**IRRIGATION DEPARTMENT**
**GOVERNMENT OF BALOCHISTAN**

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

(LOAN 3700-PAK)

# INITIAL ENVIRONMENTAL EXAMINATION REPORT

## AHMEDZAI (PIS + FIS), ZHOB RIVER BASIN

**MAY 2021**


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**Project Design, Construction Supervision and Implementation Support for Balochistan Water Resources Development Sector Project**

**FEASIBILTY STUDY OF PASHTA KHAN**

**TABLE OF CONTENTS**

**Page No.**

## LIST OF TABLES

**Page No.**

## LIST OF FIGURES

Page No.

## ACRONYMS

| | |
|---|---|
| ADB | Asian Development Bank |
| AJK | Azad Jammu Kashmir |
| BEPA | Balochistan Environmental Protection Agency |
| BHUs | Basic Health Units |
| BWRDP | Balochistan Water Resources Development Project |
| BOQ | Bill of Quantities |
| CAD | Command Area Development |
| CCR | Community Complaint Register |
| CC | Construction Contractor |
| DO | Dissolved Oxygen |
| EA | Executing Agency |
| EHS | Environment Health & Safety |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EPA | Environmental Protection Agency |
| EPC | Environmental Protection Council |
| FOs | Farmer Organizations |
| GIS | Geographic Information System |
| GoB | Government of Balochistan |
| GRC | Grievance Redress Committee |
| GRM | Grievance Redressal Mechanism |
| H2S | Hydrogen Sulphide |
| IEE | Initial Environmental Examination |
| EHS | Environment, Health and Safety |
| IWRM | Integrated Water Resources Management |
| M&E | Monitoring and Evaluation |
| MCM | Million Cubic Meter |
| NCS | National Conservation Strategy |
| NEQS | National Environmental Quality Standards |
| NOC | No Objection Certificate |
| NOx | Oxides of Nitrogen |
| NTU | Nephelometric Turbidity Unit |
| PEPA | Pakistan Environmental Protection Act |
| PEPO | Pakistan Environmental Protection Ordinance |
| PHE | Public Health Engineering Department |
| PIS | Perennial Irrigation Schemes |
| PMD | Pakistan Meteorological Department |
| PPC | Pakistan Penal Code |

| | |
|---|---|
| PPEs | Personal Protection Equipment |
| PPTA | Project Preparatory Technical Assistance |
| PIU | Project Implementation Unit |
| BID | Balochistan Irrigation Department |
| REA | Rapid Environmental Assessment |
| RHCs | Rural Health Centers |
| SOx | Oxides of Sulfur |
| SPS | Safeguard Policies |
| SC | Supervision Consultants |
| TA | Technical Assistance |
| TCI | Techno Consult International |
| TDS | Total dissolved solids |
| TSS | Total Suspended Solids |
| UNEP | United Nation Environment Program |
| VOCs | Volatile Organic Compounds |
| WHO | World Health Organization |
| WUA | Water User Association |

# EXECUTIVE SUMMARY

## A. INTRODUCTION

1. This report presents the findings of an Initial Environmental Examination (IEE) study for proposed non-core Ahmadzai Irrigation Scheme sub-project located in Zhob River Basin. The Project is being funded by Asian Development Bank (ADB) with Balochistan Irrigation Department (BID) acting as the Executive Agency (EA).

2. The sub-project is located in District Zhob at a distance of about 51 km South-East of Zhob City. It is accessible from Zhob-DI Khan Road (N-50) using Murgh Kibzai link road. After its construction in 1962, the Ahmadzai weir was damaged and repaired in 1983-84. Flood in 2010 again seriously damaged the Ahmadzai diversion weir on Sawar Rud stream and washed away the intake structure of the Perennial Irrigation Canal (PIC). Since then the irrigation water supply was shattered from the weir. The flood also damaged bot the perennial and flood channels and their associated structures. The sub-project will rehabilitate and improve damaged weir, canals and appurtenant structures to serve an area of 612 ha.

3. Main components of the sub-project include; (i) a weir structure on the Saward Rud (river) with an irrigation outlet for Perennial channel on the right side and a head regulator for Flood channel on the left side;(ii) a 3.5 km long Perennial Irrigation channel to irrigate 208 ha of command area on right bank (iii) a 7.5km long Flood Irrigation Channel to irrigate 404 ha of land by Sailaba irrigation on the left bank of the river. Ceasing this opportunity, the proposal includes extension of weir and expansion of service area.

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.

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

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

- The Balochistan Wildlife (Protection, Preservation, Conservation and Management) Act,
- 2014; and
- ADB's Safeguard Policy Statement (2009).

## C. DESCRIPTION OF PROJECT

7. The Ahmedzai sub-project comprises (i) main diversion weir across the stream Sawar Rud-a tributary of Zhob River; (ii) perennial irrigation scheme along right bank and (iii) the flood irrigation scheme along left bank. The Perennial Irrigation Scheme (PIS) supplies water round the year whereas the Flood Irrigation Scheme (FIS) supplies water to the agricultural land only during floods when there is availability of surplus flows in the stream. Right and left bank command areas of Ahmedzai sub-project will receive irrigation water from perennial and flood flows respectively.

8. The design of interventions related to all components of this subproject. These are divided as, (i) Irrigation Network – Rehabilitation and Lining. (ii) Flood Protection. and (iii) Weir construction. The scope of work for the subproject include remodelling of the existing Ahmadzai weir along with the rehabilitation and partial lining of perennial and flood channels and associated structures. Details of scope of work for the sub-project are presented in below Table.

| Sr. No. | Proposed Works | Details |
|---|---|---|
| 1 | Type of Structure | Rehabilitation of Weir and Channels |
| 2 | Main Weir Length (m) | 67 (Clear water Way width) |
| 3 | Under sluice Width (m) | 3 |
| 4 | Flood head Regulator Width (m) | 6 |
| 5 | Perennial Channel Head Regulator Width (m) | 0.55 x 0.70 |
| 6 | Upstream L/S Guide Bunds Restoration (m) | 345 |
| 7 | Upstream R/S Guide Bunds (m) | 45 |
| 8 | Downstream R/S Guide Bunds (m) | 88 |
| 9 | Aqueduct Twin Trough Length (m) | 87 |
| 10 | Aqueduct single Trough Length (m) | 40.5 |
| 11 | Lined Channel Length (m) | 3,220 |
| 12 | Unlined Channel (m) | 7,320 |
| 13 | Washing Structure (Number) | 1 |
| 14 | Animal Drinking Structure (Number) | 1 |
| 15 | Wuzu Structure (Number) | 1 |
| 16 | Time Division Structures (Number) | 10 |
| 17 | Direct Outlet (Number) | 14 |
| 18 | Super-Passage Nos | 09 |

## D. PROJECT ALTERNATIVES

*OPTIONS FOR WEIR REMODELLING*

9. Based on the nature of damages and existing condition, it is assessed that the existing weir portion of the structure is partially damaged and can be remodelled / rehabilitated/repaired to safely pass the flood flows of desired return period (3-4 times higher than the original capacity). The foundation has no sign of serious damages and dismantling of entire weir or construction of totally new weir is not needed. There could be two possible alternatives for recouping the discharge capacity of the weir and allied structures;

i. Remodelling/upgrading/repair of existing weir only.
ii. Augmenting the existing weir with additional weir length and energy dissipation arrangement in addition to remodelling/upgrading/repair of the existing weir.

10. Comparing of design parameters of both options showed that Option-2 is more suitable because its unit discharge is lesser which would require less energy dissipation. Its lower flood levels would warrant more safety to the diversion weir structure. Cost of this option may also be reduced due to lesser raising of side walls and guide banks/ flood protection embankments and reduced length of stilling basin. Hence option-2 involving upgradation of existing weir and construction of new weir may be adopted for the sub-project.

## E. BASELINE CONDITIONS

- **Land Use:** The project area covers perennial, flood irrigated and khushkaba area falling in district Zhob of Balochistan province. The gross area (Culturable Command Area) of the project is determined 820.6 ha, out of total area 208.6 ha (25.4%) is Perennial, 404 ha (49.2%) Flood irrigated and 208 ha (25.3%) is Khushkaba
- **Geology:** The area is composed of a number of different geological formations. The rocks are sedimentary and volcanics. The sedimentary rocks are limestone, sandstones, shales, clays conglomerates while the volcanic rocks include hornblends, diorites and serpentinites.
- **Soils:** The soils of the project area has variable textures which range from fine to coarse textured. The medium textured extent comprises of clay loam, loam, silt loam and sandy loam occupy the maximum content in the area. The other least classed observed in the project are is loam gravel and sandy loam gravel. Most of the area (60 percent) in Zhob consisted of rock and mountains
- **Climate:** The project site has a semi-arid climate (and its rainfall is just high enough to avoid from the arid climate category found at lower elevations, low humidity, dry winds, severe winter and mild summer.
- **Surface Water:** According to hydrological study, estimated average annual runoff volume of surface water at weir site will be about 6.27 MCM out of which 1.76 MCM is for PIS and 4.51 MCM will be for FIS. The quality of water was tested at proposed sub-project having pH of 8.3 and TDS of 300 ppm. Thus the quality of water is fresh and highly suitable for irrigation.
- **Air and Noise Quality:** Air and Noise quality monitoring results showed that these are within NEQS. 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.
- **Protected Sites:** As per assessment during the baseline surveys there are no protected sites and protected forests within or close to the potential impact zone of the this scheme.
- **Flora:** The Flora comprises Acacia Modesta, Caragana Ambigua, Bararr, Gurgulla, Sarwane, Showan, Wanna, Barrai, Ghalmi, Shorai, Lani, Azghai, Sassi, Ghaz, Korai, Sperbutai, Oma, Murgha, Tarkha and Zizyphus. Flora of sub-Project area includes Almond. Apple, apricot, grapes, pomegranates, Chinar, Euclayptus, Ber (Zizyphus nummularia), Phulai (Acacia modesta), Makhi (Caragana ambigua), Tamarix sp. And Saccharam sp.

- **Fauna** includes Mammals:Fox (Vulpes cana), Asiatic Jackal (Canis aureus), Cape hare (Lepus capensis), Porcupine (Hystrix indica), Afghan Hedgehog (Hemiechinus auritus megalotis), etc .Birds: Chukar (Alectoris chukar), See see partridge (Ammoperdix griseogularis), Magpie (Pica pica), a number of sparrows, Finches, buntings, seasonal/migratory waterfowls, hawks, and sand grouse etc. Reptiles: Afghan Tortoise (Agrionemys horsfieldii), Brown Cobra (Naja oxiana), Goh (Varanus griseus), etc. Amphibians: Amphibians found in the tract include common frog (Rana tigrina and common toad (Bufo bufo).
- **Archaeology and Cultural Heritage:** Sites of importance in regard to cultural heritage are not reported from the specific area of the project.
- **Demographic Characteristics of the Project Area:** The focused area belongs to beneficiaries of 3 main villages called Ahmadzai and Ali Zai killi. About 98 households were reported in Ahmadzai village with population of 920 persons and 55 households in Ali Killizai with population of 236 persons according to census of 2017.
- **Ethnicity and Tribes:** The main tribes of the district are Mandokhels, Kakars, Sheranis, Haripals, Babars, Lawoons, Khosty and Syeds. Sulemankhels, Nasars, Kharots and other tribes of Afghan origin are also inhabited in the district.
- **Literacy Ratio:** A person was treated as literate if he or she could read newspaper and write a simple letter in any language. According to DCR 1998, the literacy ratio among 10 years and above population was 16.78 percent in district. It was 47.84 percent in Urban and 10.40 percent in rural areas. The male literacy ratio was 24.53 percent as compared to 6.90 percent of females.
- **Livelihood:** The main occupation of the people of the project area is agriculture as more than 80 per cent of the population lives on agriculture. Most of the farmers supplement their income from Govt Jobs, livestock keeping labor, shop keeping, transporters etc. Cattle and sheep rearing are the main occupation of the people of the Ahmadzai area, where large tracts of land are still barren and cultivation is only a subsidiary occupation. In other parts of the Project area, pastoral occupation is the subsidiary occupation, as agriculture generally requires concentered efforts of the whole family, the women-folk and the children also share the work in the field. At the time of harvesting, the people from the draught stricken areas usually migrate to places where they can find work as labourers.
- **Agriculture:** Existing level of agriculture and its pattern practiced in the project area is one of the major indicators to evaluate agriculture development status availed by the farmers in the area. Farmers are practicing agriculture on availability of limited irrigation supplies (1.5 to 1.75 cusec) through perennial Gorasa Ahmed Zai Karaz, flood flows and rain fed farming. Perennial irrigation supplies are mainly utilized during both kharif and rabi seasons for cultivating wheat, kharif - rabi vegetables, fodder (sorghum & lucern) and pulses, apricot and melon under existing conditions depending upon farmers economic conditions. In flood and rain fed areas wheat, sorghum and pulses are commonly sown by the farmers.
- **Farm size:** The farm size and tenure system has a major impact on development of agriculture of the project area. The farms have been classified

into four categories i.e. small (less than 3.04 ha), medium (3.04 to 10.12 ha), large (10.12 to 20.2 ha) and very large (above 20.2 ha). According to distribution by size, in project area, the number of small, medium, large and very large farms are 163 (88.0%), 19 (10.0%), 3 (1.48) and 1 (0.6%) respectively, aggregating to 185 farms.

- **Communications:** Access to sub-project site from Zhob city is through Quetta-Zhob National Highway (N- 50), which connects to a dirt track leading to the sub-project area on south-eastern part of Zhob River basin.

## F. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11. Some of the main impacts at this stage are described below.

- **Land acquisition:** The rehabilitation works to improve existing irrigation infrastructure is proposed for this sub-project. There are no structures within RoW. One farmer has encroached about half prism of flood channel close to aqueduct, levelled it by filling soil and planted orchards some years ago. So at present, width of channel at encroached place is half comparatively. As a result, water level will rise at this place in future and may cause flood. Without attaining encroached land, project construction will be severely impacted. Land will also be required to construct a new 2 Km long Perennial irrigation Canal. This impact would be of high significance.
- ***Mitigation Measures:*** The encroacher should be compensated in accordance with provisions of the Land Acquisition Act 1894 and ADB SPS 2009 policy.
  To minimize resettlement and other social adverse impacts, proposed rehabilitation works shall be carried out along existing available RoW and works shall be restricted inside existing ROWs. If in case, any unavoidable change in alignment or new interventions required during detailed design, BID needs to prepare a LARF and address this issue. Land owner of land on which new Perennial irrigation Canal will be constructed is willing to give his land without cost. By adopting the aforementioned measures, the impact would be of low significance.
- **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 into a permanent dumping area, (iii) potential erosion from the spoil areas and spoil material reaching the river/waterways, and (iv) aesthetic impacts.
  *Mitigation Measures:* The spoil material from the excavation will be dumped at designated 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.
  The spoil material shall be deposited in layers and properly rolled and sprinkled to avoid any negative environmental impacts.
- **Flora & Fauna:** Proposed project will impact some trees falling 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 fulfil the camps 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 earthworks 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 due to tree removal 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 his 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:** 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 to minimize noise impact.
- **Ambient Air Quality:** 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 of the project site and along the road leading to it. Furthermore, fuel combustion will also 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:** 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 carried out many times a day rendering the impact minimal.

Hauling trucks containing construction materials shall be covered with tarpaulin and will be required to run at pre-determined speed in order to minimize dust generation.

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

  **Mitigation Measures:** A traffic management plan to be prepared and implemented by the contractor, inter alia, has been proposed as a mitigation measure. Construction traffic hindrance should be avoided by providing proper diversion and signage. Should the damage take place to road, the contractor must be bound to carry out repair work immediately.
- **Occupational Health and Safety:** The construction activities will involve operations which pose risks to the health and safety of the contractor's staff as well as the surrounding communities.

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

  All project related staff will be provided with the required personal PPE and shall be trained to make sure that they are aware of the usefulness and correct use.

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

  Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of it.
- **Use of local water resources**: There will be ample need of water not only for construction purposes but also for meeting the consumptive and non-consumptive needs of the campsites, workshop, washing yard, etc. It is obvious that these needs will be met from the existing resources of the areas in close proximity to channels.

  **Mitigation Measures:** Availability of water for camp site facilities and construction purposes will be ensured by the Contractor prior to start of

construction activities.

As per Local Government Act, the contractor will seek approval from the Local Government for exploitation of the water resources.

- **Safety Hazards:** Safety hazards are associated with the operation of construction machinery, equipment and tools, transportation, land cutting and landslides, fires etc. The causes of safety hazards are usually complex involving human errors, operational faults of machinery and unforeseen incidences. Over-all the impacts are negative and on short-term basis.

  **Mitigation Measures:** Safety hazards are controllable with efficient management, staff training, machinery maintenance and other preventive measures. The construction contractor will ensure proper management and utilization of the machinery to minimize the hazards during construction. Safety equipment will be provided to the labors for accident prevention.
- **Impacts on Local Communities/Workforce**: During the construction phase, general mobility of the local residents and their livestock in and around the project area is likely to be hindered. The presence of outside construction workers inevitably causes some degree of social disruption and even active disputes with the local community as a result of social/cultural differences. Usage of community's common resources like potable water, fuel wood etc. by contractor workforce may create conflicts between the community and the contractor.

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

  **Mitigation Measures: Contractor** should carry out complete restoration of the construction sites and remove all waste, debris, unused construction material, and spoil from the worksites.

**Operation Phase Impacts**

12. During project operation, significant positive environmental and socio-economic impacts will occur.

## G. ENVIRONMENTAL MANAGEMENT PLAN

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

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

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

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

**EMP Budget**

16. The EMP budget for construction and operations period of Project is 4.62 Million PKR.

## H. CONCLUSION

17. 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.

18. No involuntary settlement is involved. No indigenous persons reside or will be affected by the proposed interventions in the areas of influence. Land owner of land on which new Perennial Irrigation Canal will be constructed will give land free of cost, and one encroacher will be compensated.

19. 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.

20. 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.

21. 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

## 1.1 GENERAL

22. Balochistan is the largest province of Pakistan in terms of area and smallest in terms of population. It abounds and to a great extent excels in variety and subtlety of culture and tradition, climate and vegetation, geology, relief and resources. It is reckoned to be comparatively less developed and the sole reason is scarcity and paucity of water.

23. 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). The policy provides a comprehensive framework for the province to address the issues of water management and development in the context of basin approach, with water harvesting and groundwater recharging as an integral part of watershed management.

24. The project preparatory technical assistance (PPTA) Consultants (TA 8800-PAK) prepared the Balochistan Water Resource Development Sector Project (2016-2018) followed by ADB's approval of a loan (3700-PAK) in the amount of $100 million from its Ordinary Capital Resources, and by JFPR a grant of $5.0 million (administered by ADB) in 2018. The PPTA Consultants assisted the GoB in screening and ranking of the five potential river basins (Hingol, Mula, Pishin Lora and Zhob) and selecting the two river basins and identifying 11 sub-projects for development.

25. Government of Balochistan has now hired the services of Consultants for Project Design, Construction Supervision and Implementation Support (PDCS&IS) for Balochistan Water Resources Development Sector Project. PDCS&IS Consultants will help GoB in preparing detailed design of three core sub-projects and also feasibility studies and detailed design of balance of eight non-core sub-projects.

26. Combined together the core and non-core sub-projects on completion will contribute the three higher level outputs (irrigation infrastructure, command area and watershed and strengthening of institutional capacity) of the water resource sector in the two river basins.

27. The assignment under consideration involves conducting an Initial Environmental Examination of the Ahmadzai Perennial and Flood Irrigation scheme (PIS+FIS) (that is one of 11 sub-projects of the two river basins) proposed noncore project in Zhob River Basin. Following are the important.

28. The contract for Consultants Services for Balochistan Water Resources Development Sector Project was signed between the Irrigation Department Government of Balochistan and NESPAK-RHC-EGC JV on July 24, 2019. In accordance with the Notice to Proceed with the Services, the Consultants commenced their services on August 19, 2019.

29. Balochistan Irrigation Department is the Executing Agency vis-à-vis implementing the dam and irrigation schemes along with related infrastructure. Balochistan's Agriculture and Cooperative Department is the Implementing Agency for the command area component. Dedicated Project Management Office (PMO) and Project Implementation Office (PIO) are managing the day-to-day progress of the project on behalf of GoB.

## 1.2 THE AHMADZAI SUB-PROJECT

30. The sub-project is located in District Zhob at a distance of about 51 km South-East of Zhob City. It is accessible from Zhob-DI Khan Road (N-50) using Murgh Kibzai link road. After its construction in 1962, the Ahmadzai weir was damaged and repaired in 1983-84. Flood in 2010 again seriously damaged the Ahmadzai diversion weir on Sawar Rud stream and washed away the intake structure of the Perennial Irrigation Canal (PIC). Since then the irrigation water supply was shattered from the weir. The flood also damaged bot the perennial and flood channels and their associated structures. The sub-project will rehabilitate and improve damaged weir, canals and appurtenant structures to serve an area of 612 ha.

## 1.3 PROJECT LOCATION

31. The Ahmadzai perennial and flood irrigation sub-project is located in District Zhob at UTM coordinates N 3437108 m, E 551554 m Zone 42R. The source of water is from Sawar Rud/River (hereinafter called “the river”); a tributary of Zhob River. The sub-project site can be accessed from the Zhob city through Zhob-DI Khan National Highway (N-50). At a distance of 16km from Zhob Town, a black top road takes off from N-50 leading to Murgha Kibzai in the southward direction. The Ahmadzai sub-project area is located along this road at a distance of 35 km from N-50 as shown in the Figure-1.1. There is a major bridge crossing on the Sawar Rud for this road. Total distance from the Zhob city to the main weir of Sawar Rus is about 51km.

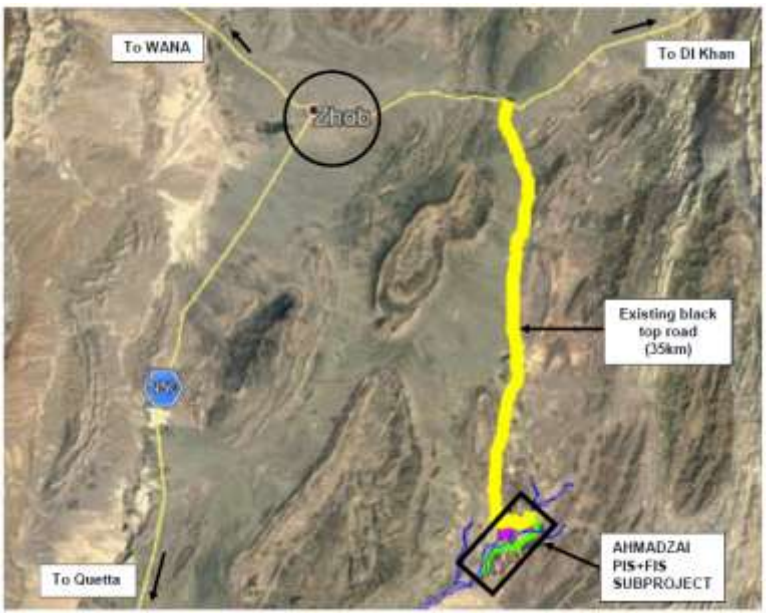



**Figure 1-1 Project Location Map**

## 1.4 LAYOUT OF SUB-PROJECT

32. The sub-project consists of a weir on Sawar Rud (River) near Killi Ahmad Zai to divert river/flood water into two irrigation channels one on each right and left bank of the river. Perennial Irrigation Channel/Scheme (PIS) is located on the right bank of serving a

command area of 208 ha and Flood Irrigation Channel/ Scheme (FIS) is located on left bank of the river serving an area of 404 ha. The layout of the project is shown in the Figure 1.2.


**Figure 1-2** Layout of the Sub-project

## 1.5 SCOPE OF WORK

33. The sub project is aimed to rehabilitate and improve damaged infrastructure to enhance size of command area for which irrigation facility is available. The existing damaged Ahmadzai weir will be remodelled along with rehabilitation and partial lining of perennial/flood canal for enhancing the agricultural production in the project area. The proposed sub-project would be fed irrigation water from the perennial and flood flows of the river. Since perennial flows are limited therefore flood flows are to be utilized efficiently to obtain maximum benefit from the sub-project.

## 1.6 ENVIRONMENTAL ASSESSMENT

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

35. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the rehabilitation of Ahmedzai Irrigation Scheme at district Zhob 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.

36. The EIA / IEE regulations of 2000 provide categories of projects for which IEE or EIA needs to be conducted. The proposed project falls under the category of “Water management, dams, irrigation & flood protection” and hence the environmental study is conducted and an IEE report is being prepared.

37. For ADB's SPS, all loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) and requires the completion of the environmental categorization form. REA was filled by consultants and is attached as Annexure 1.

38. 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.

39. 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.

40. 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.

41. 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.

42. 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 Ahmedzai Irrigation Scheme.

43. 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.

44. 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.

## 1.7 MORE SPECIFIC OBJECTIVES OF IEE REPORT

45. 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.

