2588		S	H	3	190	
Bromuconazole	116255-48-2			S	F	4	365	ICSC 1264
Bronopol	52-51-7			S	B	3	254	ICSC 415
Butamifos [ISO]	36335-67-8		OP	L	H	4	630	
Butralin [ISO]	33629-47-9			S	H	4	1049	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Butroxydim [ISO]	138164-12-2			S	H	4	1635	
Butylamine [ISO]	13952-84-6	1992		L	F	4	380	Irritant to skin; ICSC 401; JMPR 1982, 1985b
Carbaryl [ISO]	63-25-2	2757	C	S	I	3	c300	DS 3; EHC 153; HSG 78; IARC 12, Suppl.7; ICSC 121; JMPR
Carbosulfan [ISO]	55285-14-8	2992	C	L	I	3	250	JMPR 1987a, 2004
Cartap [ISO]	15263-53-3			S	I	4	325	EHC 76; JMPR 1996a
Chloralose [C]	15879-93-3			S	R	4	400	
Chlordane [ISO]	57-74-9	2996	OC	L	I	4	460	See notes 3 and 4; DS 36; EHC 34; HSG 13; IARC 79; ICSC 740; JMPR 1995a
Chlorfenapyr [ISO]	122453-73-0			S	I,MT	4	441	
Chlormequat (chloride) [ISO]	999-81-5			S	PGR	4	670	ICSC 781; JMPR 2000
Chloroacetic acid [C]	79-11-8	1751		S	H	4	650	Irritant to skin and eyes; data refer to sodium salt; ICSC 235
Chlorphonium chloride [ISO]	115-78-6	2588		S	PGR	3	178	Irritant to skin and eyes
Chlorpyrifos [ISO]	2921-88-2	2783	OP	S	I	3	135	DS 18; ICSC 851; JMPR 2000
Clomazone [ISO]	81777-89-1			L	H	4	1369	
Copper hydroxide [C]	20427-59-2		CU	S	F	4	1000	
Copper oxychloride [C]	1332-40-7		CU	S	F	4	1440	
Copper sulfate [C]	7758-98-7		CU	S	F	3	300	*ICSC 751*
4-CPA [ISO]	122-88-3		PAA	S	PGR	4	850	
Cuprous oxide [C]	1317-39-1		CU	S	F	4	470	ICSC 421, EHC 200
Cyanazine [ISO]	21725-46-2		T	S	H	3	288	ICSC 391
Cyanophos [ISO]	2636-26-2		OP	L	I	4	610	
Cyhalothrin [ISO]	68085-85-8	3352	PY	Oil	Ix	3	c144	See note 9, p. 8; EHC 99; HSG 38; ICSC 858; JMPR 1985c; JECFA 2000b
Cyhexatin [ISO]	13121-70-5		OT	S	AC	3	*265*	EHC 15; JMPR 1995b, *2006b*
Cymoxanil [ISO]	57966-95-7			S	F	4	1196	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c250	See note 9, p. 8; DS 58; EHC 82; HSG 22; ICSC 246; JECFA 1996
Alpha-cypermethrin [ISO]	67375-30-8	3349	PY	S	I	3	c79	See note 9, p 8; EHC 142; JECFA 1996; *JMPR 2008*
Cyphenothrin [(1R)-isomers] [ISO]	39515-40-7	3352	PY	L	I	4	318	
Cyproconazole	94361-06-5			S	F	4	1020	
2,4-D [ISO]	94-75-7	3345	PAA	S	H	4	375	DS 37; EHC 29, 84; HSG 5; IARC 41, Suppl. 7; ICSC 33; JMPR
Dazomet [ISO]	533-74-4			S	F-S	4	640	Irritant to skin and eyes; ICSC 786
2,4-DB	94-82-6			S	H	4	700	
DDT [ISO]	50-29-3	2761	OC	S	I	3	113	See notes 3 and 4; DS 21; EHC 9, 83; IARC 53; ICSC 34; JMPR
Deltamethrin [ISO]	52918-63-5	3349	PY	S	I	3	c135	See note 9, p. 8; DS 50; EHC 97; HSG 30; IARC 53; ICSC 247; JMPR 2001
Diazinon [ISO]	333-41-5	3018	OP	L	I	4	*300*	DS 45, EHC 198; ICSC 137; JMPR 1994, 2002, *2008*
Dicamba [ISO]	1918-00-9			S	H	4	1707	ICSC 139
Dichlorobenzene [C]	106-46-7			S	FM	4	500-5000	Mixture of isomers: ortho (3) 95-50-1, meta (3) 541-73-1, para (2B)
Dichlorophen [ISO]	97-23-4		OC	S	F	4	1250	
Dichlorprop [ISO]	7547-66-2			S	H	4	800	ICSC 38
Diclofop [ISO]	40483-25-2			S	H	4	565	
Dicofol [ISO]	115-32-2		OC	S	AC	4	c690	DS 81; IARC 30; ICSC 752; JMPR 1993
Difenoconazole [ISO]	119446-68-3			S	F	4	1453	*JMPR 2009b*
Difenzoquat [ISO]	43222-48-6	2588		S	H	4	470	
Dimepiperate [ISO]	61432-55-1		TC	S	H	4	946	
Dimethachlor [ISO]	50563-36-5			S	H	4	1600	
Dimethipin [ISO]	55290-64-7			S	H	4	1180	JMPR 2000, 2005

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