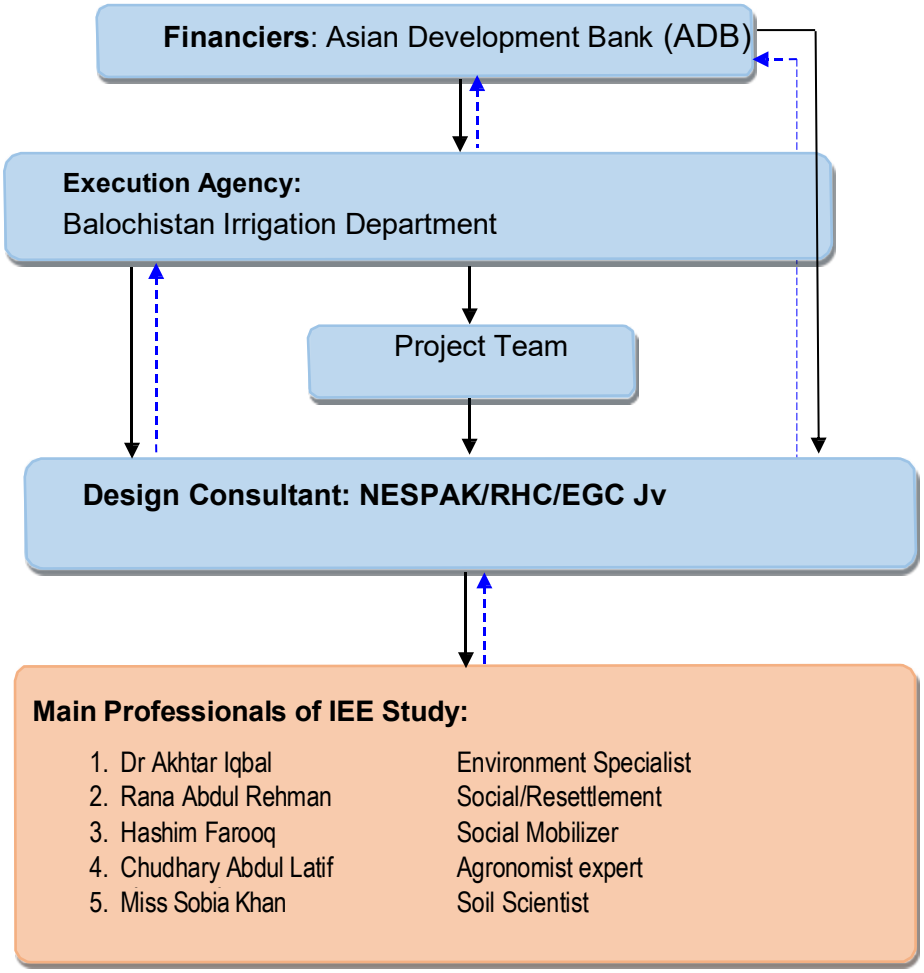
vi. Identify significant environmental impacts (both positive and negative) during all stages of the project implementation and propose mitigation measures for negative impacts

## 1.8 STRUCTURE OF THE REPORT

46. This report is divided into following chapters:

Chapter No.1: Introduction
Chapter No. 2: Policy, Law and Administrative Framework
Chapter No. 3: The Project Description
Chapter No. 4: Environmental Baseline Conditions
Chapter No. 5: Study of Alternatives
Chapter No. 6: Public Consultations
Chapter No. 7: Impact Assessment, Mitigation and Enhancement Measures
Chapter No. 8: Environmental Management Plan
Chapter No. 9: Conclusions & Recommendations

## 1.9 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. This 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 policies. In 1984, the promulgation of this ordinance was followed by the establishment of the Pak-EPA, the primary government institution dealing with environmental issues. The PEPO 1983 was replaced with a new Act of Parliament in 1997 i.e. PEPA Act 1997.

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

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. NEQS for municipal and liquid industrial effluent, industrial gaseous emissions and motor vehicle exhaust and noise, were issued by Pakistan EPA in 1994.

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 backend 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

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

### 2.6.2 Pakistan Environmental Protection Act, 1997

64. The PEPA 1997 is the apex environmental law of the country. Under section 12 of the Act, it is mandatory for the proponents of the projects7 to execute the IEE and / or EIA (where warranted), and get the approval from provincial EPA.

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

***Rules:***

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

***Regulations:***

- Review of IEE / EIA Regulations, 2000.
- National Environmental Quality Standards (Certification of Environmental Laboratories)
- Regulations, 2000.

### 2.6.3 Balochistan Environmental Protection Act, 2012

66. 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.

67. 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.

68. 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).

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

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

### 2.6.4 Pakistan EPA Review of IEE and EIA Regulations, 2000

70. 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.

71. The Review of IEE and EIA Regulations 2000, prepared by Pak-EPA under the powers conferred upon it by PEPA-97, categorizes projects for IEE and EIA, respectively. The proposed interventions under Karakh-Mula River are likely to fall under the Category B as defined in Schedule – I of Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000. According to these guidelines, the proposed project would require an IEE to be conducted.

72. According to the details provided in the regulations regarding preparation, submission, and review of IEE's and EIA's, following is a brief description of the approval process.

- A project is categorized as requiring an IEE or EIA using the two schedules attached to the regulations.
- An EIA or IEE is conducted as required and following the Pak-EPA guidelines.
- The EIA or IEE is submitted to the concerned EPA: provincial EPAs if the project is located in the provinces or Pak-EPA if it is located in the Federal administered area.
- A non-refundable review fee, depending on the cost of the project and the type of the report, is submitted along with the document as per the rates shown in Schedule III.
- The submittal is also accompanied by an application in the format prescribed in Schedule IV of the regulations.
- The EPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report, (i) confirming completeness, or (ii) asking for additional information, if needed, or (iii) returning the report requiring additional studies, if necessary.
- The EPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, for the issue of confirmation of completeness.
- When the EPA accord their approval subject to certain conditions:
- Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.

- Before commencing operation of the project, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
- An environmental management plan (EMP) is to be submitted with a request for obtaining confirmation of compliance.
- The EPA is required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
- The IEE approval is valid for three years from the date of accord. The proponents are required to complete the construction and installation within this time period and start operations. In case of any delays, the proponents are required to obtain extension from EPA.

### 2.6.5 Forest Act 1927

73. 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.

74. 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

75. 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

76. 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 Government of Pakistan Guidance on Managing COVID-19 Risks

77. Government of Pakistan issued Guidelines “Health & Safety of Building and Construction Workers during COVID-19 outbreak” to Managing COVID-19 Risks while Commencing Work in Construction Project, on 11 April 2020(Annexure 5). Taking into account these guidelines, the contractor will prepare The contractor will prepare Site-specific EMP (SSEMP), Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant

### 2.6.9 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.

### 2.6.10 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.

### 2.6.11 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.

### 2.6.12 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.

### 2.7.1 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, nongovernmental organizations and the private sector. The EPA is required to ensure compliance with the National Environmental Quality Standard (NEQS), establish monitoring and evaluation systems, and both identify the need to, as well as initiate legislation whenever necessary. It is thus the primary implementing agency in the hierarchy. 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. Another function of the provincial EPA are the review and approval of environmental assessment reports.

## 2.8 ASIAN DEVELOPMENT BANK SAFEGUARD POLICIES

### 2.8.1 ADB Requirements for Preparation of Environmental Assessments of Projects

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

86. 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".

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

88. 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.

89. Main reasons behind assigning category B is that the interventions are basically upgradation and rehabilitation of existing irrigation system and no resettlement is envisaged. However, an environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for urban development and water supply, was filled by PPTA consultants and results of the assessment show that the projects are unlikely to cause significant adverse impacts. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subprojects.

90. 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

91. 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.
  The Project will need to comply with all the Safeguard Policies in the subproject or activities, irrespective of whether or not they are being funded in whole or in part by the ADB, the GoP, or any other donor. A brief synopsis of these policies and their relevance for the proposed project is given in the **Table 2-1.**

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

| S. No. | Safeguard Policies | Key Requirements | Remarks |
|---|---|---|---|
| 1. | Environment | Projects and subprojects need IEE to address important issues not covered by any applicable regional or sectoral EA. | Applicable to proposed project |
| 2. | Involuntary Resettlement | Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.<br>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.<br>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, an illegal encroacher is using small part of Flood channel land for agriculture purpose, that will be compensated. This policy may not be applicable. |

| | | | |
|---|---|---|---|
| 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.

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

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

96. In case PAPs' grievances/complaints are unaddressed by multi-tiered Grievance Redressal Committee, ADB provides an independent forum to all the affected personnel to register their complaints directly. However, ADB may refer back the case to multi-tiered GRC

for consideration if any complainant approaches ADB without utilizing the project based GRM first.

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

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

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

## 2.9 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS

98. 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.

99. 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 1 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.

100. Similar to the standards for air quality, the comparison of noise standards provided in Table 2 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.

101. 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.

102. Similar to the standards for air and Noise quality, the comparison of Water quality standards provided in Table 3 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 2-2 Comparison of International and Local Air Quality Standards**

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

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

**Table 2-3 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 |

103. 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 2-4 Comparison of National and WHO Environmental Quality Standards for Drinking Water

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

| Properties/Parameters | Standard values | WHO standards | Remarks |
|---|---|---|---|
| | | | 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 hydrocarbons (as PAHs) g/l | | 0.01 (By GC/MS methods) | |
| | | | |
| Alpha Emitters bq/L or pCi | 0.1 | 0.1 | |
| Beta emitters | 1 | 1 | |

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

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

| # | 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:<br>New Used Vehicles<br>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 |

[F. No. 2(21)/93-E-II

**Table 2-6: 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(as$Cl^{-}$) | 1000mg/L |
| 10. | Fluoride (as $F^{-}$) | 20mg/L |
| 11. | Cyanide (as $CN^{-}$) | 2mg/L |
| 12. | An-ionic detergents (2) (as MBAS) (5) | 20mg/L |
| 13. | Sulphate($SO4^{2-}$) | 600mg/L |
| 14. | Sulphide ($S^{2-}$) | 1.0mg/L |
| 15. | Ammonia ($NH_3$) | 40mg/L |
| 16. | Pesticides, herbicides, fungicides and | 0.15mg/L |
| 17. | insecticides Cadmium (4) | 0.1mg/L |
| 18. | Chromium (4) (trivalent and hexavalent) | 1.0 mg/L |
| 19. | Copper (4) | 1.0mg/L |
| 20. | Lead (4) | 0.5mg/L |
| 21. | Mercury (4) | 0.01mg/L |
| 22. | Selenium (4) | 0.5mg/L |
| 23. | Nickel (4) | 1.0mg/L |
| 24. | Silver (4) | 1.0mg/L |
| 25. | Total toxic metals | 2.0 mg/L |
| 26. | Zinc | 5.0mg/L |
| 27. | Arsenic | 1.0mg/L |
| 28. | Barium | 1.5mg/L |
| 29. | Iron | 2.0mg/L |
| 30. | Manganese | 1.5mg/L |
| 31. | Boron | 6.0mg/L |
| 32. | Chlorine | 1.0mg/L |

Explanations:

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

# 3. THE PROJECT

## 3.1 BACKGROUND

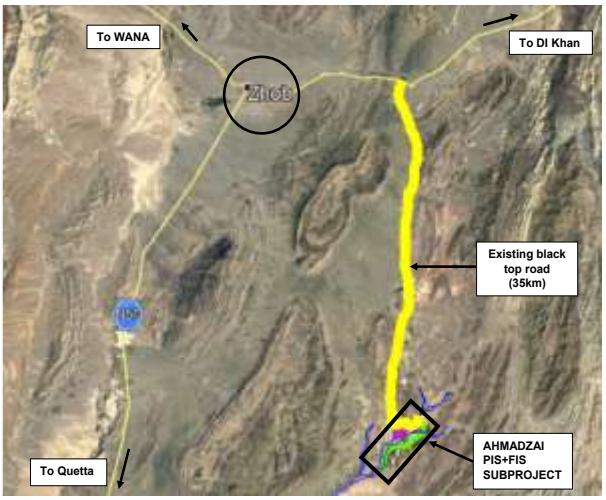
105. Balochistan is the largest province of Pakistan in terms of area and smallest in terms of population. It is reckoned to be comparatively less developed and the sole reason is scarcity and paucity of water. Islamic Republic of Pakistan received a loan (3700-PAK) from the Asian Development Bank (ADB) 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).

106. Government of Balochistan has now hired the services of the Consultants1 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 subprojects in two river basin (Mula & Zhob) as listed in the Table 1-1. The Consultants will help GoB in preparing detailed design of three core sub-projects and also feasibility studies and detailed design of the balance of eight non-core sub-projects.

107. Ahmadzai Perennial and Flood Irrigation scheme (PIS+FIS) is one of 11 sub-projects of the two river basins. The Feasibility study of Ahmadzai PIS+FIS was carried out by the Consultants in April 2020. The report in hand is the Design Report of Ahmadzai PIS+FIS sub-project and contains the analysis, design calculations and detailed drawings prepared by the Consultants.

## 3.2 LOCATION OF THE PROJECT

108. The Ahmadzai perennial and flood irrigation sub-project is located in District Zhob at UTM coordinates N 3437108 m, E 551554 m Zone 42R. The sub-project site can be accessed from the Zhob city through Zhob-DI Khan National Highway (N-50). At a distance of 16km from Zhob Town, a black top road takes off from N-50 leading to Murgha Kibzai in the southward direction. The Ahmadzai sub-project area is located along this road at a distance of 35 km from N-50. There is a major bridge crossing on the Sawar Rud for this road. Total distance from the Zhob city to the main weir of Sawar Rus is about 51km.




[1] Design and Construction Supervision Consultant were recruited and mobilized in August 2019 under the ADB Loan 3700-PAK (2019).

## Table 3-1: List of Candidate Sub-projects

| Sr. No, | Name Sub-projects | Total Estimated Cost (Million $) | AREA UNDER SUB-PROJECT (hectares) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | New Irrigated Command Area | Improved Irrigated Command Area | Total Command Area | Watershed & Groundwater Recharge | Khushkaba Farming Area | Total |
| **1** | **Ahmedzai PIS + FIS** | **2.16** | **180** | **427** | **607** | **52** | **200** | **859** |
| 2 | Muslim Bagh Flood Dispersal | 17.90 | 0 | 1,724 | 1,724 | | | 1,724 |
| ***3*** | ***Siri Toi Dam (Core)*** | ***49.50*** | ***4,027*** | ***0*** | ***4,027*** | ***3,750*** | ***361*** | ***8,138*** |
| 4 | Killi Sardar Akhter PIS | 0.90 | 0 | 230 | 230 | 22 | 0 | 252 |
| 5 | Farmers Managed PIS/FIS Scheme | | | | | | | |
| **SUBTOTAL ZHOB RIVER BASIN** | | **72.53** | **4,207** | **4,091** | **8,298** | **4,091** | **561** | **12,683** |
| 1 | Churri Infiltration Gallery | 2.91 | 685 | 115 | 800 | 8 | 350 | 1,158 |
| 2 | Pashta Khan & Garambowad PIS | 4.43 | 377 | 456 | 833 | 6 | 50 | 889 |
| ***3*** | ***Karkh Valley Development Scheme (Core)*** | ***6.73*** | ***250*** | ***2,000*** | ***2,250*** | ***210*** | ***75*** | ***2,535*** |
| ***4*** | ***Kharzan Hatachi Infiltration Gallery (Core)*** | ***6.05*** | ***106*** | ***575*** | ***681*** | ***85*** | ***378*** | ***1,144*** |
| 5 | Manyalo, Raiko & Rind Ali PIS | 6.28 | 364 | 314 | 678 | 13 | 425 | 1,116 |
| 6 | Farmers Managed PIS/FIS Scheme | | | | | | | |
| **SUBTOTAL MULA RIVER BASIN** | | **29.08** | **1,782** | **5,673** | **7,492** | **321** | **1,278** | **9,054** |
| **TOTAL** | | **101.61** | **5,989** | **9,764** | **15,753** | **4,145** | **1,839** | **21,737** |

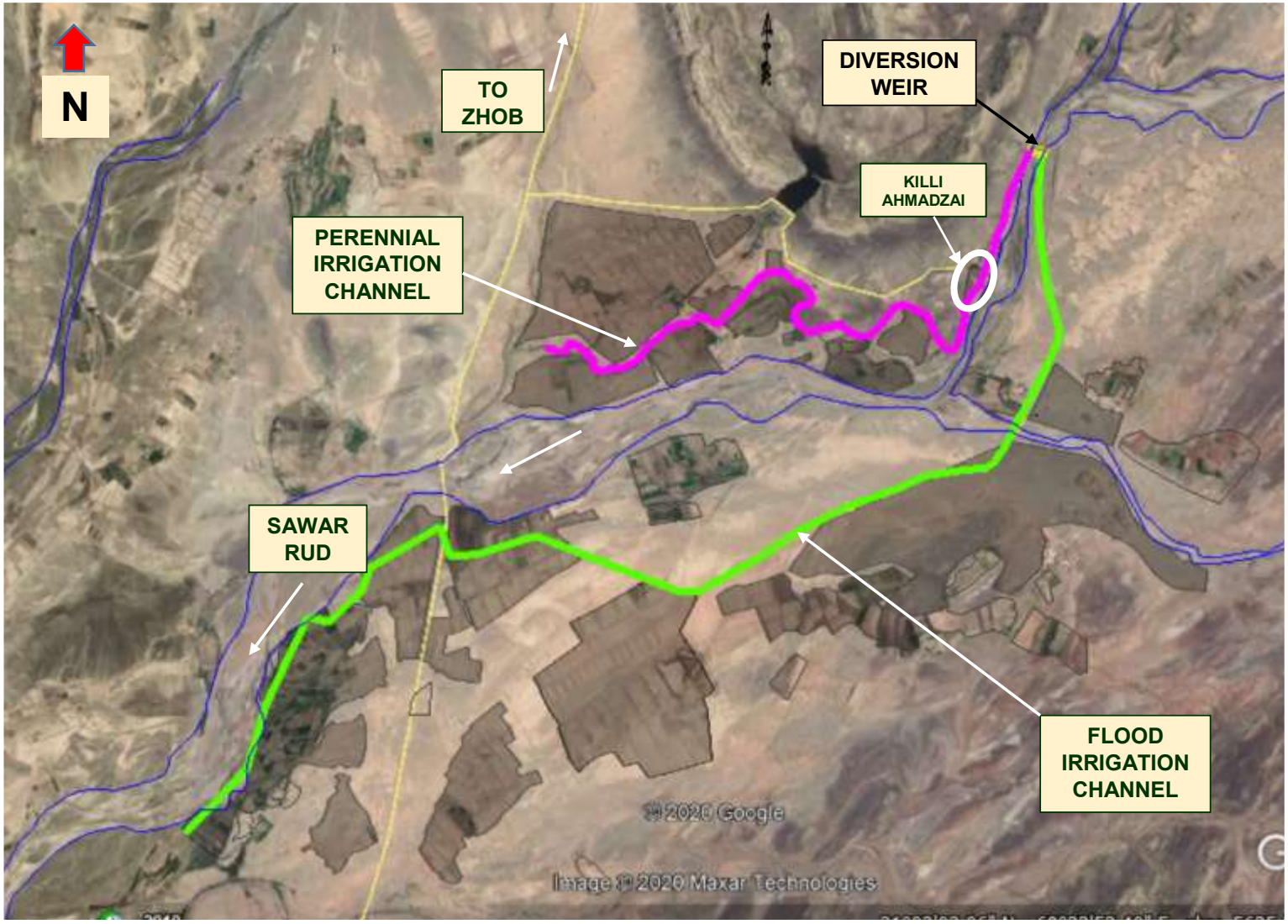



**Figure 3-1: Layout of the Sub-project**

## 3.3 COMPONENTS OF THE PROJECTAND SCOPE OF WORK

109. Main components of the sub-project include; (i) a weir structure on the Saward Rud (river) with an irrigation outlet for Perennial channel on the right side and a head regulator for Flood channel on the left side;(ii) a 3.5 km long Perennial Irrigation channel to irrigate 208 ha of command area on right bank (iii) a 7.5km long Flood Irrigation Channel to irrigate 404 ha of land by Sailaba irrigation on the left bank of the river. Ceasing this opportunity, the proposal includes extension of weir and expansion of service area.

110. The scope of work for the subproject include remodelling of the existing Ahmadzai weir along with the rehabilitation and partial lining of perennial and flood channels and associated structures. Details of scope of work for the sub-project are presented in Table 3-2 below:

**Table 3-2 : Scope of Work for Ahmadzai PIS+FIS sub-project**

| Sr. No. | Proposed Wroks | Details |
|---|---|---|
| 1 | Type of Structure | Rehabilitation of Weir and Channels |
| 2 | Main Weir Length (m) | 67 (Clear water Way width) |
| 3 | Under sluice Width (m) | 3 |
| 4 | Flood head Regulator Width (m) | 6 |
| 5 | Perennial Channel Head Regulator Width (m) | 0.55 x 0.70 |
| 6 | Upstream L/S Guide Bunds Restoration (m) | 345 |
| 7 | Upstream R/S Guide Bunds (m) | 45 |
| 8 | Downstream R/S Guide Bunds (m) | 88 |
| 9 | Aqueduct Twin Trough Length (m) | 87 |
| 10 | Aqueduct single Trough Length (m) | 40.5 |
| 11 | Lined Channel Length (m) | 3,220 |
| 12 | Unlined Channel (m) | 7,320 |
| 13 | Washing Structure (Number) | 1 |
| 14 | Animal Drinking Structure (Number) | 1 |
| 15 | Wuzu Structure (Number) | 1 |
| 16 | Time Division Structures (Number) | 10 |
| 17 | Direct Outlet (Number) | 14 |
| 18 | Super-Passage Nos | 09 |

### Weir

111. A new weir shall be constructed on right side of the existing weir to increase the discharge passage capacity and to reduce HFL. The new weir is proposed in the eroded part of the nullah bed alongside right abutment of the existing weir. Bedrock is exposed in the nullah on which foundation of the new weir would be placed. Summary of design calculations parameters of new designed weir are given in Table 3-3 below. Typical plan and sections of the existing and new weir are shown in Figure 3-2 and Figure 3-3.

**Table 3-3: Weir Design Parameters**

| No. | Description of Design Parameters | Existing Weir | New Weir |
|---|---|---|---|
| 1 | Weir Crest Length (m) | 50.0 | 20.0 |
| 2 | Crest Width (m) | 2.5 | 2.5 |
| 3 | Main Weir Crest Elevation (amsl) | 1706.8 | 1706.8 |
| 4 | Undersluice Crest Elevation (amsl) | - | 1705.8 |
| 5 | Undersluice Gate Top Elevation (amsl) | - | 1706.8 |

| No. | Description of Design Parameters | Existing Weir | New Weir |
|---|---|---|---|
| 6 | Undersluice Gate Size (HxW) m | - | 1 x 3 |
| 7 | Design Flood 50 year Return Period ($m^3/s$) | 694.0 | 694.0 |
| 8 | Safety Check Flood 100 year Return Period ($m^3/s$) | 836.0 | 836.0 |
| 9 | Highest Flood Level 50 Year Return Period (amsl) | 1710.07 | 1710.07 |
| 10 | Highest Flood Level 100 Year Return Period (amsl) | 1710.44 | 1710.44 |
| 11 | Side Wall Top Elevation (amsl) | 1711.20 | 1711.20 |
| 12 | Stilling Basin Length (m) | 20 | 23 |
| 13 | Stilling Basin Width (m) | 50 | 20 |
| 14 | Stilling Basin Elevation (amsl) | 1703.1 | 1703.1 |
| 15 | End Sill Elevation (amsl) | 1704.69 | 1704.69 |
| 16 | Tail Water Elevation (amsl) | 1707.50 | 1707.50 |
| 17 | Upstream Cutoff Depth (m) | 1.5 | 1.5 |
| 18 | Downstream Cutoff Depth (m) | 5.94 | 5.94 |
| 19 | Downstream Stone Apron Length (m) | 7 | 7 |
| | **Flood Irrigation System (FIS)** | | |
| 20 | No of Offtakes (L) | 1 | - |
| 21 | FIS Channel Crest Elevation (amsl) | 1705.14 | - |
| 22 | FIS Channel Width (m) | 6.5 | - |
| 23 | No. of Bays | 2 | - |
| 24 | Bay Width (m) | 3 | - |
| 25 | Breast Wall Bottom Elevation (amsl) | 1706.47 | - |
| | **Perennial Irrigation System (PIS)** | | |
| 26 | No of Offtakes (R) | - | 1 |
| 26 | Gate Bottom Elevation (amsl) | - | 1706.05 |
| 27 | Gate Size | - | 0.55 x 0.70 |

**Structural Elements of The Weir**

112. Existing chute blocks at the existing weir are to be retained for energy dissipation and at the end of stilling basin, end sill is provided for safe energy dissipation. In order to reduce cost, the new proposed weir section and existing as well as new proposed stilling basins are proposed of gabion mattress with 0.5m reinforced concrete layer at the top. The concrete layer is to provide a stable/durable surface for energy dissipation and to seal the voids of the underlying gabion mattress.

113. Floor thickness of the weir at chute, toe of glacis and stilling basin locations is computed from Khosla's Theory of Independent Variables to provide adequate weight to withstand the uplift pressures. A filter layer will be provide under the gabion mattress to avoid the movement of fine particles which may result in cavity formation under the floor and cause structural settlement/failure.

114. Reinforced concrete cut off has been provided on the up-stream and down-stream ends of the structure to provide safety against undermining of the structure due to scour and to increase the seepage path to reduce uplift pressures and control exit gradient. The depth of cut off has been calculated with Lacey scour depth formula.

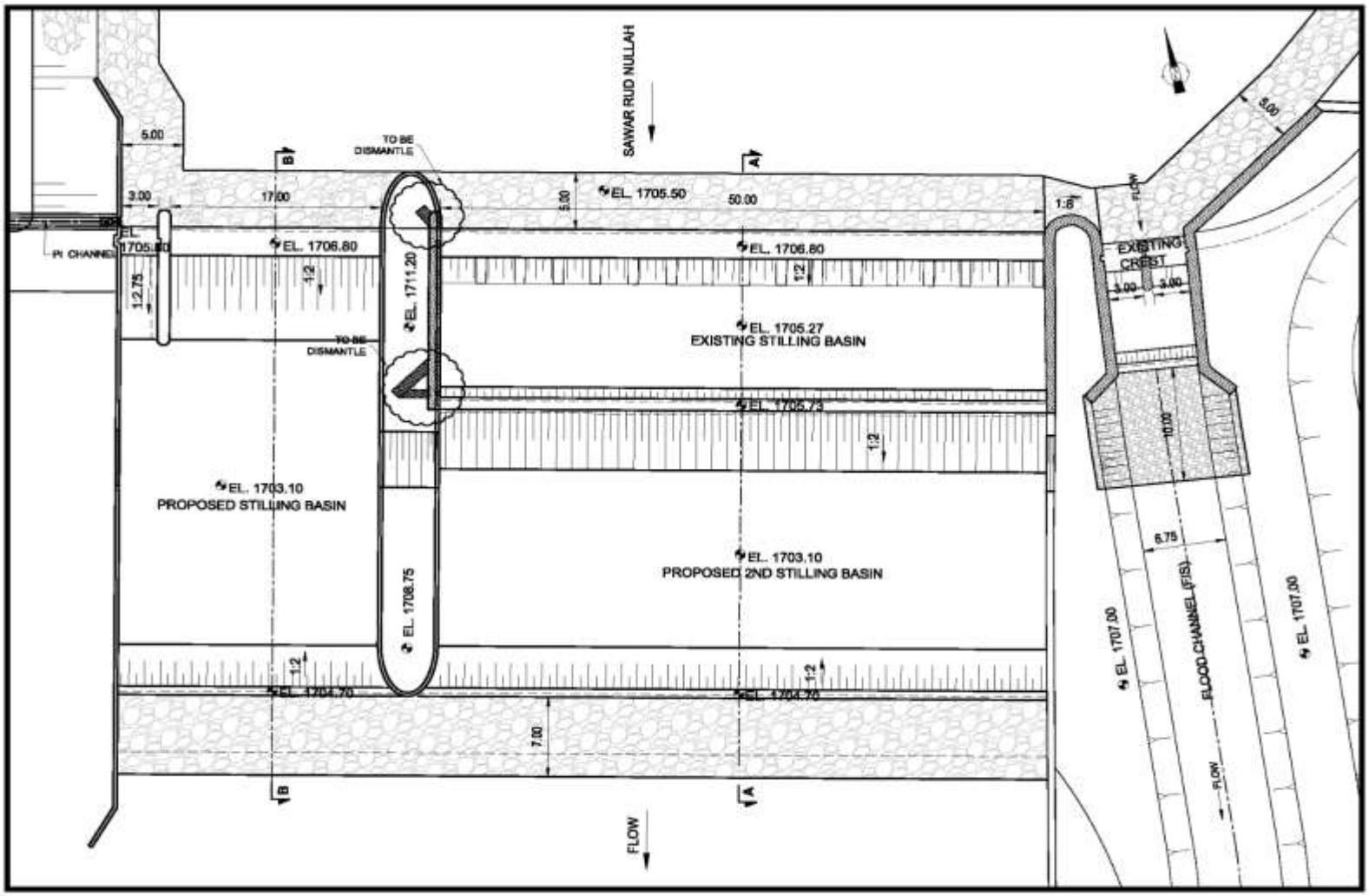



**Figure 3-2: Plan of the Ahmadzai Weir (New+Upgraded)**

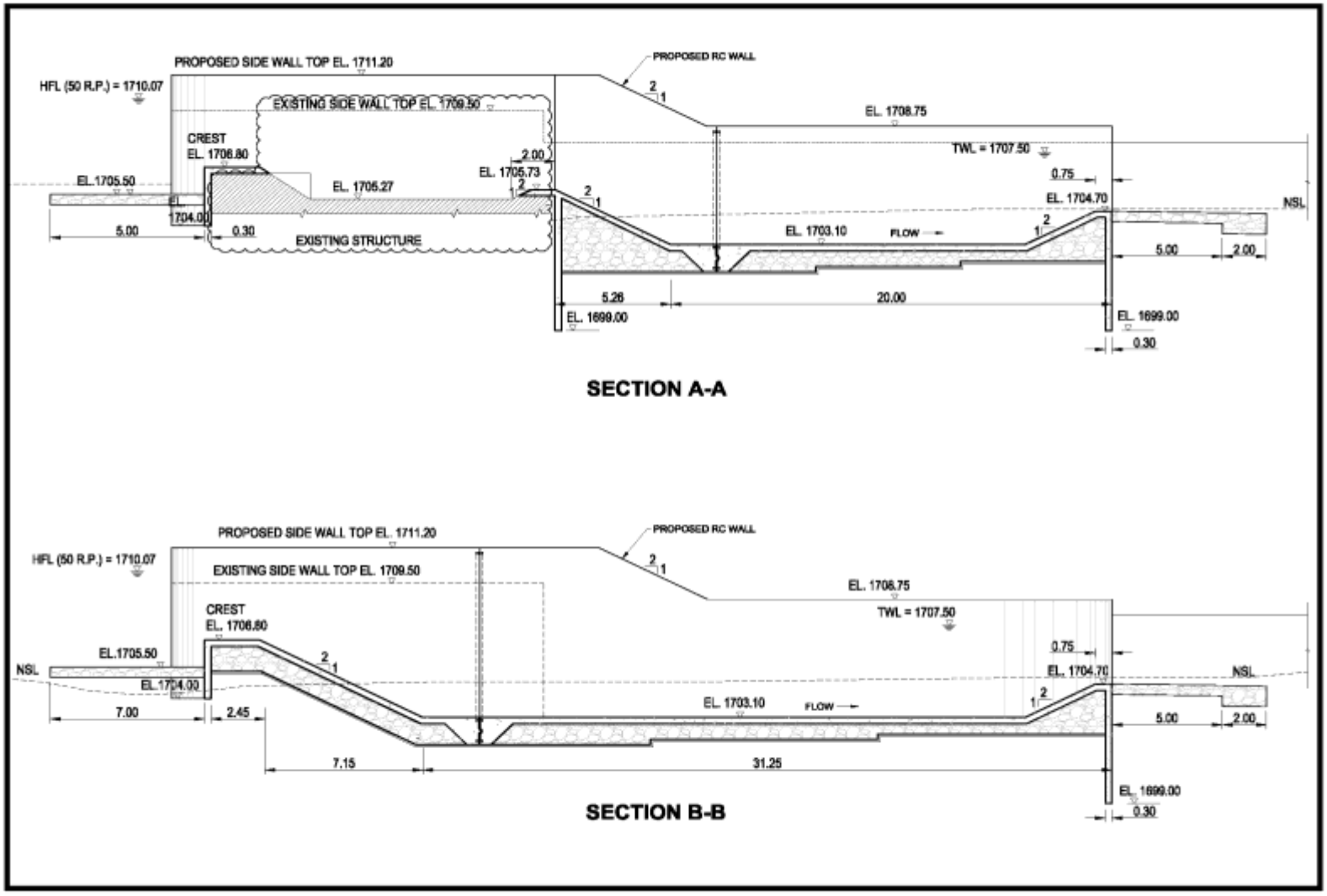



**Figure 3-3: Sections of the Weir**

### 3.3.1 IRRIGATION SYSTEM

115. The irrigation system of Ahmedzai sub-project comprises two canals—one each offtakes from right and left bank. The right bank canal (RBC) serves 202 ha land through perennial irrigation supplies. The left bank canal (LBC) irrigates 404 ha land is envisaged to be operational when surplus irrigation supplies are available during floods. A two-prong approach was used including (i) assessment of current situation and need to change the existing situation (ii) improvement in design to ensure safety and reliability of the irrigation supply system.

### 3.3.2 Right Bank Perennial Lined Channel

116. A rectangular cross section with plain concrete bed and stone masonry side walls is adopted for perennial right-side channel. A composite roughness coefficient of 0.02 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 PIS canal are given in Table 3-4.

**Table 3-4 Design Parameters of PIS**

| RD (Km) | Discharge ($m^3/s$) | Manning "n" | Bed Slope m/m | Bed Width (m) | Flow Depth (m) | Velocity (m/s) | Free Board (m) |
|---|---|---|---|---|---|---|---|
| 000 to 0+700 | 0.160 | 0.020 | 0.0024 | 0.75 | 0.30 | 0.73 | 0.25 |
| 0+700 to 1+300 | 0.160 | 0.020 | 0.0014 | 0.75 | 0.36 | 0.60 | 0.25 |
| 1+300 to 1+500 | 0.160 | 0.020 | 0.0010 | 0.75 | 0.41 | 0.53 | 0.25 |
| 1+500 to 2+650 | 0.160 | 0.020 | 0.0011 | 0.75 | 0.39 | 0.55 | 0.25 |
| 2+650 to 3+220 | 0.160 | 0.020 | 0.0013 | 0.75 | 0.37 | 0.59 | 0.25 |

### 3.3.3 Left Side Flood Channel

117. The channel cross section adopted for a design discharge is the one that has adequate capacity for minimum cost of construction and maintenance. The economics must include the right of way and inline structures across the channel. Generally, a trapezoidal cross section is least costly in rural areas where space is available for placement of the canal.

118. A roughness coefficient of 0.025 has been adopted for LSC (earthen canal) considering local material of channel alignment and also as per design criteria. Flood flows are only diverted during flood in river, channel section has been designed to carry maximum discharge during floods. Velocities in flood channel are accepted normally higher than normal earthen channel design within acceptable range. For design of the channel cross section and longitudinal profile, bed slope has been taken as average natural ground slope. In subsequent estimates, bed slope was adjusted such that average flow velocity for earthen canal section was within recommended limits and adopted slope resulted in minimum possible cut and fill volumes and maximum area that can be commanded. The maximum and minimum velocities adopted are 1.38 m/sec and 2.63 m/sec respectively. Summary of design parameters of FIS is given in Table 3-5.

**Table 3-5 Design Parameters of FIS**

| RD (Km) | Discharge ($m^3/s$) | Manning "n" | Bed Slope m/m | Bed Width (m) | Flow Depth (m) | Velocity (m/s) | Free Board (m) |
|---|---|---|---|---|---|---|---|
| 000 to 1+000 | 14.15 | 0.025 | 0.0016 | 6.75 | 1.10 | 1.40 | 0.75 |
| 1+000 to 1+500 | 14.15 | 0.025 | 0.0012 | 6.75 | 1.20 | 1.30 | 0.75 |
| 1+500 to 2+500 | 14.15 | 0.025 | 0.0015 | 6.75 | 1.20 | 1.40 | 0.75 |
| 2+500 to 4+150 | 14.15 | 0.025 | 0.0079 | 6.75 | 0.70 | 2.50 | 0.75 |
| 4+150 to 4+510 | 10.50 | 0.025 | 0.0085 | 5.00 | 0.70 | 2.40 | 0.75 |
| 4+510 to 5+200 | 10.50 | 0.025 | 0.0035 | 5.00 | 0.90 | 1.80 | 0.75 |
| 5+200 to 6+100 | 10.50 | 0.025 | 0.0090 | 5.00 | 0.70 | 2.50 | 0.75 |
| 6+100 to 7+320 | 7.00 | 0.025 | 0.0055 | 4.50 | 0.60 | 1.90 | 0.75 |

### 3.3.4 Canal Structures

119. The flood channel sections were designed for gradually reducing design flow at each off- take. A number of structures are proposed across each canal including aqueducts, road crossings, supper passages and off-takes. Community structures are also proposed along perennial channel for use of water by the local population, these include washing, wuzu and animal drinking structures.

Flow Distribution Structures

120. 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 are finalized after extensive discussions with farmers.

Time Division Structures/ Nuccas

121. Time division structures have been provided to divert the flow from main channel to secondary canal (water course). The structure comprises stone masonry walls with concrete floor and gated openings to feed flow form 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.

122. Time division structures has been provided on perennial channel as per existing locations and as requirement of FO during walk-trough survey. Time division structures have been proposed at ten locations along the canal length.

123. Simple nucca/ cut is provided in flood channel embankment with stone protection upstream and downstream. Fourteen outlets have been provided in flood channel. Detailed drawings are given in Volume II-Drawings of Feasibility Study.

Aqueducts

124. An aqueduct is a cross-drainage structure provided to cross a nullah/ river when the bed level of the canal is clearly above the highest water level expected in the nullah/ river. At several locations, canals, cross natural streams where, aqueducts are provided. An aqueduct is provided where the soffit level of the aqueduct is above the highest flood level of selected return period flood in the natural stream with adequate freeboard.

125. Tail reach of right bank perennial canal has been re-aligned to command the higher-level area which cross the seepage channel of an existing small dam constructed by the

Zhob Irrigation Division about 1000 m west of Kili Ahmadzai. A single trough aqueduct has been provided to cross this existing stream.

126. Left bank flood channel as mentioned in sections follow the existing alignment. Two aqueducts exist along its alignment one to cross a surface runoff and other for river flow crossing. First aqueduct for crossing surface runoff channel was badly damaged and will be replaced with new structure and additional length will be provided to cover the water way width.

127. Second aqueduct which is provided to cross the river was also damaged. The trough of this aqueduct is damaged due to encroachment by local farmers into four right side bays out of the total nine bays by constructing gabion wall along the stream to developed an orchard. Stream width at aqueduct location has been reduced by this encroachment and consequently water levels in the nallah rise during floods which have washed out two bays of the aqueduct. Piers of the aqueduct are in good condition and to be retained with some rehabilitation/repair. Blockage are required to be removed for design flood pass under the aqueduct. Client is requested to resolve this administrative issue either by removing this encroachment to clear the water way or provide additional land on left bank of nullah to get the required nullah width restored for future reliability of the structure

128. The proposed aqueduct is rectangular in section (single & double trough). The size of aqueducts is adjusted according to incoming flow of the canal. It will allow transverse river flow to pass under it with adequate freeboard and without affecting canal.

Super passages

129. Super passages are provided where channel is in cut and drainage flow is to pass over the channel. Super passages are provided on perennial channel only where the canal is passing around a steep hillside and nullah have to pass over the channel. The alignment of the wing walls and embankment length is determined as per site condition. Upstream and downstream bed protection are provided to ensure that the structure is not undermined by local scour.

130. Sixteen super passage have been provided on lined perennial channel at locations where a nullah is crossing or sheet flow is passing over the channel.

Social Structures

131. It is important to take care of the requirements of the local population along the alignment of irrigation channel. In this regard social structures are provided after discussions with the local farmers. Farmers are the users of irrigation water and their views are to be incorporated into the design of the irrigation system. During walk through survey with community (FO) social structures location were selected as per their requirements. Washing structure, animal drinking trough and wuzu structures are provided as per their requirement at appropriate locations.

### 3.3.5 Proposed Mechanical Works

132. All existing gates installed at outlets flood irrigation channel and perennial irrigation channel shall be rehabilitated/upgraded along with the hoisting system. An additional gate will be installed at the newly proposed under sluice bay used for flushing sediments. The

international recommended standards and guidelines for the gate design include Design of Hydraulic Gates, 2nd Edition by Paulo C.F Erbisti, Technical Specifications for Gates and Penstocks (TSGP) and U.S. Army Corps of Engineers and U.S. Bureau of Reclamation). Gates equipment complete in all respect such as embedded parts. worm gear / screw type hoisting system, hoisting deck / platform for the operator shall be provided to facilitate the gate operation mechanism.

## 3.4 MAJOR QUANTITIES OF WORKS

133. Quantities of various items of works for the construction of Ahmadzai PIS+FIS sub-project will be worked out from drawings prepared based at detailed design stage. Major dimensions and parameters of works are summarized in Table 3-6.

**Table 3-6 Dimensions/Parameter of Works**

| No. | Project Components | Unit | Dimensions/Parameters |
|---|---|---|---|
| 1a | Rehabilitation of weir and silting basin | m | 50 |
| 1b | Construction of new weir and silting basin | m | 20 |
| 2a | Rehabilitation of Weir abutment wall | m | 40 |
| 2b | Construction of new Weir abutment wall | m | 161 |
| 3 | Head regulator | Nos. | 2 |
| 4 | Mechanical works | Nos. | 3 gates |
| 5 | Lined Channel | m | 3,220 |
| 6 | Earthen channel | m | 7,325 |
| 7 | Aqueduct | m | 128 |
| 8 | Super Passage | Nos. | 09 |
| 9 | Road culvert | Nos. | 1 |
| 10 | Irrigation Outlets | Nos. | 14 |
| 11 | Animal Drinking structure | Nos. | 1 |
| 12a | Washing Structure | Nos. | 1 |
| 12b | Wuzu Structure | Nos. | 1 |
| 13 | Bund and river training works | m | 470 |
| 14 | Time division structure | Nos. | 10 |

134. It is estimated that above work can be completed within 24 months from the start of construction work.

## 3.5 CONSTRUCTION SCHEDULE

135. The non-core sub-project Works are divided into the following two main activities.

**Activity – 1:** *Preliminary works* which include improvement of existing access road to project site, construction of offices, material testing laboratory, mobilization of construction equipment, etc.

**Activity – 2:** *Construction/Rehabilitation of weir & irrigation channels* which includes: rehabilitation of weir and stilling basin, rehabilitation of two irrigation channels, stone masonry, weir abutment walls, head regulators, aqueduct, road culvert, super passage, washing and animal drawing drinking structures, bunds, inspection paths along channel, cross drainage structures along channel length.

## 3.6 PROPOSED CONSTRUCTION SCHEDULE

136. 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.

**Rehabilitation of Weir & associated Structures:**

137. The meteorological and river flow data showed that best suited period for construction of major civil works is from September to end 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 each year. The project contract has been awarded to the contractor in the fourth quarter of 2020.

138. Main factors which affect construction program are planning for material utilization (including procurement and transportation of material from other cities to project site). In view of work load involved in rehabilitation of weirs and construction of weir abutment wall, head regulator, stilling basin, mechanical works and rip rap etc., 10 months have been proposed for completion (beyond preliminary works) involving one main flood period/season.

139. The work on construction of main canal, earthen channel, aqueduct, road culvert, super passage, animal drinking structure, washing structure, protection bund and river training works will be completed in year – 2 of construction.

140. It is important that main canal structures and miscellaneous works are also completed along with construction of weir structure. These works can be taken up in construction year -1 and completed in the 2nd year. The construction of drainage crossings may take relatively more time than irrigation canals.

## 3.7 CONSTRUCTION EQUIPMENT

141. Table 3-7 shows a tentative list of construction equipment required by the contractor to enable him to undertake this work and meet the prescribed schedule.

**Table 3-7: 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 gallons | 2 |
| 7 | Hydraulic Excavator with 14” wide bucket | 1 |
| 8 | Concrete Batching Mixer | 4 |
| 9 | Concrete Vibrators | 6 |
| 10 | Centrifugal pumps ½ cfs | 2 |
| 11 | Hand compactors | 3 |
| 12 | Diesel generator | 2 |
| 3 | Jeeps | 2 |

# 4. ENVIRONMENTAL AND SOCIAL BASELINE

## 4.1 GENERAL

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

## 4.2 AREA OF INFLUENCE

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

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

## 4.3 PHYSICAL ENVIRONMENT

### 4.3.1 Geography

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

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

147. Zhob district is situated in the extreme north-east of Balochistan province. Afghanistan lies to the north-west, while South Waziristan Agency (FATA) lies to the north of Zhob. The eastern boundary is marked by the Suleiman range and D.I. Khan district,

Sherani District on North-east, Loralai and Musa Khel district border on the south and south west and Killa Saifullah district on the immediate west. Topographically, the district is covered with mountains and hills, which are intersected by broad valleys of Zhob River and its tributaries. The district lies between Toba Kakari Range and Suleman Range extend on Western and Eastern boundaries of the district, respectively. The lowest point of the district is 1500 meters above sea level. People live up to 2500 meters. The highest peak in the district is Takht-i-Suleiman (Solomon's throne) at 4000 meters.

### 4.3.2 Geology

148. Tectonically the sub project site is situated in the vicinity of a number of active faults like Kakar Khorasan fault in the north and the Zhob Valley Thrust in the south. Both these faults are trending northeast-southwest. The area is in the near vicinity of subduction zone of Pakistan- India Plate and Eurasian Plate. Due to continuous subduction activity the rocks have undergone immense folding and faulting. A large number of east-west trending folds, existing in the north of the area have been mapped by GSP (Fig 4.1).

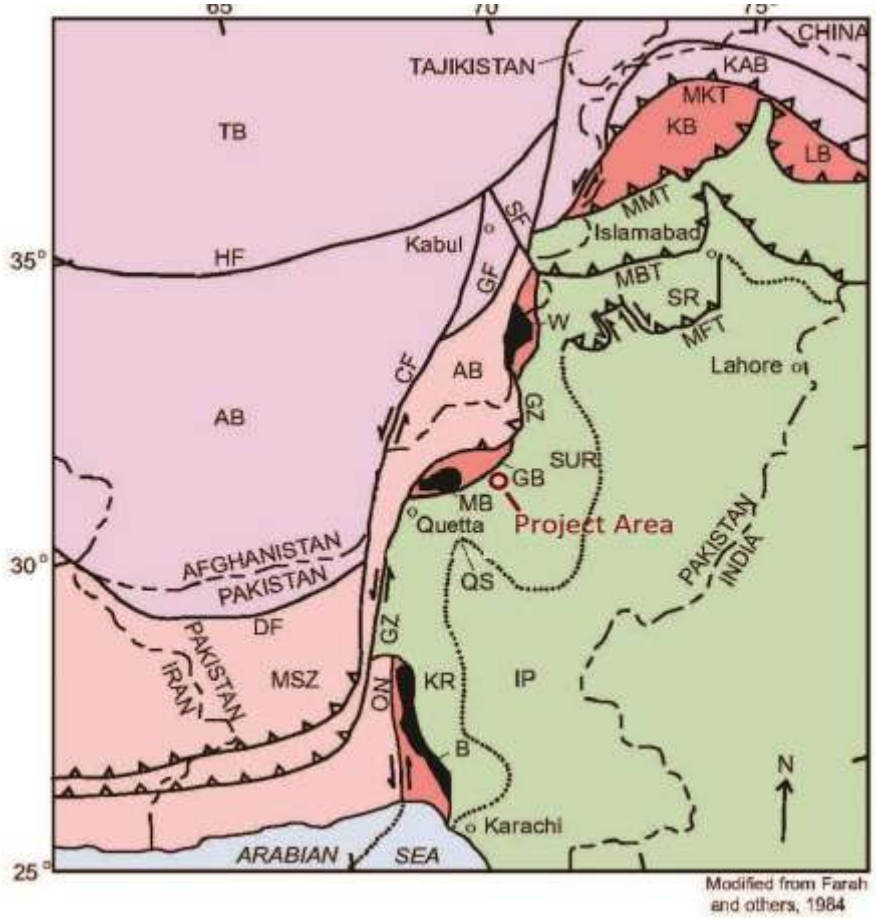



**Figure 4-1 Geological map of the Project area**

### 4.3.3 Weir Site Geology

149. The sub project site is bounded by mountain ranges as Shinkai Ghar in the Noth, Mand Ghar in the South, Nar/Tor Ghar in the East and Rakhpur ghar in the West as shown in the Regional Geological Map prepared by government of Canada for government of Pakistan under Colombo Plan on scale 1:253,440 (Map No 29, FORT SANDEMAN 39 A.E.).

150. The rocks covered under the alluvium at weir site area are mainly cretaceous rocks of sedimentary in nature. Alternate beds of Sandstone, shale, marl and limestone belong to Pab formation and Parh Group. Rocks are dipping in northwest direction at the angle of ˚. 75 ˚- 65 The recent alluvium is present in the river bed and consists of angular to sub-angular, rounded and sub-rounded gravels and boulders with some sand and fine particles (Fig 4.2). The rock outcrop at right abutment was observed. The rocks are exposed on right bank belong to Cretaceous Sandstone of Pab Formation and Parh Group, alternate beds of Limestone, Shale and Marl.

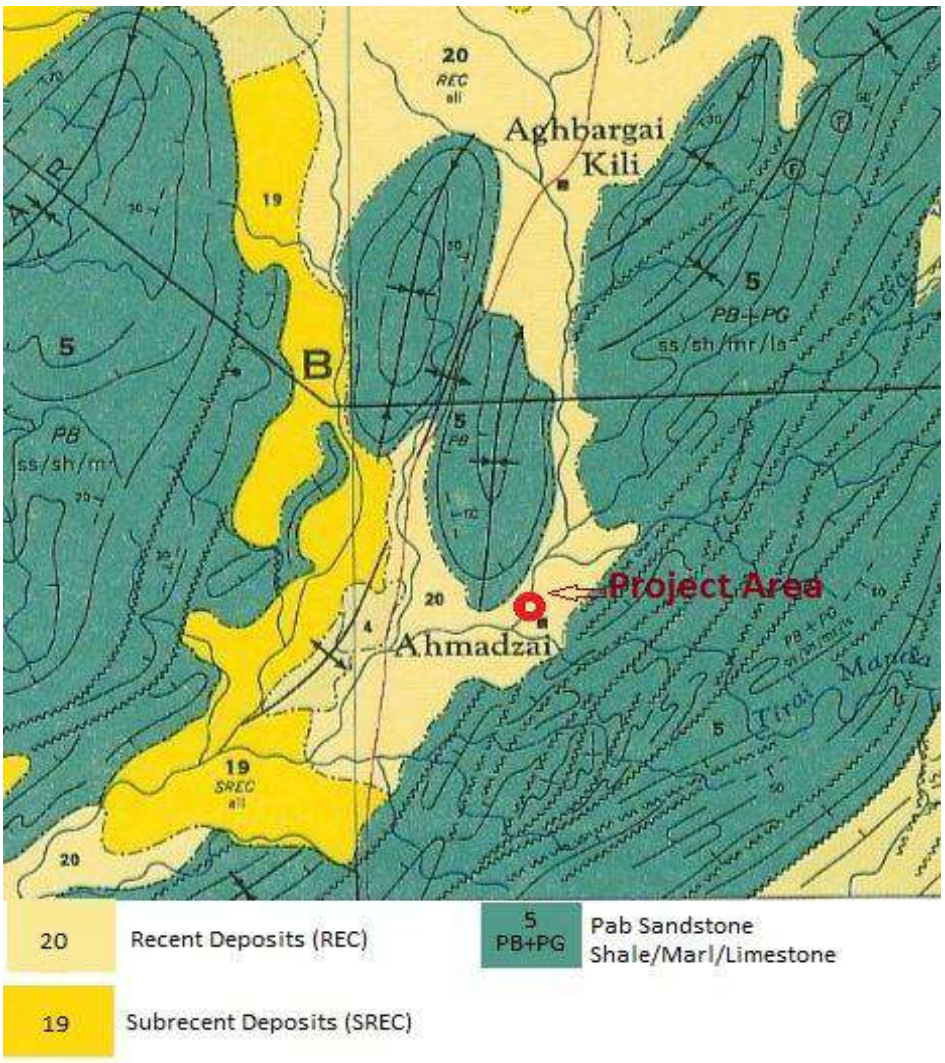



**Figure 4-2 Map of Weir Site Geology**

### 4.3.4 Topography

151. High mountains surround the project area which lies near Killi Ahmadzai. The terrain is generally flat in the sub-project and its command area. It is located in an environment of degraded rangelands. The average altitude of the Ahmadzai PIS+FIS sub-project command area is 1700 m above mean sea level.

### 4.3.5 Seismicity

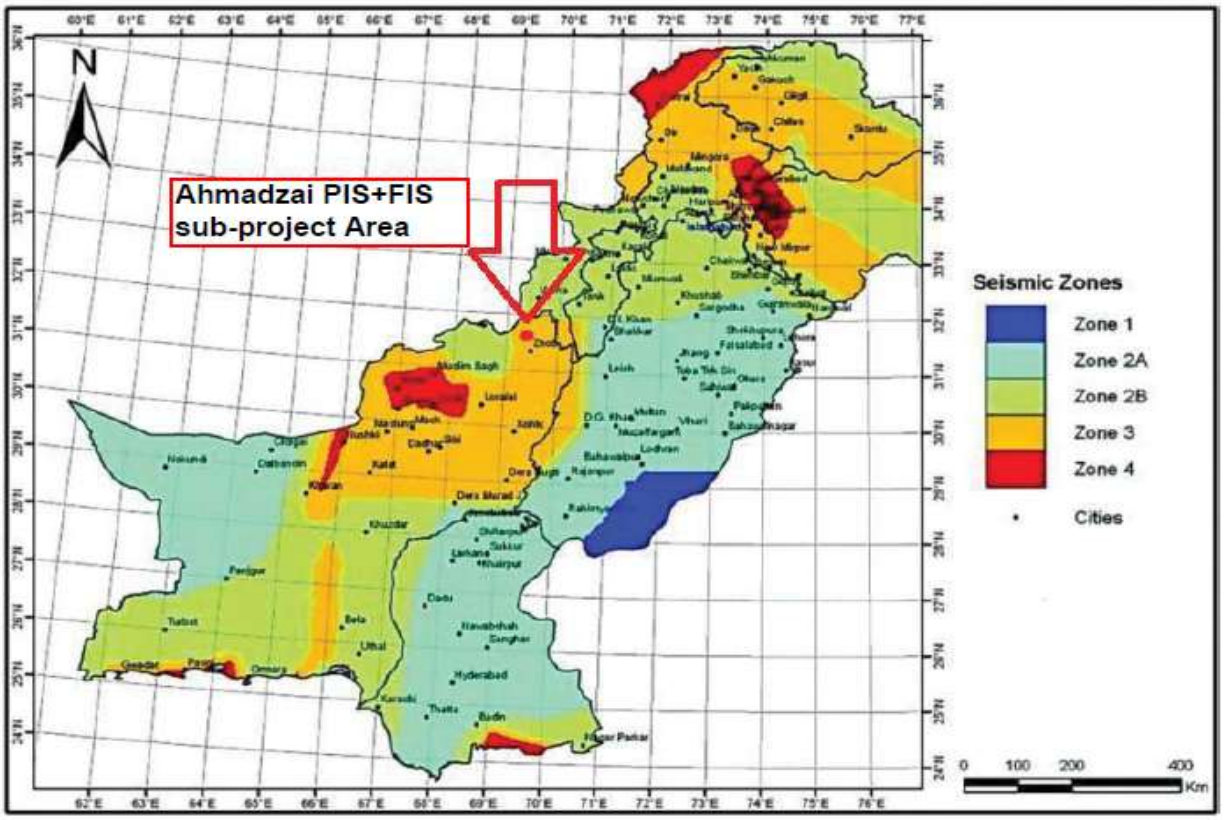
152. The entire province of Balochistan lies in a seismically active region. The province has experienced devastating earthquakes in the past. A powerful earthquake with a magnitude of 7.0 on the Richter scale was recorded on May 31, 1935 and devastated Quetta town and resulting in 35,000 fatalities.

153. Again, on the Nov 28th, 1945, an earthquake measuring 8.6 on the Richter scale hit Balochistan killing almost 4000 people.

154. The seismic zoning map of Pakistan, indicates that the project area lies in the zone 3.

155. This zone is classified as Moderate Damage Risk Zone which is liable to Medvedev–Sponheuer–Karnik scale (MSK) VII and also 7.8 on Modified Mercalli (MM) scale. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence. The updated Seismic Zoning Map of Pakistan is shown below as Figure 4-3.

**Figure 4-3**: **Seismic Zoning Map of Pakistan**




**Climate of The sub-project area**

156. Zhob has a semi-arid climate and its rainfall is just high enough to take it out of the arid climate category found at lower elevations. Unlike most of Balochistan, Zhob does on occasions receive rainfall from the monsoon though this occurs very erratically. The climate of Zhob is very cold in winter as compared to other lower basins of Balochistan. The Ahmadzai weir site located at an elevated south eastern part of the Zhob basin has intense winters with the mercury dropping below zero degrees Celsius (0 ºC). The coldest months are generally December and January while summer in general is warm to hot.

### 4.3.6 Precipitation

157. Mean monthly rainfall data and the number of rainy days recorded at the Zhob Met Station are given in Table 4-3 The average annual rainfall of the area is about 297.3 mm (11.7 inches), while on the average the maximum monthly rainfall is 66.4 mm during the month of July and a minimum of 5.2 mm in October. The maximum rainfall occurs during the months of June to September, which is about 50% of the annual rainfall. Winter rains generally occur during the months of January and February, whereas, October is normally the months with least precipitation. The distribution of average monthly rainfall is given in Table 4-1 and shown graphically in Figure 4-4 below

**Table 4-1: Mean Monthly Rainfall in Zhob**

| Month | Mean Monthly Rainfall (mm) | Rainy Days (No.) |
|---|---|---|
| January | 15.1 | 2.3 |
| February | 27.3 | 2.8 |
| March | 43.5 | 4.9 |
| April | 31.9 | 3.4 |
| May | 17.3 | 2.0 |
| June | 19.8 | 2.8 |
| July | 66.4 | 5.0 |
| August | 44.8 | 3.7 |
| September | 9.0 | 0.9 |
| October | 5.2 | 0.7 |
| November | 5.5 | 0.6 |
| December | 11.4 | 1.0 |
| Annual | 297.2 | 30.1 |

Source (Pakistan Meteorological Department)

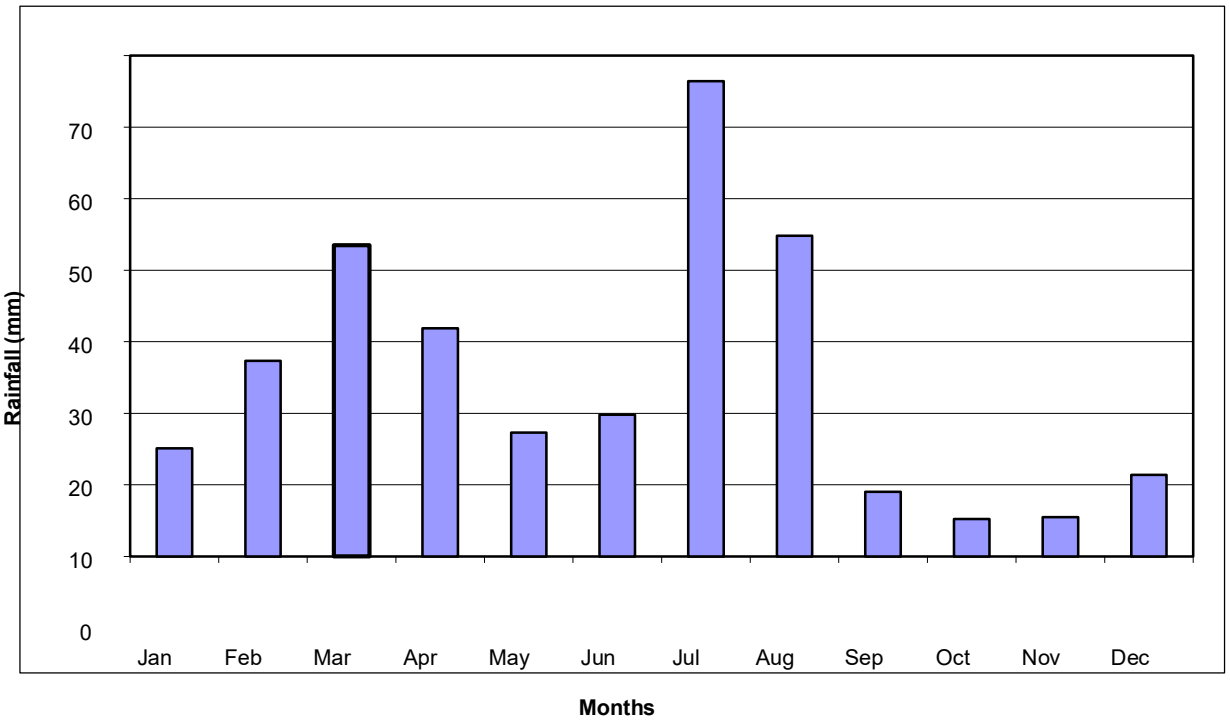



**Figure 4-4: Monthly Distribution of Rainfall at Zhob**

### 4.3.7 Temperature

158. The mean daily temperature ranges from (June being the hottest month) 25.7oC to 29.4oC in the summer season (May to September) and 6.3oC to 9.1oC in winter season

(December to February). Mean monthly temperature in June rises to a highest value of 29.4oC and falls to the lowest value of 6.3oC 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 4-2.

**Table 4-2: Mean Monthly Temperatures in Zhob**

| Month | Temperature (°C) | | |
|---|---|---|---|
| | Min | Max | Mean |
| January | -1.0 | 13.6 | 6.3 |
| February | 1.7 | 15.9 | 8.9 |
| March | 7.2 | 21.2 | 14.2 |
| April | 12.8 | 27.6 | 20.2 |
| May | 18.1 | 33.3 | 25.7 |
| June | 22.0 | 36.8 | 29.4 |
| July | 22.4 | 36.3 | 29.2 |
| August | 21.9 | 35.6 | 28.3 |
| September | 18.6 | 33.5 | 26.0 |
| October | 11.8 | 28.2 | 19.8 |
| November | 5.4 | 22.7 | 13.9 |
| December | 0.5 | 16.5 | 9.1 |

Source (Pakistan Meteorological Department)

### 4.3.8 Relative Humidity

159. 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 3.3. At 00:00 hr the relative humidity varies from lowest value of 45.4% in May to highest value of 69.4% in August. At 12:00 hr the lowest value is 16.5 % in May to highest value of 33.7 % in January as given in Table 4-3.

**Table 4-3: Mean Monthly Relative Humidity in Zhob**

| Month | Relative Humidity (%) | | |
|---|---|---|---|
| | 00:00 hr | 03:00 hr | 12:00 hr |
| January | 67.4 | 62.3 | 33.7 |
| February | 64.7 | 59.6 | 31.4 |
| March | 64.7 | 55.8 | 28.1 |
| April | 53.7 | 44.4 | 21.6 |
| May | 45.4 | 34.1 | 16.5 |
| June | 47.3 | 37.4 | 18.4 |
| July | 64.7 | 54.4 | 29.4 |
| August | 69.4 | 60.6 | 28.0 |
| September | 62.2 | 52.2 | 17.7 |
| October | 52.7 | 41.8 | 16.5 |
| November | 54.9 | 44.9 | 23.9 |
| December | 61.5 | 54.9 | 28.8 |

Source (Pakistan Meteorological Department)

### 4.3.9 Wind Speed

160. The mean monthly wind speed in knots is given in Table 3.4. 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 as given in Table 4-4.

**Table 4-4: Mean Wind Speed at Synoptic Hours in Zhob**

| | Mean Wind at Synoptic Hours (Knots) |
|---|---|

| Month | 00:00 | 03:00 | 12:00 |
|---|---|---|---|
| January | 0.8 | 1.2 | 3.1 |
| February | 0.9 | 1.3 | 4.3 |
| March | 1.3 | 1.7 | 5.4 |
| April | 1.5 | 1.8 | 6.0 |
| May | 1.4 | 1.6 | 6.0 |
| June | 1.3 | 1.5 | 5.9 |
| July | 1.3 | 1.5 | 5.7 |
| August | 1.3 | 1.4 | 5.1 |
| September | 0.9 | 1.4 | 4.0 |
| October | 1.0 | 1.0 | 3.1 |
| November | 0.9 | 1.0 | 2.6 |
| December | 0.9 | 1.1 | 2.6 |

### 4.3.10 Hydrology and Flood assessment

161. The hydrological assessments covered the estimation of water availability and design flood at the weir site. Total catchment area at the weir site is 225 square kilometres. 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 275 mm and rainfall-runoff factor for Zhob and Gomal basins as 0.10-0.12. This worked out average annual runoff volume at Ahmadzai weir site as 6.27 million cubic meter (mcm) which includes 1.76 mcm of perennial flows and 4.51 mcm of flood flows.

162. For estimation of flood flow, one-day annual maximum rainfall data record of Zhob was used for a period from1980 to 2018 (39 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 (given in Table 4-5)

**Table 4-5: Estimated Peak Floods at Ahmadzai Weir**

| Return Period | Estimated Peak Floods | |
|---|---|---|
| (Years) | ($ft^3/s$) | ($m^3/s$) |
| 25 | 19600 | 555 |
| 50 | 24600 | 697 |
| 100 | 29600 | 838 |

### 4.3.11 Ambient Air Quality

163. 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.

164. 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 4-6)

**Table 4-6 Ahmedzai village-Ambient Air Quality**

| Parameters | SPM |
|---|---|
| | µg/m3 |
| **Methodology** | Integrated Sampling Technique |
| **Result (Average)** | 182.4 |
| **NEQS/WHO for Ambient Air** | **500 (24 hour)** |

**Table 4-7 Alizai Village-Ambient Air Quality**

| Parameters | SPM |
|---|---|
| | µg/$m^3$ |
| **Methodology** | Integrated Sampling Technique |
| **Result (Average)** | 190.7 |
| **NEQS/WHO for Ambient Air** | **500 (24 hour)** |

### 4.3.12 Ambient Noise

165. During site visits, noise levels at two locations in the Project area were measured with Digital Sound Level Meter (Table 4-8; Fig 4-5). The noise levels in the project area are way lower than the permissible limits by EPA (Table 4-9). Other than noise generated from some vehicles moving on the main road, no major source of noise is present in the project vicinity. However, Complete Environmental Monitoring Report has been attached as Annex-3

**Table 4-8 Alizai Village-Ambient Noise**

| Date | Time | Noise dB (A) Leq | | | | | | | | | | Average | NEQS/WHO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Mar-20 | Day | 39.5 | 39.4 | 39.7 | 41.0 | 41.3 | 42.4 | 43.7 | 43.4 | 44.2 | 42.8 | 41.7 | 55 (Day time) 45 (Night Time) |

**Figure 4-5 AliZai Village-Ambient Noise**

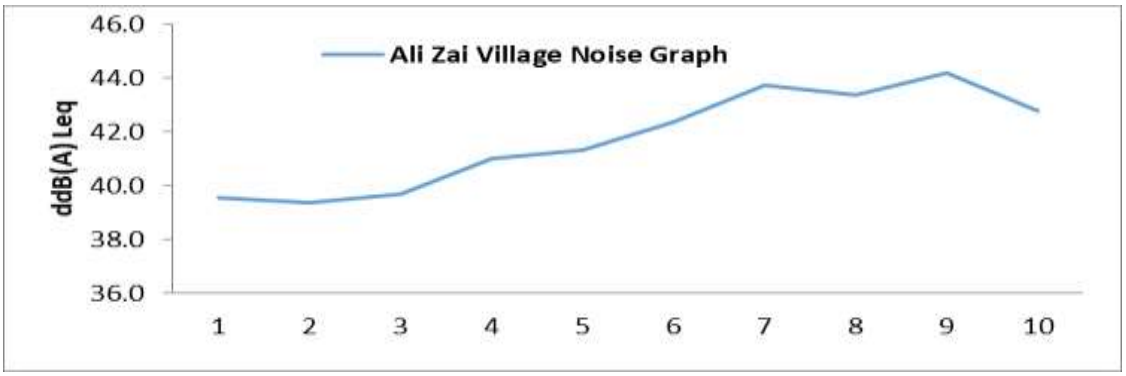
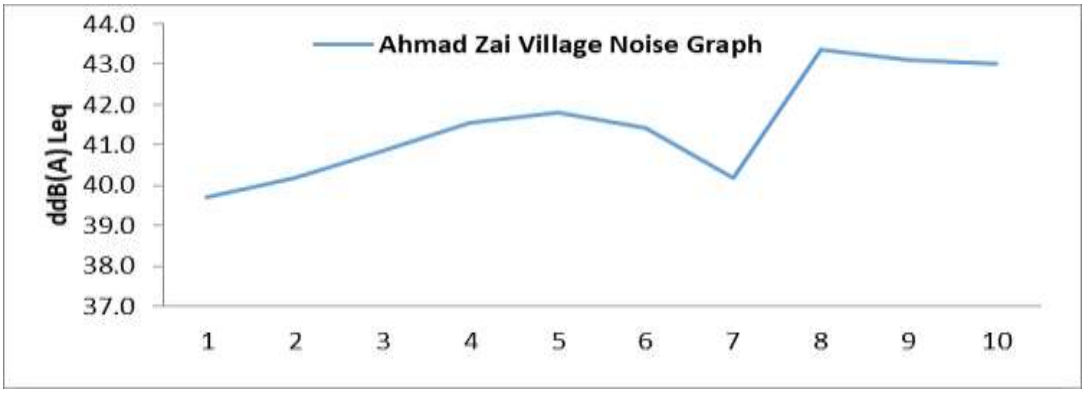


**Table 4-9 Ahmedzai Village-Ambient Noise**

| Date | Time | Noise dB (A) Leq | | | | | | | | | | Average | NEQS/WHO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Mar-20 | Day | 39.7 | 40.2 | 40.9 | 41.5 | 41.2 | 41.4 | 43.0 | 43.4 | 46.0 | 43.0 | 42.0 | 55 (Day time) 45 (Night Time) |




**Graph 4-1 Ahmad Zai village-Ambient Noise**

### 4.3.13 Water Quality

166. Surface water is being used as drinking water throughout the project area. The Sawar Rud a tributary of Zhob River is the major surface of water source of project area. It is perennial and flows throughout the year. No NEQS are set for surface water quality. However, the tested parameters of the surface water of Sawar Rud comply the drinking water National Environmental Quality Standards.

**Table 4-10: Water Quality of the project area**

| Sr. No. | Parameters | Unit | Results | NEQS | WHO |
|---|---|---|---|---|---|
| 1. | pH^ | - | 8.286 | 6.5-8.5 | 6.5-8.5 |
| 2. | Total Dissolved Solids^ | mg/l | 310 | <1000 | <1000 |
| 3. | Turbidity | NTU | 0.77 | <5NTU | <5NTU |
| 4. | Taste | - | Non-Objectionable | Non objectionable/ Acceptable | Non objectionable/ Acceptable |
| 5. | Odor | - | Non-Objectionable | Non objectionable/ Acceptable | Non objectionable/ Acceptable |
| 6. | Total Hardness^ | mg/l | 68 | <500mg/l | --- |
| 7. | Chloride ($Cl^{-1}$)^ | mg/l | 36 | <250 | 250 |
| 8. | Arsenic | mg/l | 0.0049 | ≤0.05 | 0.01 |
| 9. | Cadmium | mg/l | 0.0023 | 0.01 | 0.003 |
| 10. | Sulphate ($SO_4^{-2}$) | mg/l | 29 | | |
| 11. | Copper (Cu) | mg/l | 0.0310 | 2 | 2 |
| 12. | Sodium (Na) | mg/l | 22 | | |
| 13. | Nickle | mg/l | 0.0037 | ≤0.02 | 0.02 |
| 14. | Lead (Pb) | mg/l | BDL | ≤0.05 | 0.01 |

| | | | | | |
|---|---|---|---|---|---|
| 15. | Iron (Fe) | mg/l | 0.0347 | | |
| 16. | Selenium | mg/l | 0.0025 | 0.01 | 0.01 |
| 17. | Nitrite^ | mg/l | 0.0022 | ≤3 | 3 |
| 18. | Nitrate | mg/l | 0.0071 | ≤50 | 50 |
| 19. | Zinc (Zn) | mg/l | 0.0787 | 5.0 | 3 |
| 20. | Boron (B) | mg/l | 0.0233 | 0.3 | 0.3 |
| 21. | Aluminum (Al) | mg/l | 0.0180 | ≤0.2 | 0.2 |
| 22. | Barium (Ba) | mg/l | 0.0192 | 0.7 | 0.7 |
| 23. | Fluoride (F) | mg/l | 0.40 | ≤1.5 | 1.5 |
| 24. | Cyanide (CN) | mg/l | BDL | ≤0.05 | 0.07 |
| 25. | Chromium (Cr) | mg/l | 0.0024 | ≤0.05 | 0.05 |
| 26. | Manganese (Mn) | mg/l | 0.0048 | ≤0.5 | 0.5 |
| 27. | Mercury (Hg) | mg/l | BDL | ≤0.001 | 0.001 |
| 28. | Antimony (Sb) | mg/l | 0.0016 | ≤0.005 | 0.02 |
| 29. | Phenolic Compound (As Phenol) | mg/l | Nil | | 0.002 |

## 4.4 BIOLOGICAL ENVIRONMENT

### 4.4.1 Flora

167. 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 4-11 Major Forest Types in Zhob District**

| # | Taxon | Vernacular/ English name | Family | Life form | Conservation status |
|---|---|---|---|---|---|
| 01 | Pinus gerardiana | Chilgoza Pine | Pinaceae | Tree | Near threaten |
| 02 | Olea ferrugenea | Olive | Oleaceae | Tree | Not assessed |
| 03 | Pistacia khinjik | Shina | Anacaediaceae | Tree | Least concern |
| 04 | Pistachia cabulica | Uzhgai | Anacaediaceae | Tree | Not assessed |
| 05 | Reptonia buxifolia | Gurgura | Sapotaceae | Tree | Not assessed |
| 06 | Fraxinus xanthoxyloides | Shang/ Wild Ash | Oleaceae | Tree | Not assessed |
| 07 | Prunus eburnean. | Wild almond | Rosaceae | Tree | Not assessed |
| 08 | Periploca aphylla | Barara | Ascalpidaceae | Shrub | Not assessed |
| 09 | Prunus creasus | Anang | Rosaceae | Shrub | Not assessed |
| 10 | Scorzonera mollis | Arghuch | Asteraceae | Shrub | Not assessed |
| 11 | Datura fastuosa | Datura | Solanaceae | Shrub | Not assessed |
| 12 | Narium odorum | Gandarae | Apocynaceae | Shrub | Not assessed |
| 13 | Othonnopsis intermedia | Gangu | Asteraceae | Shrub | Not assessed |
| 14 | Sophora grifithii | Ghuzera | Fabaceae | Shrub | Not assessed |
| 15 | Allium sphaerocephalum | Injaora | Alliaceae | Shrub | Not assessed |

| | | | | | |
|---|---|---|---|---|---|
| 16 | Zizyphora clinopolioides | Maurai | | Shrub | |
| 17 | Phragmites communis | Nal | Gramineae | Shrub | Least concern |
| 18 | Withania cougulans | Khamazurgae | Solanaceae | Shrub | Not assessed |
| 19 | Malcolmia africana | Khatol | Brassicaceae | Shrub | Not assessed |
| 20 | Caragana ambigua | Makhi | Fabaceae | Shrub | Not assessed |
| 21 | Eremurus aucheriana | Shezgae | Aspholpdiaceae | Shrub | Not assessed |
| 22 | Plantago ovata | Shkanpara | Plantigenaceae | Shrub | Not assessed |
| 23 | Haloxylon grifithii | Shorae | Amarantheaceae | Shrub | Not assessed |
| 24 | Artimesia meritima | Tarkha | Asteraceae | Shrub | Not assessed |
| 25 | Rhazya stricta | Urgalama | Apocynaceae | Shrub | Not assessed |
| 26 | Achillea santolina | Zawala | Asteraceae | Shrub | Not assessed |
| 27 | Peucedanum sp. | Raghbolae | Apiaceae | Shrub | Not assessed |
| 28 | Panicum colonum | Rakhpatti | Poaceae | Grass | Not assessed |
| 29 | Tullipa stellata | Sanda | Liliaceae | Shrub | Not assessed |
| 30 | Lactuca sp. | Sandreza | Asteraceae | Shrub | Not assessed |
| 31 | Daphne oleoides | Malaghunae | Thymelaeaceae | Shrub | Not assessed |
| 32 | Nannorrhops ritchiana | Mazari | Arecaceae | Shrub | Not assessed |
| 33 | Dodonea viscose | Sanatha | Sapindaceae | Herb | Not assessed |
| 34 | Chrysopogon aucheri, | | Poaceae | Grass | Not assessed |
| 35 | Sorghum halepense | Barau | Poaceae | Grass | Introduced |
| 36 | Heteropogon contortus | Barwaza | Poaceae | Grass | Not assessed |
| 37 | Poa bulbosa | Margha | Poaceae | Grass | Not assessed |
| 38 | Typha angustifolia | Lukha | Typhaceae | Shrub | Not assessed |

— ***Topographic distribution of vegetation***

168. Vegetation zones of the district consist mainly of the following categories (Table 4-13):

**Table 4-12 Vegetation Zones of Zhob District**

| Vegetation Zone | Floristic composition |
|---|---|
| Hills | Olive (Olea ferrugenea), Blue pine (Pinus gerardiana), Shina (Pistacia khinjik), Uzhgai (Pistachia cabulica), Gurgura (Reptonia buxifolia), Shang/ Wild Ash (Fraxinus xanthoxyloides), Wild almond (Prunus eburnean), etc. |
| Foothills | Olive (Olea ferrugenea), Phulai (Acacia modesta), Sanatha (Dodonea viscose), Gymnosporia spinosa, Ber (Zizyphus nummularia), Khamazurgae (Withania cougulans), Khatol (Malcolmia africana), Makhi (Caragana ambigua), Shezgae |

| | |
|---|---|
| | (Eremurus aucheriana), shkanpara (Plantago ovata), Shorae (Haloxylon grifithii), Tarkha (Artimesia meritima), Urgalama (Rhzya stricta), Zawala (Achillea santolina), Pamangi (Bouce rosia aucheriana), Raghbolae ( Peucedanum sp.), Rakhpatti(Panicum colonum), Sanda (Tillipa stellata), Sandreza, (Lactuca sp.), Malaghunae (Daphne oleoides), and Mazari (Nannorrhops ritchiana). |
| Plains and Stream beds | Commonly found in the entire district where Tamarix sp. And Saccharam sp. are commonly found. |

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

***Rangelands***

169. The type of rangeland present in the district is classified as Suleiman Mountain Ranges. It has species like: Stipa pennata, Pennisetum orientalis, Chrysopogon aucheri, and Cymbopogon sp. etc. The productivity is good with average productive capacity of 250 kg /hectare. The angelands in the district belong to communities living around them. Due to communal ownership, usually these are accessible to all members of the community and also to nomads passing through the area on their traditional routes of migration to new areas.

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

### 4.4.2 Fauna

171. **Mammals:** Fox *(Vulpes cana),* Asiatic Jackal *(Canis aureus),* Cape hare (*Lepus capensis*), Porcupine *(Hystrix indica),* Afghan Hedgehog *(Hemiechinus auritus megalotis),* etc

172. **Birds:** Chukar *(Alectoris chukar),* See see partridge *(Ammoperdix griseogularis),* Magpie *(Pica pica),* a number of sparrows, Finches, buntings, seasonal/migratory waterfowls, hawks, and sand grouse etc.

173. **Reptiles:** Afghan Tortoise *(Agrionemys horsfieldii),* Brown Cobra *(Naja oxiana),* Goh *(Varanus griseus),* etc.

174. **Amphibians**: Amphibians found in the tract include common frog (Rana tigrina and common toad (Bufo bufo).

## 4.5 SOCIO-ECONOMIC BASELINE STRUCTURE

**Project Area**

175. Proposed project area mainly falls in following rural settlement.

- Ahmadzai
- Alizai Killi

176. The main tribe living in these villages is Kakar. Pushto is the main language spoken by the local residents. Only a small number of people can speak and understand Urdu. Access road is two km away from the village so people face problems for movement. No basic facilities i.e. water supply, access road, medical and educational facility are available in the project rea Only a boy's primary school exists which can't fulfil the educational needs of the area. mostly people are engaged in agriculture and daily wage labor for livelihood.

**Socioeconomic Baseline Survey**

177. The information regarding socioeconomic baseline survey is based on the primary data collected from the settlements existing along the proposed project area. Baseline survey is carried out at Ahmadzai and Alizai Killi villages, either to identify the situation analysis of socioeconomic conditions or to collect information about settlements.

178. A site visit of the proposed project was carried out from March 09, 2020 to March 14, 2020. A sample of available 17 respondents was selected because majority of the male population is out of the village for livelihood of their families. Respondents included local residents, private land owners, shop keepers, farmers, job holders (Govt / pvt), drivers, daily wage labor and students. Efforts were made to include the different types of stakeholders according to their stakes in the sample and contact the maximum population during the survey.

179. This field survey included the collection of demographic and socio-economic baseline information i.e. educational levels, economic resources and dependencies, quality of life, infrastructure (water supply resources and its use & satisfaction, sewerage), transportation, availability of facilities, housing settlement patterns, general health status, perceived impacts of the project, their protective measures, basic needs, the means to safeguard their interests during project implementation.

**Demographic Characteristics of the Respondents**
Following information was extracted from baseline survey results

### 4.5.1 Age Composition

180. The demographic characteristics of the sample survey results depicts that 11% of the respondents were up to 25 years of age, 24% of the respondents were aged between 26 – 35 and 36 – 45 years each. While majority of the respondents i.e. 41% respondents were more than 45 years of age as Shown in Pie chart 4-6. These figures show that sampled respondents were mature enough to give their opinion about the proposed project and have envisioned of its impacts.

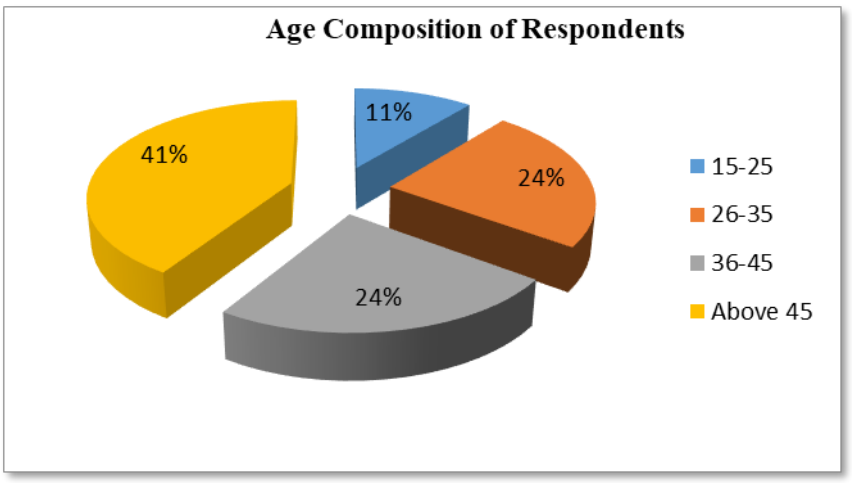



**Figure 4-6 Age Composition of the Respondents**

### 4.5.2 Marital Status

181. In sampled respondents, 100% were found married during socioeconomic baseline survey. as shown in the Figure 4-7 below.

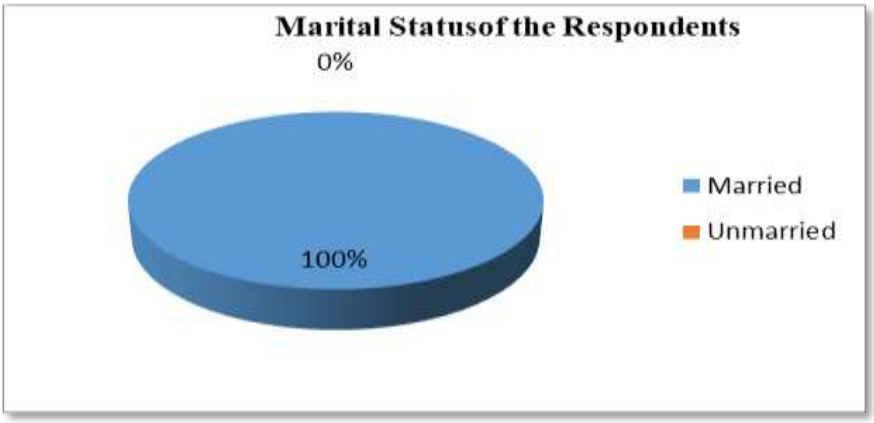



**Figure 4-7: Marital Status of the Respondents**

### 4.5.3 Mother Tongue

182. Pushto language is the only language being spoken by 100% respondents for communication (Fig .4-8).

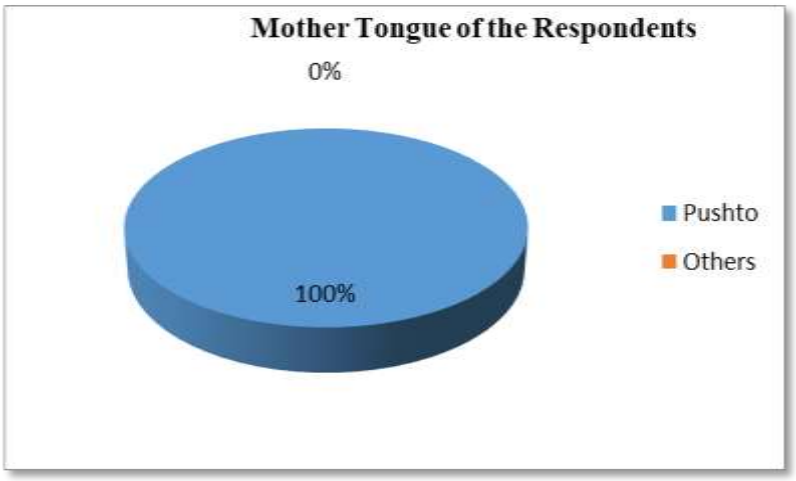



**Figure 4-8: Mother Tongue of the Respondents**

### 4.5.4 Caste / Ethnic Group

183. "Kakar" is the main tribe in the project area. Ahamdzai and Alizai are sub-clans of this tribe. According to baseline survey, it was found that the majority of the respondents i.e. 53% were Alizai Kakar and 47% belongs to Ahmadzai (Fig 4-9).

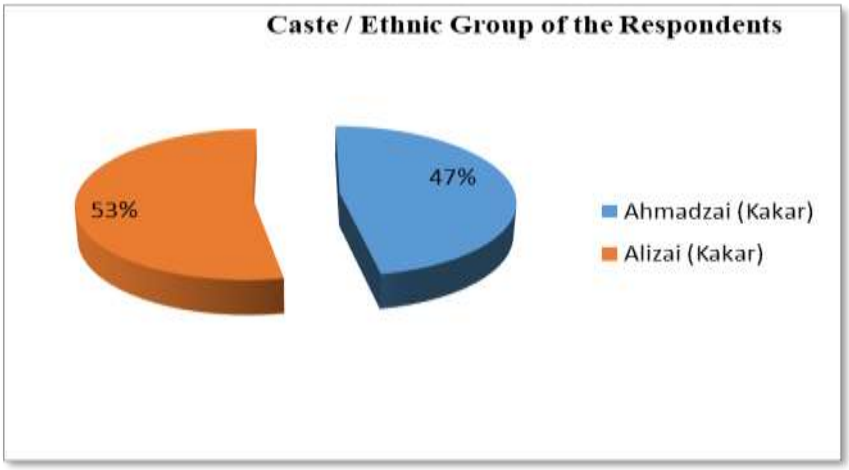



**Figure 4-9: Caste/Ethnic Group of the Respondents**

❖ **Quality of Life**

### 4.5.5 Educational Status

184. From survey results (Fig 4-10) it was found that majority of the respondents were literate due to unavailability of educational facilities. Out of 17 respondents, a vast majority i.e. 76% were illiterate. Only 24% of the respondents had passed the matric.

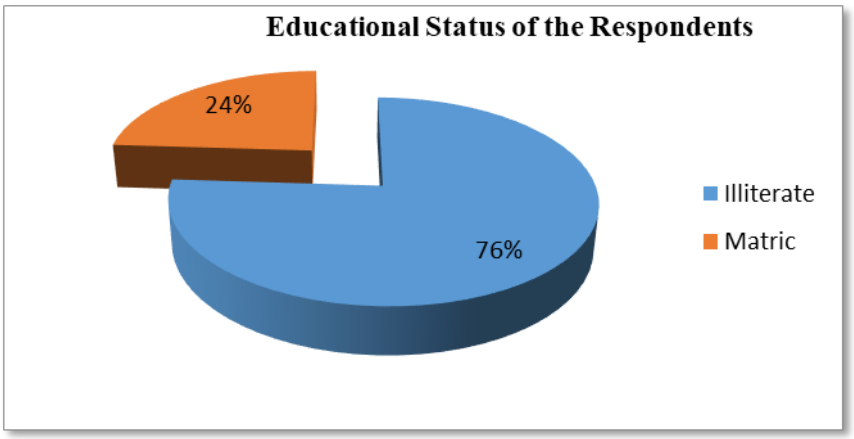



**Figure 4-10: Educational Status**

### 4.5.6 Professional Status

185. According to socioeconomic survey findings (Fig 4-11), it was witnessed that out of 17 respondents, majority i.e. 47% are engaged in agricultural activities, 18% are involved in livestock and working as daily wage labour each, 11% are doing government/private jobs. While 06% respondents were student.

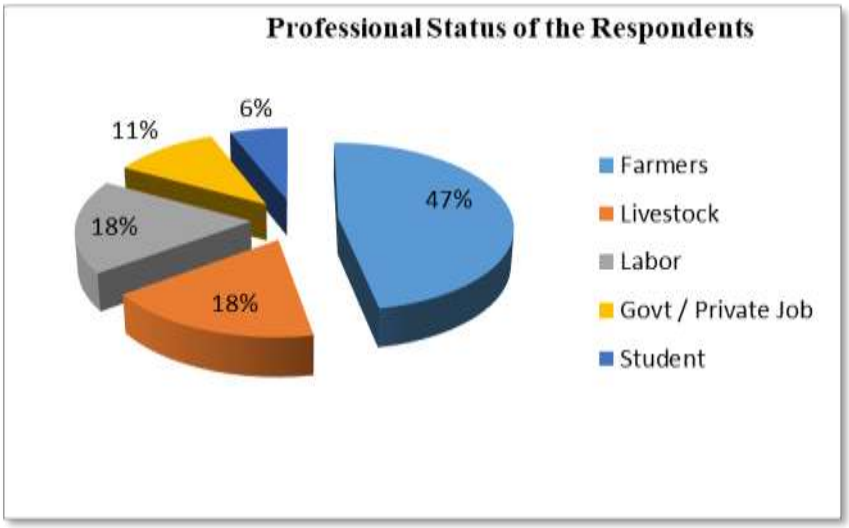



**Figure 4-11: Professional Status of the Respondents**

### 4.5.7 Average Monthly Income

186. The income status of the respondents was evaluated by dividing the respondents into different income categories. During field survey it was observed that out of 17 respondents, 12% respondents are earning up to 17,000, 18% respondents fall within the income range of 30,001-45,000. While majority i.e. 41% respondents fall within the income range of 17,001-30,000 and 29% were those who earn above 45,000.

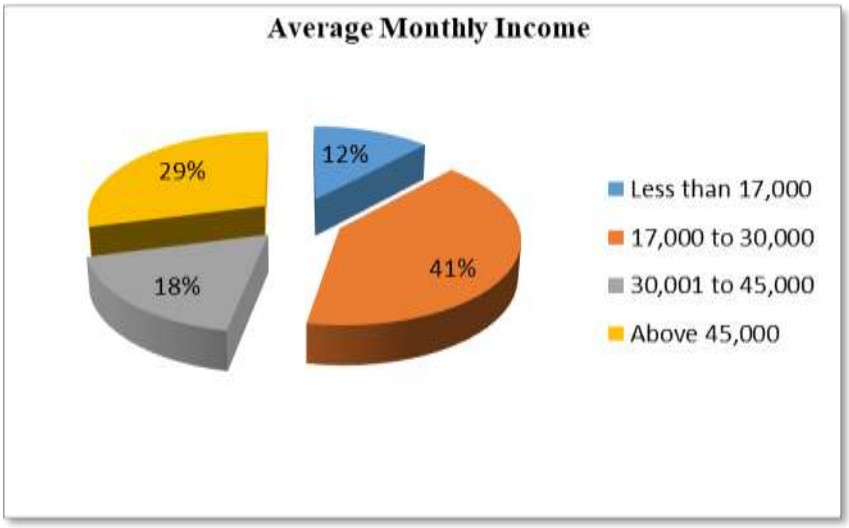



**Figure 4-12: Average Monthly Income of Respondents**

### 4.5.8 Average Monthly Expenditures

187. Average monthly expenditure of the respondents is shown in Fig 4-13. Out of 17 respondents, 18% respondents are falling within the monthly expenditure group less than 17,000, while majority i.e. 52% respondents fall in average monthly expenditure range of 17,000-30,000, 12% respondents fall within the expenditure range of 30,001 to 45,000 and 18% respondents have the expenditure range of above 39,000.

.

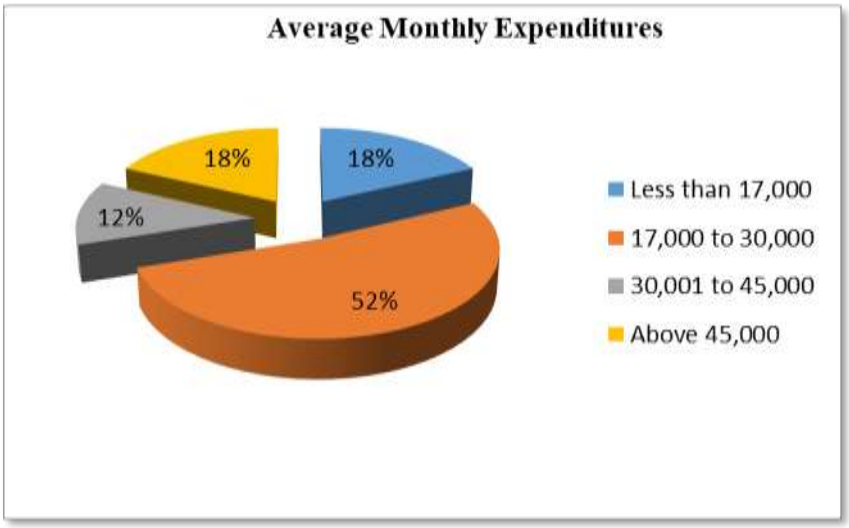



**Figure 4-13: Average Monthly Expenditures of Respondents**

***Family Pattern and Household Size***

### 4.5.9 Family System

188. Survey results shown that majority of the respondents i.e. 59% are living in the joint family system in which parents and children live with other combinations of family members. Remaining 41% are living in the nuclear family system (Fig 4-14).

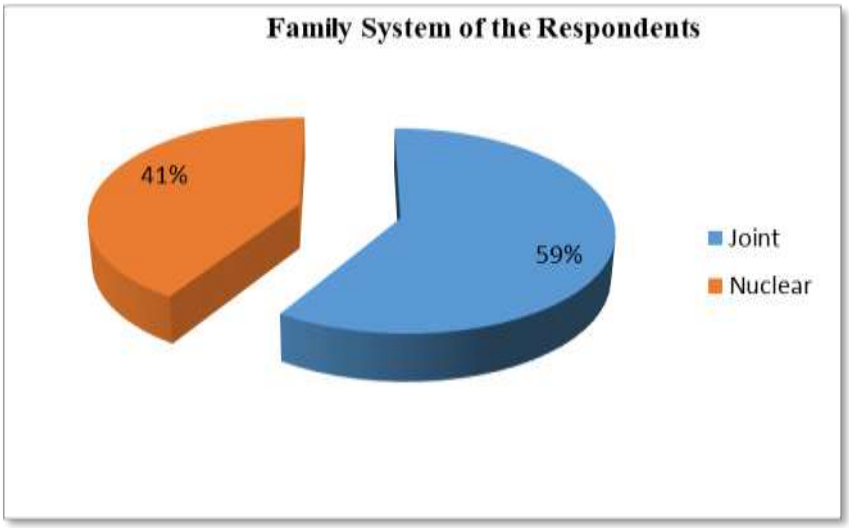



**Figure 4-14: Family System of the Respondents**

### 4.5.10 Average Household Size

189. It is clear from data presented in the Figure 4-15 that the majority of the respondents 41% reported their household size ranging from 6-10 persons, 35% families had household size of 10-15 and 24% respondents have the average household from 0-5.

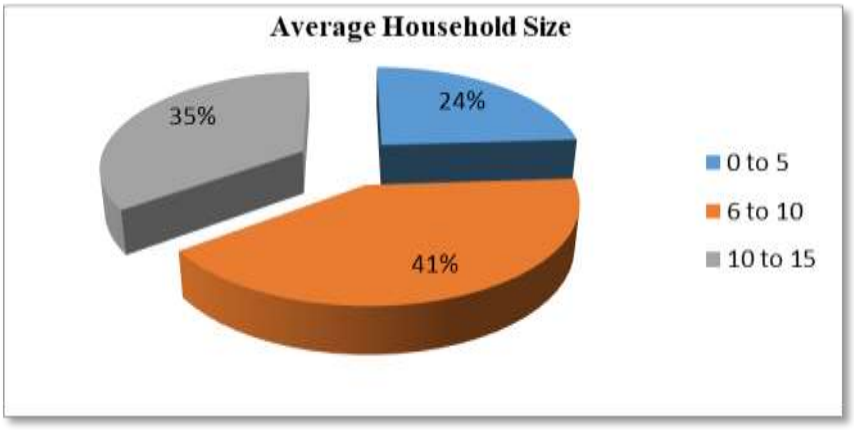



**Figure 4-15: Average Household Size of Respondents**

***Housing & Settlement Pattern***

### 4.5.11 Ownership Status of the Houses/Shops

190. Ownership status of the house depict that how much respondents belong to self-owned, rented structures (houses and shops). During field survey it was observed that 100% of the respondents have self-owned house (Fig 4-16).

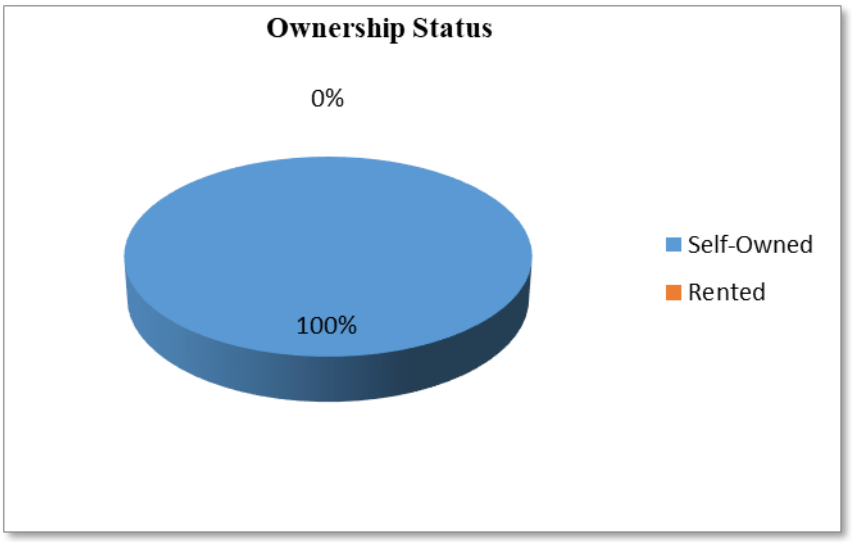



**Figure 4-16: Ownership Status of the Houses/Shops**

### 4.5.12 Nature of Construction of Houses

191. Out of 17 respondents, majority i.e. 59% of them live in the Katcha houses made up of mud bricks whereas 29% live in the semi-pacca houses. Only 12% respondents live in Pucca houses (Fig 4-17).

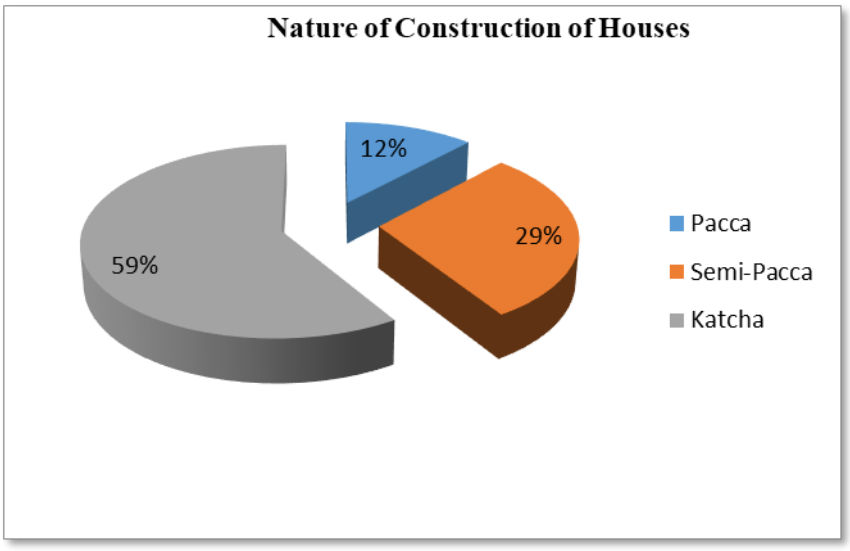



**Figure 4-17: Nature of Construction of Houses**

***Basic Amenities***

### 4.5.13 Availability of facilities

192. The availability of facilities and development of this community is noticed by visiting the proposed project area. Electricity is the only available facility for the respondents. Local community have no access to drainage & sewerage systems, water supply, gas and waste management (4-18).

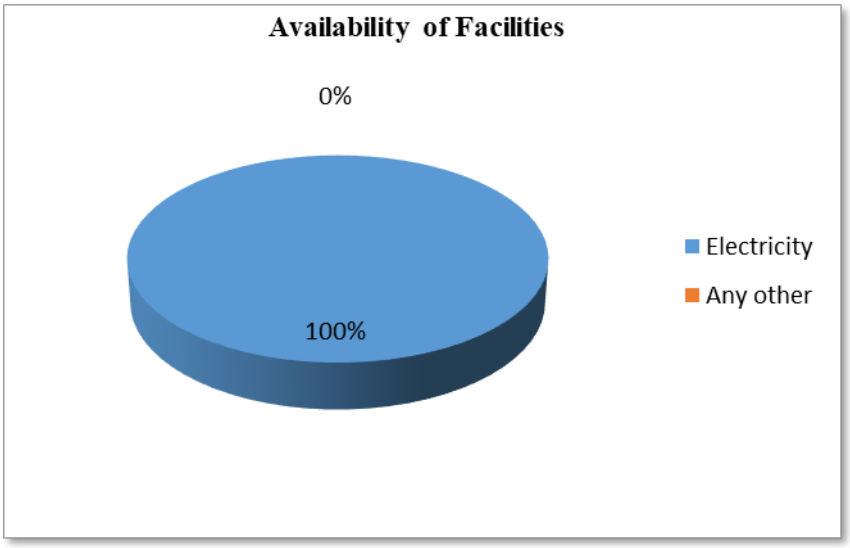



**Figure 4-18: Availability of Facilities for Respondents**

***Source of Water and its Satisfaction Level***

### 4.5.14 Source of Water

193. Sampled respondents are depending upon a number of sources of water for domestic use which is shown in Figure 4-19. Kareez and channel are the main sources of water for domestic use in the proposed project area. So majority of the respondents i.e. 65% get water from this kareez, 29% respondents use channel water while only 06% respondents use hand pumps/electric motor.

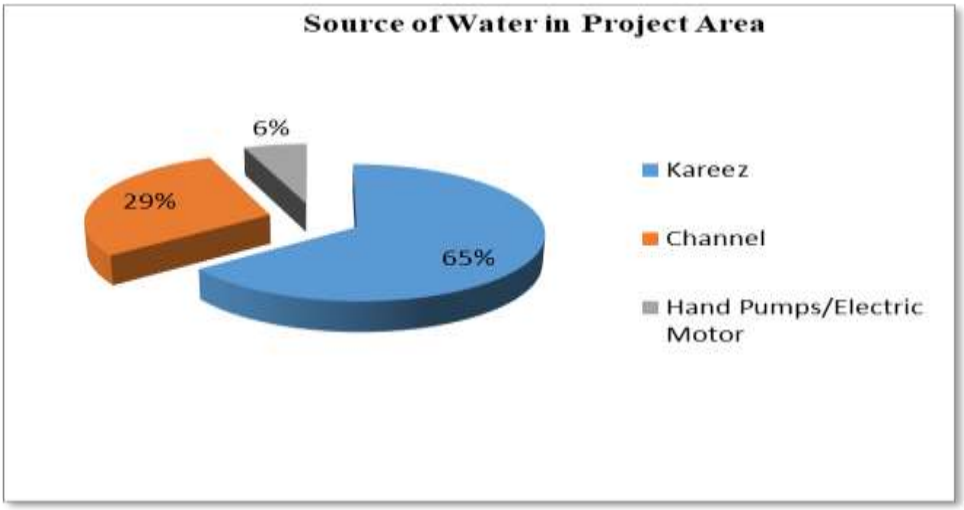



**Figure 4-19: Source of Water**

### 4.5.15 Satisfaction Level with Water Quality

194. The quality of water is directly linked to the quality of health. Figure 4-20 depicts the perception of people about water quality in the proposed project area. It was noticed during the baseline survey that the quality of water is not satisfactory. Majority of respondents i.e. 53% are not satisfied with it due to its poor quality while 47% respondents are satisfied with quality of water.

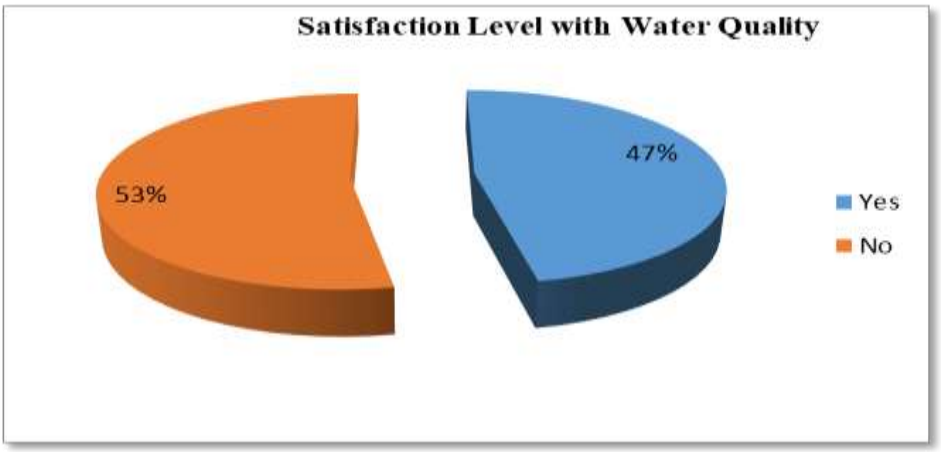



**Figure 4-20: Satisfaction Level with Water Quality**

***Awareness & Implementation of Proposed Project***

### 4.5.16 Awareness about the Project

195. The analysis of the socio economic baseline survey shows the awareness level about the proposed project in Figure 4-21. Community had much awareness about the proposed project and 100% of the respondents know about the proposed project.

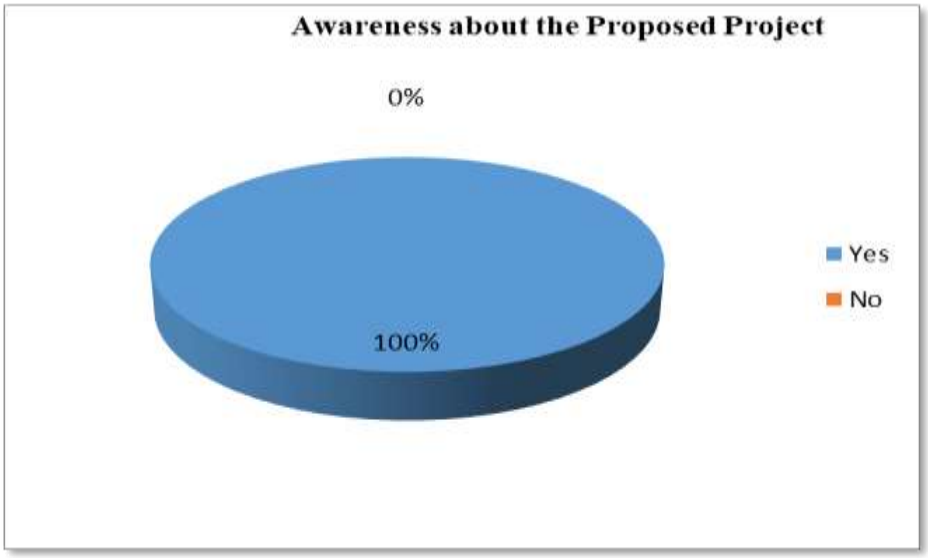



**Figure 4-21: Awareness about the Proposed Project**

### 4.5.17 Implementation of the Proposed Project

196. Out of 17 respondents, majority of respondents i.e. 94% were in favor of the construction of proposed project by considering it beneficial for the public while 06% were against the proposed project due to some concerns/apprehensions (Fig 4-22).

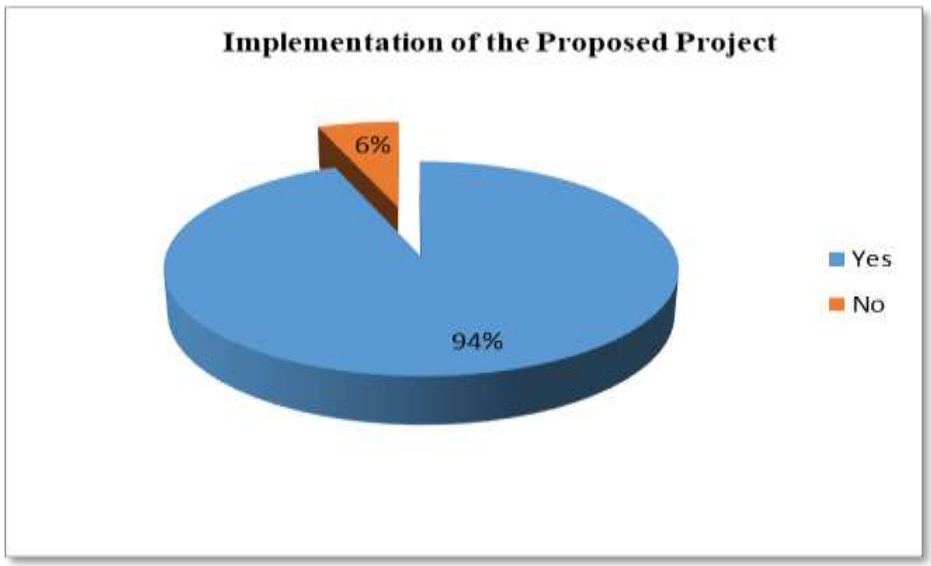



**Figure 4-22: Implementation of Proposed Project**

### 4.5.18 Reasons of Acceptance of the Proposed Project

197. Out of 16 respondents (who are in favor of this project), majority of respondents i.e. 47% believed that income will increase due to this project as availability of water will increase their crops. In addition to, 35% respondents believed that this project will also helpful to increase cropped area while according to 18% value enhancement of the project area will also be increase (Fig 4-23).

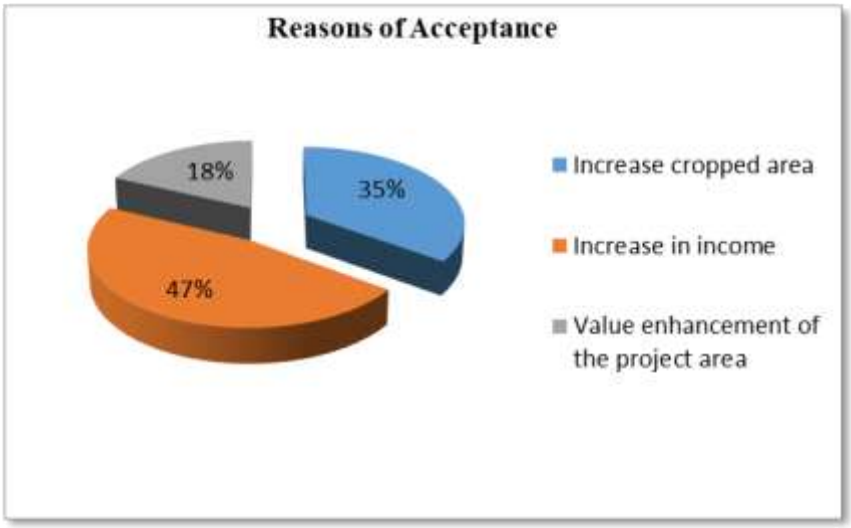



**Figure 4-23: Reasons of Acceptance of Project**

### 4.5.19 Perceived Impacts of the Project after Construction

198. When respondents were asked about impacts which they perceive after construction phase, 34% respondent believed that their cropped area will increase due to the implementation of this project. While according to 30% respondents after the completion of this project income will raise and 36% believed that due to this project their families will enjoy better living standard due to this project (Fig 4-24).

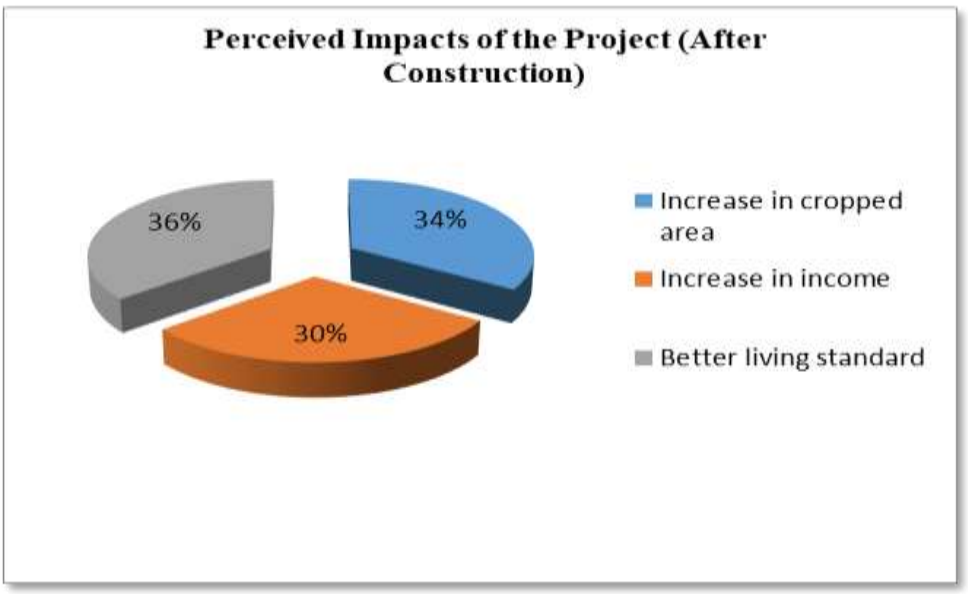



**Figure 4-24: Impacts Perceived by Respondents**

***Suggested Measures and Needs***

### 4.5.20 Protective Measures

199. From the data given in 4-25, majority of respondents i.e. 46% respondents highlighted that the construction activities should be completed well in time, 26% of the respondents said that proper water share according to land should be provided to farmers and 28% talks about jobs which should be given on anteriority basis to local residents.

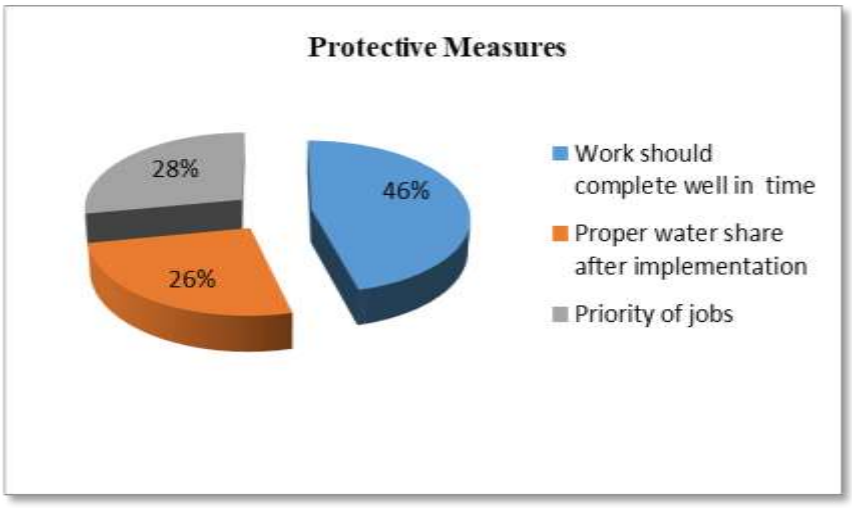



**Figure 4-25: Protective Measures Suggested by Respondents**

### 4.5.21 Pressing Needs of the Project Area

200. Survey Results are shown in Figure 4-24, which further depict that out of 17 respondents, 27% of them revealed that provision of water supply is the dire need of the people, 32% and 25% respondents said that the proper educational and medical facilities should be provided to the local residents and these institutions should also be upgraded with the passage of time.

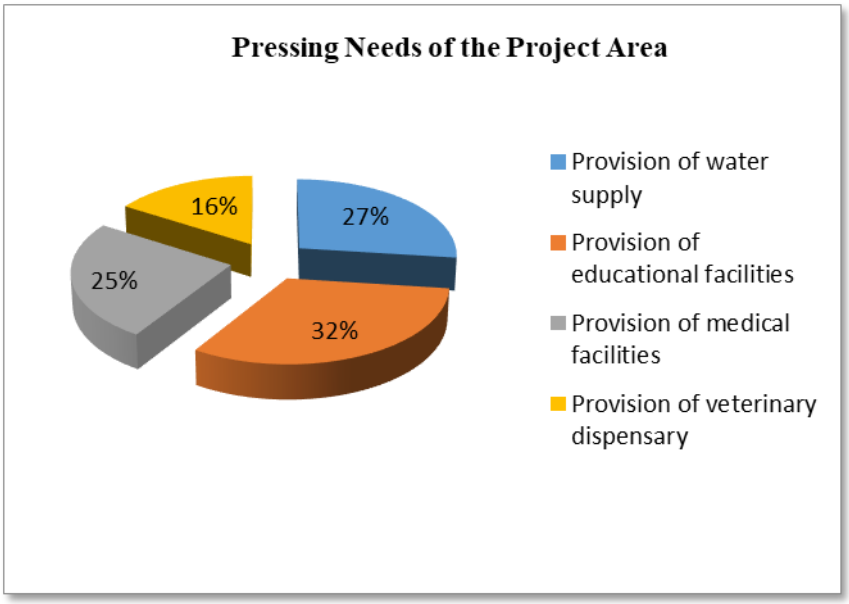



**Figure 4-26: Pressing Needs of Project Area suggested by Respondents**

### 4.5.22 Livelihood

201. The main occupation of the people of the project area is agriculture. Most of the farmers supplement their income from Govt Jobs, livestock keeping labor, shop keeping, transporters etc. Cattle and sheep rearing are the main occupation of the people of the Ahmadzai area, where large tracts of land are still barren and cultivation is only a subsidiary occupation. In other parts of the Project area, pastoral occupation is the subsidiary occupation, as agriculture generally requires concentred efforts of the whole family, the

women-folk and the children also share the work in the field. At the time of harvesting, the people from the draught stricken areas usually migrate to places where they can find work as labourers.

### 4.5.23 Agriculture

202. Existing level of agriculture and its pattern practiced in the project area is one of the major indicators to evaluate agriculture development status availed by the farmers in the area. Farmers are practicing agriculture on availability of limited irrigation supplies (1.5 to 1.75 cusec) through perennial Gorasa Ahmed Zai Karaz, flood flows and rain fed farming. Perennial irrigation supplies are mainly utilized during both kharif and rabi seasons for cultivating wheat, kharif - rabi vegetables, fodder (sorghum & lucern) and pulses, apricot and melon under existing conditions depending upon farmer's economic conditions. In flood and rain fed areas wheat, sorghum and pulses are commonly sown by the farmers.

### 4.5.24 Communications:

203. Access to sub-project site from Zhob city is through Quetta-Zhob National Highway (N- 50), which connects to a dirt track leading to the sub-project area on south-eastern part of Zhob River basin.

# 5. ANALYSIS OF ALTERNATIVES

## 5.1 ALTERNATIVES/OPTIONS FOR WEIR REMODELLING

204. Based on the nature of damages and existing condition, it is assessed that the existing weir portion of the structure is partially damaged and can be remodelled / rehabilitated/repaired to safely pass the flood flows of desired return period (3-4 times higher than the original capacity). The foundation has no sign of serious damages and dismantling of entire weir or construction of totally new weir is not needed. There could be two possible alternatives for recouping the discharge capacity of the weir and allied structures;

(i) Remodelling/upgrading/repair of existing weir only.
(ii) Augmenting the existing weir with additional weir length and energy dissipation arrangement in addition to remodelling/upgrading/repair of the existing weir.

### 5.1.1 OPTION-1 – Remodeling / Up gradation of Existing Weir (No Extension)

205. Weir crest length is kept the same as existing i.e. 50 m and the head above crest is calculated for the design discharge of 50-year return period flood (694.0 m3/sec [24,507 ft3/sec]). The weir formula is used Q= CLH1.5 for calculation of head above crest, where 'Q' stands for discharge (694.0 m3/sec), 'C' for coefficient of discharge (adopted value = 1.7), L for the weir crest length (50 m) and H for water head above crest. The corresponding calculations reveal a head above crest of 4.1 m. This results in discharge intensity of 13.88 m3/sec/m, which has implications to the energy dissipations and safety.

206. Highest Flood Level (HFL) is calculated by adding the 4.1 m surcharge in the weir crest level of 1706.8 amsl (existing). HFL works out to be 1710.90 amsl which is higher than the existing side wall top level of 1709.5 amsl by 1.4 m. This warrants raising of side walls of the structure. Side walls new top level is fixed as 1712.0 amsl by adding 1.1m freeboard to the HFL. It will result in 2.5m (1712.0-1709.5) raising of the existing side walls of the weir. HFL for passing 100 year return period flood is computed as 1711.44 amsl which is lower than the side walls top level by 0.56m.

207. After raising total height of side walls from the weir crest will be 5.20 m which is almost double the existing wall height. The top levels of all flood protection and guide banks on the upstream side of the weir would also require raising/strengthening to conform to the new wall top level of 1712.0 amsl to contain the flood levels within the desired limits.

208. Tail water levels for stilling basin design have been worked out by developing a hydraulic model of the desired river reach in HEC RAS for both design and safety check floods. Upstream and downstream nullah slopes have been adopted as boundary conditions and the value of channel roughness is taken as 0.035 for model setup. The screenshots of river cross section on downstream side of main weir showing tail water level as 1707.5 amsl for the design flood and 1708.0 amsl for the safety check flood (Fig 5-1).

209. The stilling basin for energy dissipation is designed using United State Bureau of Reclamation (USBR) Engineering Monograph No 25 (Hydraulic Design of Stilling Basins and Energy Dissipaters). The & velocity of flow and Froude number at the start of the stilling basin are calculated by energy balance method for the design discharge of 694.0 m3/sec. Stilling basin length is computed as 29 m with cistern level as 1702.0 amsl to accommodate the jump with in the basin length.

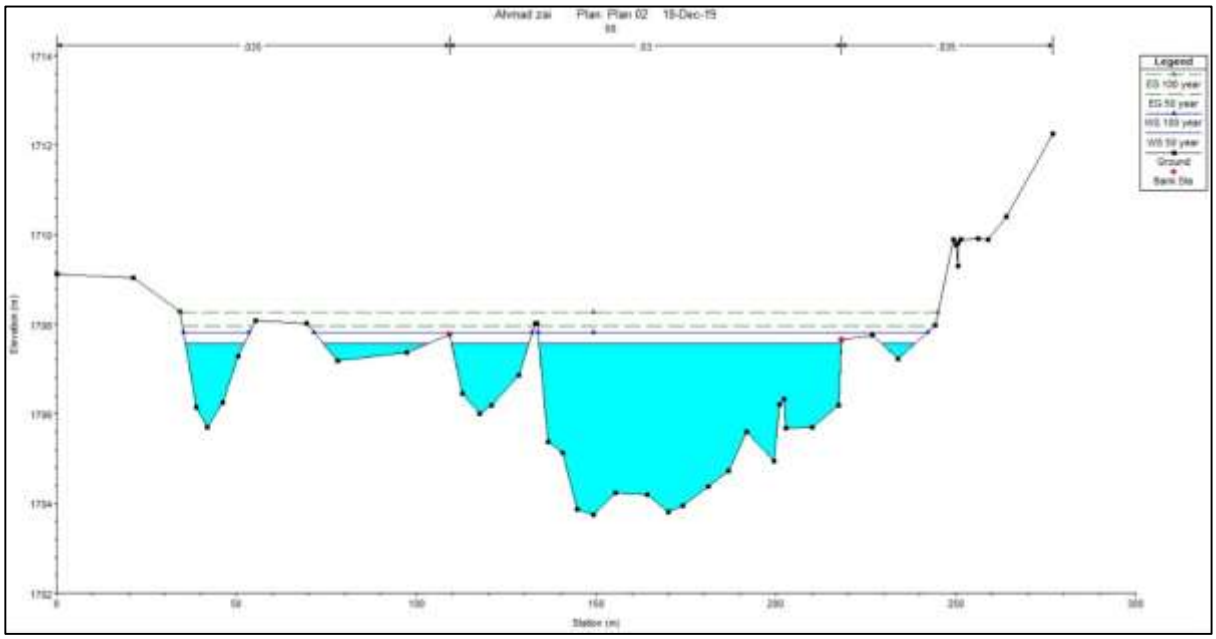


**Figure 5-1: Model Output Showing Tail Water Level for Ahmadzai Weir.**

210. The design cistern level (1702.0 amsl) is fixed 3.27 m deeper than the existing stilling basin level (1705.27 amsl) to avoid sweeping of the hydraulic jump. Existing stilling basin is monolithic with the sidewalls and main weir body and it is not advisable to dismantle the floor to bring it down to El.1702.0 amsl. It is proposed that configuration of the existing stilling basin would be kept as it is and will only be repaired. The required additional length of new stilling basin (29m) would be provided at El. 1702.0 amsl at the end of the existing basin and a glacis at 1V:2H slope will be provided for a smooth transition between the two floors.

211. Salient Features of Existing and Remodelled Weir are given in Table 5-1 below.

**Table 5-1 Salient Features of Existing and Remodelled Weir**

| Sr. No. | Description of Design Parameters | Existing Weir | Remodeled Weir |
|---|---|---|---|
| 1 | Design Capacity (3 year Return Period for Existing and 50 year Return Period for remodeled weir) ($m^3/s$) | 188.4 | 694.0 |
| 2 | Safety Check Flood (100 year Return Period) ($m^3/s$) | NA | 836.0 |
| 3 | Weir Crest Length (m) | 50.0 | 50.0 |
| 4 | Crest Width (m) | 2.50 | 2.50 |
| 5 | Crest Elevation (amsl) | 1706.8 | 1706.8 |
| 6 | Highest Flood Level (50 Year Return Period) (amsl) | NA | 1710.89 |
| 7 | Highest Flood Level (100 Year Return Period) (amsl) | NA | 1711.44 |
| 8 | Side Walls Top Elevation (amsl) | 1709.5 | 1712.00 |
| 9 | Stilling Basin Length (m) | 10.17 | 29.00 |
| 10 | Stilling Basin Width (m) | 50.0 | 50.0 |
| 11 | Stilling Basin Elevation (amsl) | 1705.27 | 1702.0 |
| 12 | End Sill Elevation (amsl) | 1705.97 | 1703.95 |
| 13 | Tail Water Elevation (amsl) | 1707.50 | 1707.50 |
| 14 | Upstream Cutoff Depth (m) | NA | 2.50 |
| 15 | Downstream Cutoff Depth (m) | NA | 4.00 |
| 16 | Downstream Stone Apron Length (m) | NA | 7.00 |
| 17 | No of Off takes (L) | 1 | 1 |
| 18 | FIS Channel Crest Elevation (amsl) | 1705.14 | 1705.14 |

| | | | |
|---|---|---|---|
| 19 | FIS Channel Width (m) | 6.50 | 6.50 |
| 20 | No. of Bays | 2 | 2 |
| 21 | Bay Width (m) | 3 | 3 |
| 22 | Breast Wall Bottom Elevation (amsl) | 1706.47 | 1706.47 |
| 23 | No of Off takes (R) | 1 | 1 |
| 24 | Gate Bottom Elevation (amsl) | 1705.82 | 1705.82 |
| 25 | Gate Size | 0.42 x 1.15 | 0.42 x 1.15 |

### 5.1.2 OPTION-2 – Extension by Constructing a New Weir on Right Bank

212. A new weir may be constructed on right side of the existing weir to increase the discharge passage capacity and to reduce HFL. The new weir is proposed in the eroded part of the nullah bed alongside right abutment of the existing weir. Bedrock is exposed in the nullah on which foundation of the new weir would be placed.

213. Crest length of new weir is fixed as 20m including 3 m wide under sluice bay based on topography and available space for placement of the structure. Surcharge over crest for a total weir crest length of 70 m (including 50m existing) is calculated for the design discharge of 50year return period (694.0 m3/sec [24,507 ft3/sec]). Using weir formula Q= CLH1.5, the head above crest is calculated as 3.27 m. In the formula 'Q' stands for discharge (694.0 m3/sec), 'C' for coefficient of discharge (adopted value = 1.7 for broad crested weir), L for the weir crest length (70 m) and H for water head over the crest.

214. Highest Flood Level (HFL) is calculated by adding the 3.27 m surcharge head to the weir crest level 1706.8 amsl (existing). HFL works out to be 1710.07 amsl which is 0.57m higher than the existing side wall top level of 1709.5 amsl. Therefore, side walls are required to be raised and new top level is fixed as 1711.2 amsl by adding 1.1m freeboard to the HFL. It will result in 1.7 m (1711.2-1709.5) raising of the existing side walls of the weir. Total height of side walls from the weir crest will become 4.4 m. The top levels of all flood protection and guide banks on the upstream side of weir would also be required to be raised to new wall top level of 1711.20 amsl to contain the HFL within the required limits. Adopting similar calculations HFL for flood of 100 year return period is computed as 1710.44 amsl which is 0.76 m lower than the side walls top level.

215. The stilling basin for energy dissipation is designed using United State Bureau of Reclamation (USBR) Engineering Monograph No 25 (Hydraulic Design of Stilling Basins and Energy Dissipaters). The depth & velocity of flow and Froude number at the start of the stilling basin are calculated by energy balance method for the design discharge 694.0 m3/sec. Stilling basin length is computed as 23 m with cistern level 1703.1 amsl to accommodate the jump with in basin length. A total of 23 m long stilling basin shall be required for the new weir with cistern level of 1703.1 amsl.

216. Configuration of existing stilling basin would be kept the same for the existing 50m weir portion i.e. 10.17m long floor at El. 1705.27 amsl. An additional basin length would be provided adjacent to the existing floor on its downstream side at El. 1703.1 amsl. This would result in two level stilling basins in the existing weir portion. A glacis with 1V:2H slope will be provided to connect the both stilling basins.

217. Design calculations/parameters of new designed weir are given in Table 5-2below:

**Table 5-2 Weir Design Parameters for Option-2**

| No. | Description of Design Parameters | Main Weir | New Weir |
|---|---|---|---|
| 1 | Weir Crest Length (m) | 50.0 | 20.0 |
| 2 | Crest Width (m) | 2.5 | 2.5 |
| 3 | Main Weir Crest Elevation (amsl) | 1706.8 | 1706.8 |
| 4 | Undersluice Crest Elevation (amsl) | - | 1705.8 |
| 5 | Undersluice Gate Top Elevation (amsl) | - | 1706.8 |
| 6 | Undersluice Gate Size (HxW) m | - | 1 x 3 |
| 7 | Design Flood 50 year Return Period ($m^3/s$) | 694.0 | 694.0 |
| 8 | Safety Check Flood 100 year Return Period ($m^3/s$) | 836.0 | 836.0 |
| 9 | Highest Flood Level 50 Year Return Period (amsl) | 1710.07 | 1710.07 |
| 10 | Highest Flood Level 100 Year Return Period (amsl) | 1710.44 | 1710.44 |
| 11 | Side Wall Top Elevation (amsl) | 1711.20 | 1711.20 |
| 12 | Stilling Basin Length (m) | 20 | 23 |
| 13 | Stilling Basin Width (m) | 50 | 20 |
| 14 | Stilling Basin Elevation (amsl) | 1703.1 | 1703.1 |
| 15 | End Sill Elevation (amsl) | 1704.69 | 1704.69 |
| 16 | Tail Water Elevation (amsl) | 1707.50 | 1707.50 |
| 17 | Upstream Cutoff Depth (m) | 1.5 | 1.5 |
| 18 | Downstream Cutoff Depth (m) | 5.94 | 5.94 |
| 19 | Downstream Stone Apron Length (m) | 7 | 7 |
| | **Flood Irrigation System (FIS)** | | |
| 20 | No of Offtakes (L) | 1 | - |
| 21 | FIS Channel Crest Elevation (amsl) | 1705.14 | - |
| 22 | FIS Channel Width (m) | 6.5 | - |
| 23 | No. of Bays | 2 | - |
| 24 | Bay Width (m) | 3 | - |
| 25 | Breast Wall Bottom Elevation (amsl) | 1706.47 | - |
| | **Perennial Irrigation System (PIS)** | | |
| 26 | No of Offtakes (R) | - | 1 |
| 27 | Gate Bottom Elevation (amsl) | - | 1 |
| 28 | Gate Size | - | 0 |

### 5.1.3 Conclusion on the remodeling option for the weir

218. The design parameters of both options are summarized in Table 5-3 below. It may be noted that Option-2 is more suitable because its unit discharge is lesser which would require less energy dissipation. Its lower flood levels would warrant more safety to the diversion weir structure. Cost of this option may also be reduced due to lesser raising of side walls and guide banks/ flood protection embankments and reduced length of stilling basin. Hence option-2 involving upgradation of existing weir and construction of new weir may be adopted for the sub-project.

**Table 5-3 Summary of Design Parameters of Weir Remodelling Options Analysed**

| Sr No | Parameter | unit | Otption-1 Existing Weir | Option-2 Existing + New |
|---|---|---|---|---|
| 1 | Weir Crest Level | amsl | 1706.8 | 1706.8 |
| 2 | Length of Weir Crest | m | 50 | 70 |
| 3 | Unit Discharge | $m^2/s$ | 13.88 | 9.91 |
| 4 | Head over Weir Crest | m | 4.10 | 3.27 |
| 5 | Raising Requirement of Weir Side Walls | m | 2.5 | 1.7 |
| 6 | Total Height of Side Walls | m | 5.2 | 4.4 |
| 7 | Highest Flood Level | amsl | 1710.89 | 1710.07 |
| 8 | Side Walls Top Levels | amsl | 1712.0 | 1711.2 |

| | | | | |
|---|---|---|---|---|
| 9 | Guide Bank/ Flood Protection Top level | amsl | 1712.0 | 1711.2 |
| 10 | Total Length of Stilling Basin | m | 29 | 20 |
| 11 | Width of Stilling Basin | m | 50 | 70 |

219. Comparison of both options for weir construction wrtt Environment, Social and economic parameters is given in Table 5-4 below.

**Table 5-4 Comparison of Alternatives**

| | **Environment** | **Social** | **Economic** |
|---|---|---|---|
| Weir Option 2<br>Augmenting the existing weir with additional weir length and energy dissipation arrangement in addition to remodelling/upgrading/repair of the existing weir. | Comparatively Less energy dissipation, Low flood level | More safety to the diversion weir structure because of low flood levels that in turns ensure more Public safety | **Low Cost** due to lesser raising of side walls and guide banks/ flood protection embankments and reduced length of stilling basin. |
| Weir Option 1<br>Remodelling/upgrading/repair of existing weir only. | more dissipation high, High flood Level | Less secure for public comparatively | More Costly comparatively |

# 6. PUBLIC CONSULTATION AND DISCLOSURE

## 6.1 GENERAL

220. This section describes the outcome of the public consultation sessions held with different stakeholders that may be affected (positive / negative) by the proposed project activities. Public Consultation is a mandatory part of the IEE / EIA process for development projects. The adequacy of the public consultation and information disclosure is one of the basic criteria used to determine the project compliance with the national / international laws or safeguard policies.

221. The consultation process was carried out in accordance with the requirements of Pakistan Environmental Procedures. The objectives of this process were to:

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

## 6.2 Consultation and Participation Process

222. For ascertaining the perceptions of different stakeholders about the project (during construction/operation) consultation meetings were held with them. A site visit was conducted for IEE studies of Ahmadzai Irrigation scheme under BWRDSP from March 09, 2020 to March 14, 2020. Project area mainly falls in Ahmadzai and Alizai Killi villages. Consultation meetings were carried out during the site visit with local community. A brief of these activities is given in below (Table 6.1).

**Table 6-1: Details of Consultation Meetings**

| Sr. No | Date | Village | No. of Participants | Venue |
|---|---|---|---|---|
| 1 | 10-03-2020 | Ahmadzai | 11 | Hujra Ibrahim Khan |
| 2 | 12-03-2020 | | 10 | Hujra Juma Khan |
| 3 | 12-03-2020 | Alizai Killi | 09 | Hujra Feroz Khan |

## 6.3 METHODS OF PUBLIC CONSULTATION

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

- Scoping Sessions
- Informal Meetings
- Individual Interview

## 6.4 IDENTIFICATION OF STAKEHOLDERS

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

## 6.5 MAJOR STAKEHOLDERS AND THEIR APPREHENSIONS

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

**Table 6-2 Stakeholders Contacted in the Project Area**

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

226. No major apprehensions were raised by the local residents during these consultation meetings. Participants showed their full support for project implementation. Private land acquisition is involved in the sub project. Community is willing to provide land voluntarily for the project without any compensation. To avoid any conflict community is agreed for written agreement for the land to be acquired for the project. One encroacher family will be compensated only for their crops on the basis of annual yield as they are cultivating their crops in government owned land. Figure-1 shows the pictorial view of Interviews and consultation meetings held with the stakeholders. Attendance sheets of Public consultations are attached as Annexure 4.

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








## 6.6 CONSULTATION MEETINGS AND FORMAL AND INFORMAL GROUP DISCUSSIONS

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

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

229. Generally, it was found that people were already aware of the proposed project. After the meetings, 90% respondents including all local residents and other stakeholders showed their full support for the proposed project. This project will be beneficial in terms of agricultural development, not only for the local residents but also good for the development of the area.

## 6.7 CONCERNS / SUGGESTIONS OF THE STAKEHOLDERS

230. The most commonly raised concerns during the meetings are listed below:

- Proposed project should start as soon as possible without any delay.
- Commencement of the proposed project will involve private land acquisition on permanent basis. Community is willing to provide land voluntarily for the project without any compensation. To avoid any conflict community is agreed for written agreement for the land to be acquired for the project;
- No house / shop is falling within the RoW. Only one encroacher will face loss of income as carrying out agricultural activities in Government owned land.
- Local residents should be given priority for jobs during the construction and operation phase;
- Exposure of noise and dust pollution will cause disturbance and health & safety issues to the local residents and other stakeholders throughout the construction stage due to the movement of construction machinery and transportation of construction materials.;
- Due to the movement of loaded trucks during the construction period of proposed project, congestion on the access road will increase.
- Government should provide basic facilities to project area as part of the project.
- Due to the construction of the proposed project, public utilities will be disturbed. Arrangements should be made to minimize the disruption of public utilities or they may be rehabilitated on priority basis to reduce the impacts;
- Increase in traffic and safety hazards will create problems to local population and surrounding communities. Accordingly, a detailed health and safety plan must be developed to mitigate the construction and operation risks of the proposed project on the local residents and surrounding communities.
- Solid waste produced during construction should be disposed of timely.

## 6.8 SUGGESTION / MITIGATION MEASURES PROPOSED BY EIA CONSULTANTS FOR ADDRESSING THE STAKEHOLDER'S CONCERNS

231. The contractors and design consultants may include the following environmental and safety provisions in the project design in order to protect the surrounding communities from the anticipated impacts of pre and post construction activities:

- Project will start after final design.
- Significant efforts including change in design should be adopted to minimize private land acquisition.
- Encroacher family will be compensated only for the crops on the basis of average yield.
- Local residents should be given priority while hiring during construction phase of the proposed project;
- The effects of noise and dust pollution on the local residents should be minimized by making necessary arrangements. Dust pollution should be controlled by water sprinkling on daily basis
- Construction machinery should be placed at adequate locations away from the sensitive areas to minimize the impacts related to the noise;
- Construction material and asphalt plant should be located outside the residential area.
- Project facilities should be located outside the existing residential areas. In order to avoid restricting the daily movement of the local stakeholders, construction vehicles should remain confined within their designated areas of movement;
- The utilities to be shifted due to the implementation of the proposed project should be rehabilitated on priority basis to minimize the impacts on the stakeholders;
- Solid waste generated during construction at site should be disposed of safely at approved waste disposal sites.

## 6.9 GENDER CONSULTATIONS

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

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

234. The project provides support the formation of formal and informal women's groups (WGs) to represent female beneficiaries. WGs will be responsible for: (a) giving input to PMO/PIO BWRDP on infrastructure design particularly location of social structures such as washing points and animal drinking troughs; and (b) acting as an agent for basic health and

hygiene training, participation in income generation activities and Grievance Redress Committees GRCs.

### i. Objectives of Gender Consultations

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

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

### ii. Process of Gender Consultation

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

### iii. Brief of Consultations and Participants

237. Keeping in view the important role of the female in the project activates, gender consultations were conducted in 2 villages where 50 women participate in the discussions in the project area of Ahmedzai sub-project. The summary of participants with locations is provided in Table 3.1 and photographs are presented in Annexure-I. These consultations were conducted in the same villages where the male members of the community were consulted.

238. Women actively participated in the meetings and showed their support for the project with the consent of their male members.

**Table 3.1: Summary Location Wise Number of Participants of Gender Consultations**

| Sr. No. | Location / Village | Name of Scheme | River Basin | Participants (No.) |
|---|---|---|---|---|
| 1 | Ahmedzai | Ahmedzai (PIS+FIS) | Zhob | 27 |
| 2 | Alizai | | | 23 |
| **Total** | | | | **50** |

### iv. Gender Consultation in Ahmedzai Sub-project area

239. Parallel with male community consultations, females of the project area were also consulted to achieve the objectives of the field. More than 50 female participated the in the two meetings. The locations, number of participants with age, occupation and educational status is provided in the Table 3.1.

**Table 3.1: Consultations with the Participants (Ahmedzai PIS+FIS)**

| Village: Ahmedzai | | | | |
|---|---|---|---|---|
| **Sr. No.** | **Name** | **Age** | **Occupation** | **Education** |
| 1 | Bebi Feroz | 35 | House Wife | Illiterate |
| 2 | Shaiaba | 30 | House Wife | Illiterate |
| 3 | Zenat | 25 | House Wife | Illiterate |
| 4 | Saira | 25 | House Wife | Illiterate |
| 5 | Satai | 55 | House Wife | Illiterate |
| 6 | Fatima | 27 | House Wife | Illiterate |
| 7 | Baro | 50 | House Wife | Illiterate |
| 8 | Sazia | 22 | House Wife | Illiterate |
| 9 | Shaida | 23 | House Wife | Illiterate |
| 10 | Batto | 33 | House Wife | Illiterate |
| 11 | Nazia | 21 | House Wife | Illiterate |
| 12 | Malalai | 20 | House Wife | Illiterate |
| 13 | Parveen | 25 | House Wife | Illiterate |
| 14 | Tabasum | 20 | House Wife | Illiterate |
| 15 | Naila bibi | 40 | House Wife | Illiterate |
| 16 | Farida | 42 | House Wife | Illiterate |
| 17 | Shabnam | 18 | House Wife | Illiterate |
| 18 | Rida | 21 | House Wife | Illiterate |
| 19 | Nasreen | 25 | House Wife | Illiterate |
| 20 | Sadiqa | 22 | House Wife | Illiterate |
| 21 | Kalsoom | 23 | House Wife | Illiterate |
| 22 | Malika | 50 | House Wife | Illiterate |
| 23 | Abida | 18 | House Wife | Illiterate |
| 24 | Shair bano | 19 | House Wife | Illiterate |
| 25 | Zargoona | 55 | House Wife | Primary |
| 26 | Parveen | 40 | House Wife | Illiterate |
| 27 | Kafia | 48 | House Wife | Illiterate |
| **Village: Alizai** | | | | |
| 1 | Habibi | 45 | House Wife | Illiterate |
| 2 | Bano | 30 | House Wife | Illiterate |
| 3 | Khasa | 50 | House Wife | Illiterate |
| 4 | Hameeda | 41 | House Wife | Illiterate |
| 5 | Hosla | 25 | House Wife | Illiterate |
| 6 | Gul Sheena | 30 | House Wife | Illiterate |
| 7 | Pashkai | 35 | House Wife | Illiterate |
| 8 | Gul Bashra | 25 | House Wife | Illiterate |
| 9 | Mashrai | 40 | House Wife | Illiterate |
| 10 | Saleha | 35 | House Wife | Illiterate |
| 11 | Balto | 19 | House Wife | Illiterate |
| 12 | Zartal | 25 | House Wife | Illiterate |
| 13 | Bakhtema | 18 | House Wife | Illiterate |
| 14 | Barokha | 25 | House Wife | Illiterate |
| 15 | Tyaba | 26 | House Wife | Illiterate |

| | | | | |
|---|---|---|---|---|
| 16 | Kokai | 22 | House Wife | Illiterate |
| 17 | Nazia | 30 | House Wife | Illiterate |
| 18 | Sabira | 30 | House Wife | Illiterate |
| 19 | Saira | 25 | House Wife | Illiterate |
| 20 | Akhtar Bibi | 25 | House Wife | Illiterate |
| 21 | Tamam Bibi | 30 | House Wife | Illiterate |
| 22 | Taj bibi | 20 | House Wife | Illiterate |
| 23 | Gul dado | 55 | House Wife | Illiterate |

A View of Consultation in village Ahmedzai

A View of Consultation in village Alizai

240. All participants were briefed about the purpose of meetings their involvement in the project activities. Social structures proposed in the project components for the benefits of the women were explained in detail. All participants were housewives and only one was literate. Low -level of literacy indicates educational facilities in the sub-project area are nominal and there is no trend of sending specially girls to schools. The women are also deprived of the basic facilities.

241. Participants suggested the washing points and water supplies should be constructed near the settlements with the easy access.

### v. Current Roles and Responsibilities of Women

242. The women of the project area do not play active role in the agriculture and watershed management activities. Economic activities for women in the sub-project area are very rare, except the livestock rearing at home. Embroidery work and tailoring is also source of income for some women. Poultry rearing is common source of income.

243. In the Project area of Zhob River Basin, women's freedom for movement is limited and where cultural values are strictly observed. In the sub-project area of Ahmedzai, Killi Sardar Akhatar women are not allowed to work outside of their homes and are not allowed to participated in business affairs.

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

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

**Handicrafts Made by Local Women**

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

### vi. Gender Issues in the Sub-Project Areas

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

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

Women have no facility to market their product and their work, but product is not properly rewarded; and

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

### vii. Pressing Needs of Women

247. During consultations women expressed following pressing needs:

- Supply of clean drinking water and sanitation facilities;
- Provision of health facilities in the project area is another need of females for the treatment they have to travel long way to get treatment and these facilities are only available in big cities (Zhob ).
- Provision of vocational training centres to enhance skills on income generation activities. Living standard of women in the project area can be improved by promoting the traditional Crafts of Balochistan specially to empower female entrepreneurs through skill development in numerous arts & crafts pertaining to the cultural heritage of the area, providing Mirco Credit facility for purchase of Tools/Machinery & Working Capital enabling poor to stand on their feet. In fact, embroidery is the predominant craft of a cottage industry that is widely practiced craft in Balochistan but the vocational training centres do not exist in the project areas. These facilities should be extended in the project area. Trainings will help in the better quality production and poverty alleviation.
- Provision and up gradation of educational facilities;
- Access roads and public transport facilities;

### viii. Meeting with Balochistan Rural Support Programme (BRSP)

248. Balochistan Rural Support Programme (BRSP) the main organization working in the project area. BRSP is working in the rural areas of Baluchistan and has strong presence and experience for implementing various multi-sector development programmes in 24 districts of Baluchistan. The main objective of BRSP is to mobilize and engaging communities in long term development for a positive change in the society and generates demand for services by the communities to raise their voice for their basic rights.

249. A meeting was conducted with representatives of BRSP (District Programme Manager & Admin Officer) Zhob district. They were briefed about components of project interventions related to the women's participation proposed for the project to improve the socio-economic condition of the project.

### ix. Meeting with Human Development Foundation (HDF)

250. A meeting held with field coordinator of HDF Mr. Neem Mandokhail and with other representatives of NGOs in Zhob city. Community participation in the BWRDS was discussed in detail. They also shared their experience of community mobilization and gender involvement in income generation activities. They also shared them activates regarding kitchen gardening and its benefits for the local women.

251. Suggestions and Recommendations by BRSP & HDF

252. For community mobilization and participation, BRSP & HDF offered their full support towards project initiatives and gender involvement.

253. The representatives of the BWRSP & HDF given valuable suggestions to achieve the desire objectives of the project with community involvement.

- The area of sub-projects (Ahmedzai and Killi Sardar Akhtar) is tuff and rigid which is under the control of tribes. Their norms and cultural values and norms should be followed.
- Series of trust building meetings with all tribes should be a part of community mobilizations
- They proposed Solar Power Fruit Drying System which, is useful to drying dry different types of fruits at small scale.
- Livestock fattening and kitchen gardening are beneficial for involvement of women in income generation activities.

Meeting with District Program Manager BRSP-Zhob

Meeting with Field Coordinator HDF-Zhob

# 7. ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

## 7.1 METHODOLOGY

254. This chapter categorizes the potential impacts of the remodeling of Upper Jhelum Canal on the physical, biological and social environment of the project area.

255. In order to assess the type and intensity of impacts of the project, a check list of potential impacts was developed on basis of the literature review, field surveys, investigations, and stakeholder's consultations. The matrix charts the relations between the project components, and the various aspects of the physical, biological and social environment, and on the basis of this identifies the potential impacts associated with each project activity. The check list also characterizes the impacts with respect to their severity, in addition to determining whether the potential impact can be avoided through better project design and planning, or mitigated with the help of appropriate measures to be taken during the project execution. The potential impacts thus identified are discussed in the following sections.

## 7.2 IMPACT ASSESSMENT - OVERVIEW

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

257. On the other hand, the project will be beneficial; job opportunities particularly for the local population during construction stage and extremely beneficial for agricultural production once the Ahmedzai Irrigation sub project is complete. In addition, the social assistance activities at the canal will greatly enhance the project benefits for the local communities.

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

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

**Table 7-1 Check list of potential impacts for Design, Construction and Operational Phases**

| | | Impact categorization | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mild | | | Moderate | | | Severe | | |
| | | * | ** | *** | * | ** | *** | * | ** | *** |
| A. | **Design & Planning Phase** | | | | | | | | | |
| | Land acquisition | | | | | ✓ | | | | |
| | Assessment of water availability | | | ✓ | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B. | **Implementation & Construction Phase** | | | | | | | | | |
| 1. | Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard | | | | | | ✓ | | | |
| 2. | Soil Contamination | | | | ✓ | | | | | |
| 3. | Soil erosion/ silt run-off | | ✓ | | | | | | | |
| 4. | Disposal of spoil | | | | ✓ | | | | | |
| 5. | Surface or Ground water contamination | | | | | | | | ✓ | |
| 6. | Improper construction techniques and monitoring | | | | | ✓ | | | | |
| 7. | Air Pollution | | | | ✓ | | | | | |
| 8. | Noise and vibration | | | | ✓ | | | | | |
| 9. | Accidental damage to utilities in excavated areas | | | ✓ | | | | | | |
| 10.. | Traffic disruption | | | | | | ✓ | | | |
| 11. | Occupational Health and Safety | | | | | ✓ | | | | |
| 12. | Rain effect | | | | | | ✓ | | | |
| 13. | Flora | | | | | ✓ | | | | |
| 14. | Fauna | | | | | | ✓ | | | |
| **Social Impacts during Construction phase** | | | | | | | | | | |
| 1 | Impacts on Local Communities/ Work force | | | | | | ✓ | | | |
| 2 | Social disruption | | | | ✓ | | | | | |
| 3 | Safety and noise hazards | | | | | ✓ | | | | |
| 4 | Gender Issues | | | | | ✓ | | | | |
| 5 | Safety Hazards for local people | | | | | ✓ | | | | |
| C. | **Operation & Maintenance Phase** | | | | | | | | | |
| 1. | Adequacy of operation and maintenance (O & M) | | | | ✓ | | | | | |
| 2. | Conflicts caused by unavailability or improper distribution of water in the area | | | | | | ✓ | | | |
| 3. | Disposal waste (connection of waste streams) in the Canal | | | | | ✓ | | | | |
| 4. | Use of fertilizers & pesticides | | | | | | ✓ | | | |
| 5. | Risk due to Natural Hazard i.e. Flooding and Earthquakes | | | | ✓ | | | | | |
| 6. | Flora (Vegetation) | | | | ✓ | | | | | |
| 7. | Fauna (Animal community) | | | | | | ✓ | | | |

## 7.3 EXPLANATION OF THE IMPACT ASSESSMENT

259. This section provides a brief explanation of each factor, also suggesting a line of action towards mitigation measures for the adverse impacts.

### 7.3.1 Design Phase

o **Assessment of Water Availability**

260. Improper assessment of water availability and failure of design. This impact would be of moderate significance.

**Mitigation Measures**

261. Design works will ensure the proper assessment of water availability. BIPD will ensure the annual average available water of 6.27 MCM for irrigation water from tributary of Zhob River.

- **Land acquisition:**

262. The rehabilitation works to improve existing irrigation infrastructure is proposed for this sub-project. There are no structures within RoW. One farmer has encroached about half prism of flood channel close to aqueduct, levelled it by filling soil and planted orchards some years ago. So at present, width of channel at encroached place is half comparatively. As a result, water level will rise at this place in future and may cause flood. Without attaining encroached land, project construction will be severely impacted. Land will also be required to construct a new 2 Km long Perennial Irrigation Canal. This impact would be of high significance.

- **Mitigation Measures**

263. The encroacher should be compensated in accordance with provisions of the Land Acquisition Act 1894 and ADB SPS 2009 policy.

264. To minimize resettlement and other social adverse impacts, proposed rehabilitation works shall be carried out along existing available RoW and works shall be restricted inside existing ROWs. If in case, any unavoidable change in alignment or new interventions required during detailed design, BID needs to prepare a LARF and address this issue. Land owner of land on which new Perennial Irrigation Canal will be constructed is willing to give his land without cost. By adopting the aforementioned measures, the impact would be of low significance.

### 7.3.2 Construction Phase

Land Resources

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

- **Disposal of Soil Material**

266. Spoils will be generated from the excavation activities of canals and water courses. Disposal of spoil / surplus material may cause negative environmental impacts, if not properly mitigated during implementation of the proposed project. Potential impacts from spoils and its disposal are (i) land for disposal of spoil, (ii) conversion of those land areas into a permanent dumping area, (iii) potential erosion from the spoil areas and spoil material reaching the river/waterways, and (iv) aesthetic impacts. This impact would be of moderate significance.

- **Soil Erosion**

267. Major considerations are as follow.

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

o **Soil Contamination**

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

- During transfer of fuel from one container to another or during refuelling
- Unloading of construction material due to careless handling
- Maintenance of equipment and vehicles
- Due to leakages from equipment and containers
- It is anticipated that a large quantity of excavated material will need to be disposed of. If this waste material is not properly disposed of, it will contaminate the soil and water resources, especially during the rainy season.

269. This impact would be of moderate significance.

❖ Mitigation Measures

270. The mitigation measures, which will be carried out during construction as well as operation stages for land resources are as under:

o **Disposal of Soil Material**

- The spoil material from the excavation will be dumped at designated 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.
- The spoil material shall be deposited in layers and properly rolled and sprinkled to avoid any negative environmental impacts.

o **Soil Erosion**

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

- All the freshly cut surfaces will be restored/stabilized as soon as possible;

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

o **Soil Contamination**

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

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

▪ *Hydrology and Water Resources*

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

o **Use of Local Water Resources**

274. The water resources of the project area mainly comprised of surface water that is being used by all communities for drinking purpose. There will be ample need of water not only for construction purposes (of concrete side slopes) but also for meeting the consumptive and non-consumptive needs of the campsites, workshop, washing yard, etc. It is obvious that these needs will be met from the existing resources of the areas in close proximity to canal. This impact would be of moderate significance.

**Contamination of Water Resources**

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

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

❖ Mitigation Measures

276. Measures to be adopted to mitigate the adverse impact on water resources and surface drainage patterns are discussed below:

o **Use of Local Water Resources**

277. Mitigations measures regarding use of local water supplies as follow.

- Availability of water for camp site facilities and construction purposes will be ensured by the contractor prior to start of construction activities. As per Local Government Act, the contractor will seek approval from the Local Government for exploitation of the water resources.
- The Contractor will be required to act as a go-between closely with local communities to ensure that any potential conflicts related to common resource utilization for project purposes are resolved quickly.
- The contractor will prepare guidelines for the workers for minimizing the wastage of water during construction activities and at campsites.

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

o **Contamination of Surface and Ground Water Resources**

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

- Camps will be located at least 500 m away from the nearest local settlement to prevent the contamination of community-owned water resources like springs, hill torrents, etc.

- Wastewater effluent from contractors' workshops and equipment washing-yards will be passed through an oil skimmer and to gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams. Similarly, the wastewater effluent from the campsite will be treated before disposal into a stream.
- Borrow pits and natural depressions lined with impervious liners will be used to dispose of scraped obnoxious material, and then covered with soil. This will check potential groundwater contamination. Such measures will also be provided at stream side disposal of waste material in addition to retaining walls or gabions. Available stone (boulders) from excavated rocks will be used for retaining walls as well as for gabions. It will reduce the quantity of dumping material. However, all types of hazardous waste will have to be collected on site separately and stored in appropriate containers to be finally removed from site and be brought to adequate handling, recycling or disposal facilities.

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

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

❖ *Air Quality and Noise Pollution*

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

❖ Impact on Air Quality

o **Fugitive Dust Emissions**

282. Air quality will be affected by fugitive dust emissions from excavating activities of construction machinery, material stockpiles & material transportation, dust from the unpaved surfaces and movement of construction vehicles, which can be very harmful for the site worker, local population and natural vegetation. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability.

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

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

**Vehicular and Generator Exhaust Emissions**

284. Emissions of noxious gases from movement of heavy machinery, batching plant and generators etc. would release emissions which would certainly add to the ambient air levels of the immediate vicinity. Especially the movements of heavy machinery and vehicles of old make and poor engine condition tends to release more than new well-tuned vehicles. Use of low-grade fuels and lubricants also increases the emission levels.

❖ Mitigation Measures

o **Fugitive Dust Emissions**

285. The mitigations measures include the following:

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

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

286. The mitigations measures include the following:

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

o **Vehicular and Generator Exhaust Emissions**

287. The mitigations measures include the following:

- All vehicles during construction activities will be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;

- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions.
- Batching plant should be set up considering the wind direction so that the nearby communities are not affected by the emissions from batching plant.
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.
- Best quality fuel and lubes should be purchased where possible lead free oil and lubes should be used.

❖ Impact of Noise Pollution

o **Noise and Vibration from Construction Activities**

288. Noise is the most pervasive environmental nuisance. Noise is a by-product of human activity and area of exposure increases as a function of mobility and construction activities. The main sources for noise in the project area may be heavy machinery such as excavators, concrete mixing plant, stone crushers and other equipment. This impact will, however, be temporary and moderate negative in nature.

❖ Mitigation Measures

o **Noise and Vibration from Construction Activities**

289. The mitigation measures will include the following:

- Vehicles and equipment used should be well fitted, as applicable, with silencers and properly maintained; that will reduce noise hazards according to permissible limits as fixed by Pak EPA (noise is 85 dB (A) while the WHO noise guidelines prescribed a limit of 55 dB (A).
- Construction workers will be provided suitable hearing protection like ear cap, or earmuffs and will be trained about their usage.
- In and near populated areas, the construction activities will be restricted to be carried out between 6 a.m. and 20:00 p.m.
- Hedges and high boundary walls will be used as noise barriers in sensitive areas such as schools, hospitals and mosques.
- Public hearings will be held to discuss appropriate solutions and techniques to control noise (e.g. mud or brick walls, bushes, etc.). Such hearings consultations should also be regularly conducted to solicit public feedback, to avoid public inconvenience and suggestions for improvement in working strategy / working environment and progress of project activities; and
- In accordance with the Environmental Monitoring Plan, noise measurements will be carried out on regular basis at locations and schedule specified to maintain the level within the NEQS level and to ensure the effectiveness of mitigation measures.

▪ Biological Resources

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

- **Flora**

291. Cutting of few trees and bushes is expected in the ROW of proposed project during construction activities. The Contractor's workers may damage the vegetation and trees (for use as firewood to fulfill the camps requirements). The cutting of small trees and shrubs will cause degradation of local environment as under:

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

- **Fauna**

- **Mammals and Reptiles**

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

293. During the construction phase, there will be negative impacts on the mammals and reptiles of the area, due to construction activities involving excavation, movement of labour, carriage of goods and machinery to various sites along the. Mammals, such as jackal, fox, porcupine, mongoose etc. will avoid these areas for fear of being persecuted. Same will be the case with reptiles; some reptiles might be killed during the digging and dragging operations. Movements of the mammals and reptiles will be restricted during the construction phase.

294. Eatable and refuse goods of the Contractor's camps may attract wildlife that might be hunted by the workers.

295. Due to establishment of labor camps, food storage, setting up of kitchens production of sewage and wastewater may result in multiplication of rodents like rats, mice etc. and vectors like mosquitoes, bugs and flies, which will have a negative impact.

- **Birds-Avian Fauna**

296. 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

- **Flora**

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

- Campsites and Elevated Ground Storage Tanks (EGST) will be established on waste/barren land rather than on forested or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth or agricultural area.
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement.

- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as small trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands.
- Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed.
- The compaction of trenches should also be done properly. Inadequate compaction of trenches will result in flow of soil during rainy season resulting in increased soil erosion
- As far as possible digging in the cultivated land should be done when the land is barren to avoid damage to agricultural crops.
- Open fires should be banned in the area to avoid hazards of fire in the project area.

o **Fauna**

_ ***Mammals and Reptiles***

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

_ ***Birds-Avian Fauna***

- Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.
- Staff working on the project should be given clear orders, not to shoot, snare or trap any bird.

o **SOCIO ECONOMIC, CULTURAL AND ARCHAEOLOGICAL ISSUES**

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

o **Impacts on Local Communities/Workforce**

299. Major settlements in areas exist in the vicinity of construction areas of the main canal structures. The access will pass through the villages. Moreover, access roads of main villages ahead of the canal alignment will pass through the construction area. As a consequence of this the communities of surrounding settlements will be affected during the construction phase as follows:

- During the construction phase, general mobility of the local residents and their livestock in and around the project area is likely to be hindered. Likewise access to the natural resource may be affected. This particularly applies to the women and children.
- Usage of Community's common resources like potable water, fuel wood etc. by Contractor workforce may create conflicts between the community and the Contractor.

- Communities will have to face the noise and dust hazards during the construction activities.
- The presence of outside construction workers inevitably causes some degree of social disruption and even active disputes with the local community as a result of social/cultural differences. This particularly relates to the disruption of the privacy of women working in the fields or in the yards of their houses, located at lower elevation than the working sites. Likewise, the risk of theft of community assets by the workers and vice versa may occur.

o **Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard**

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

**Mitigation Measures**

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

o **Gender Issues**

301. The rural women actively participate in outdoor socio-economic activities such as livestock rearing, fetching of drinking water, etc. Their privacy may suffer due to the project activities. Moreover, it will cause hindrance to the mobility of local women for working in the field, herding livestock, bringing drinking water from springs, picking fuel wood, etc. The induction of outside labour may create social issues due to the unawareness of local customs and norms.

o **Safety Hazards**

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

o **Impact of Induced Traffic**

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

o **Impacts related to Health and Safety**

- **Occupational Health and Safety**

304. Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavourable working environment and due to storage, handling and transport of hazardous construction material. Detail of main construction activities and impacts, which may result in ill health, injury, or in extreme cases death as given in following Table 7.12.

**Table 7-2: Detail of main Construction activities and Impacts**

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

o **The Coronavirus Disease (COVID-19) Situation in Balochistan and impacts**

305. As a precautionary measure to COVID-19, the Government of Baluchistan enforced lockdown starting from 24 March 2020 that was extended for two weeks further to stem the spread of coronavirus in the province. The decision was taken after number of confirmed coronavirus cases reached 110 in the province. Land border with Iran was sealed and stopped pilgrims from traveling to Iran via Taftan border, Balochistan as well as five other crossings after eight coronavirus deaths were reported from the neighbouring country. In Balochistan Province, Confirmed COVID-19 cases were 12,560, recoveries 11,460 and deaths 141 till 24 August 2020. The COVID-19 infection rate is rapidly declining in Balochistan. Construction processes are dynamic with significantly varying number of workers on a construction project site from day to day. The workers coming from diverse environments and working closely together increases the risk of exposure to COVID 19.

- **Graves, Cultural and Historical Sites**

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

❖ Mitigation Measures

o **Local Communities/Workforce**

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

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

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

o **Gender Issues**

308. Mitigation measures regarding gender issues include the following:

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

o **Safety Hazards**

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

- Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety material including safety boots, helmets, and gloves, hearing protection and protective masks, and monitoring their proper and sustained usage.
- The Contractor will ensure the provision of medical services, medicines, first aid kits, vehicle, etc. at the campsite and working place. For this purpose, he will install, staff, equip and operate a clinic on site. It is recommended that this clinic

should also be open to the population of the nearby villages, in order of give them some direct benefits from the project.

- Cordon off the work areas where necessary.
- The storage of all solid waste shall be practiced so as to prevent the attraction, harbourage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odours, unsightliness, or public nuisances.

o **Impact on Induced Traffic**

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

o **Impacts related to Health and Safety**

***I - Occupational Health and Safety***

- All suggested project-specific health and safety plans would include appropriate training and supervision of employees and enforcement of workplace safety policies.
- All processes and equipment will be designed and constructed for safe operation.
- A process of safety management program will be developed and implemented to identify hazards associated with each applicable chemical.
- All project related staff will be provided with the required personal PPE and shall be trained to make sure that they are aware of the usefulness and correct use.
- Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.
- Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them.
- Use of correct signage for better understanding of all the health safety instructions and precautions for the workers. Signage will be in languages appropriate to the workforce employed.
- Government of Pakistan issued specific circulars and guidelines “Health & Safety of Building and Construction Workers during COVID-19 outbreak” about resuming work in on-going contracts and starting work in new projects following the prescribed protocol. Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan, the contractor will prepare Site-specific EMP (SSEMP) and Site Specific Health and Safety Management Plan (SSHSMP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks.

o **Graves, Cultural and Historical Sites**

310. Currently no graveyard is affected by this project. However, if any graves affected by the project, they will have to be shifted. The proponent will obtain Fatwa from local Mufti before shifting the graves. During such operation the proponent will inform local administration and seek their assistance for security. The request will also be extended to

Health Department for deputation of medical and paramedical staff during the operation. As referred earlier, no relocation of historical site is involved, so no mitigation is required except that contractor will follow the prayer timing particularly at prayer of Juma and the workforce will observe the sanctity of religious properties.

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

## 7.4 OPERATIONAL AND MANAGEMENT PHASE

### o Adequacy of operation and maintenance (O & M)

312. No or Inadequate operation and maintenance of canal will be main hindrance to obtain project objectives

**Mitigation Measures**

- Carrying out repair of damaged canal linings if any bank holes, repairs of cattle and washing 'ghats' and carry out extensive annual maintenance programmes on structures and canal, and insurance of adequate irrigation water supply at the tails in the proposed canal command area.
- The investment made must be maintained in the long term, off-farm O & M will be the responsibility of the project and it should be sustainable.
- Ensure community participation in management and operation of the irrigation system and provide necessary training about it.
- Maintenance of on-farm structures will be the responsibility of the individual landowner.

### o Conflicts caused by unavailability or improper distribution of water in the area

313. As per the feasibility calculations, sufficient water will be available for the project and if not, social issues will arise. This impact would be of moderate significance.

**Mitigation Measures**

- 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 formed, 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.

- **Disposal waste (connection of waste streams) in the Canal**

314. Disposal of waste in the canal will degrade irrigation water quality and cause health issues. This impact will lead to serious health issues and will be of moderate significance

**Mitigation Measures**

315. Proper monitoring of canal alignment and disconnect all identified waste streams

- **Use of fertilizers & pesticides**

316. With additional area under cultivation, and with better water availability for existing area, cropping intensity will increase, resulting in an automatic increase of fertilizers and pesticides use. Use of any banned fertilizer and pesticide will cause health issues. It may also cause contamination of fresh water through surface runoff. This would be an impact of moderate significance.

**Mitigation Measures**

- 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.

# 8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

## 8.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

### 8.1.1 General

317. 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.

318. 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.

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

### 8.1.2 Structure of EM

320. The contents of this chapter are given below

- Regulatory Requirements
- Purpose & Need of the EMP
- Objectives of the EMP
- Scope of the EMP
- Institutional Arrangement for Implementation of EMP

❑ Institutional Arrangements for Implementation of EMP during Construction Phase

a. Role and Responsibilities of the Functionaries involved in EMP Implementation
b. Reporting Mechanism
c. Non-Compliance of the EMP

❑ Institutional Arrangements for Implementation of EMP during Operation Phase

a. Role and Responsibilities of the Functionaries involved in EMP Implementation
b. Reporting Mechanism

- Environmental Mitigation Plan
- Environmental Monitoring Plan
- Implementation of EMP

❑ NOC and other Approvals
❑ Stakeholder Coordination

- Trainings
- Communication & Documentation
  - Environmental Management Cos
  - Change Management

### 8.1.3 Regulatory Requirements

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

### 8.1.4 Purpose & Need of the EMP

322. 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.

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

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

### 8.1.5 Objectives of the EMP

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

### 8.1.6 Scope of the EMP

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

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

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

### 8.1.7 Institutional Arrangement for Implementation of EMP

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

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

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

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

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

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

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

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

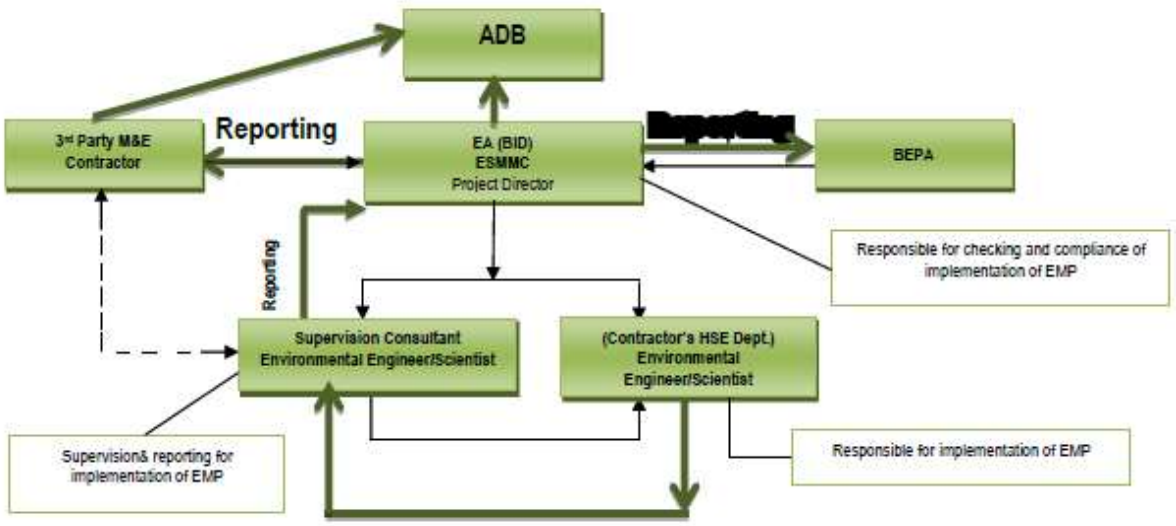



Figure 19: Organizational Setup for Implementation of EMP (Construction Phase)

❑ **Roles and Responsibilities**

**a) BEPA**

332. BEPA is the regulatory authority for issuance of NOC for this proposed project. As part of its mandate, protection of environment is its responsibility. Therefore, this agency will

undertake an audit (as and when required) of project activities with respect to the protocols as defined in EMP.

**b) 3rd Party M&E Contractor (if required)[2]**

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

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

**c) Project Director, PMO-BWRDSP:**

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

- Ensuring that the required environmental training is provided to the concerned staff;
- The Project Director will be responsible for carrying out random site visits to the construction sites to review the environmental performance of the Construction Contractors;
- Review monitoring reports for the progress of environment related activities;
- Make sure that the Construction Contractor is implementing the additional measures suggested by the Supervision Consultant in environmental monitoring reports;
- To assist Contractor for obtaining necessary approvals from the concerned departments.
- Maintaining interface with the other lined departments / stakeholders; and
- Reporting to the BEPA on status of EMP implementation.
- Reporting to ADB on status of EMP implementation.

**d) Supervision Consultant: Resident Engineer**

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

- To oversee the performance of Construction Contractor to make sure that the Construction Contractor is carrying out the work in accordance with the

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

tender design and follow the specifications;
- Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;
- Strong coordination with the Construction Contractor and ESMMC.

**e) Supervision Consultant: Environmental Inspector**

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

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

**f) Construction Contractor: Environmental Supervisor/Inspector**

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

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

❑ **Reporting Mechanism**

338. Progress reporting related to environmental activities will be responsibility of Supervision Consultant, Environmental Specialist. He will also be responsible for submitting monthly EMP compliance report for the project to the PD-PMO. A bi-annual report of environmental activities shall be submitted to ADB by BID.

339. PD will in turn add his remarks / comments / feedback and submit the Report to ADB and BEPA in accordance with the frequency defined by them. In case the frequency is not defined and/or communicated, bi-annual monitoring reports based on the monthly monitoring report will be submitted to ADB for disclosure on ADB website.

❑ **Non-Compliance of the EMP**

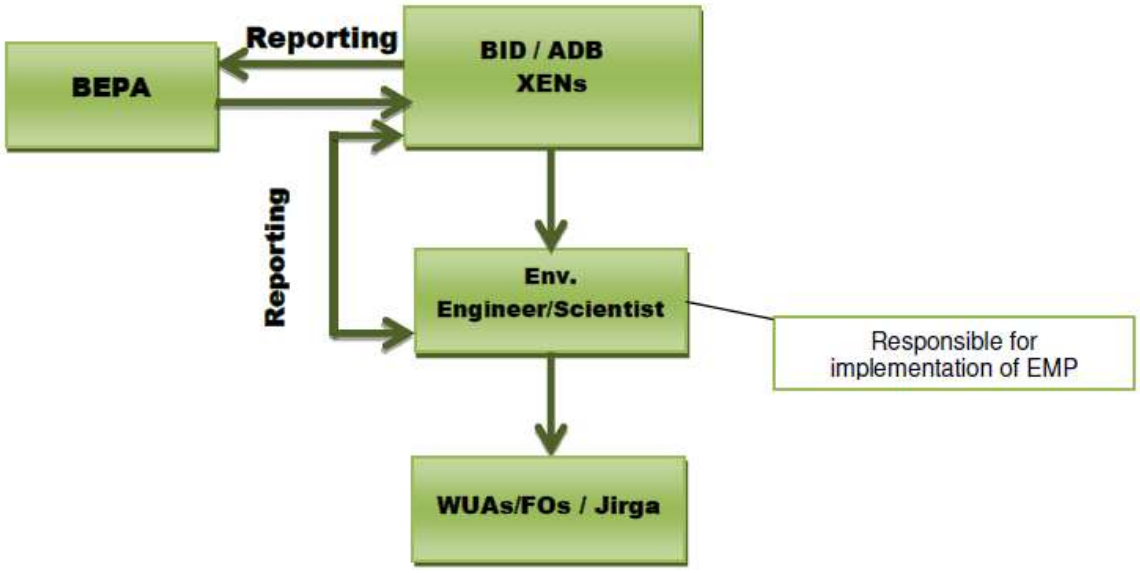
340. The implementation of the proposed EMP involves inputs from various functionaries. Construction Contractor will be primarily responsible for ensuring implementation and reporting of the mitigation measures proposed in the EMP, which will be part of the contract

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**

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

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



- **Roles and Responsibilities**

**8.1.7.1.1.1**

**a) Environmental Engineer/Scientist**

342. 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**

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

### 8.1.8 Environmental Management Plan

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

## Table 8-1 ENVIRONMENT MANAGEMENT PLAN (EMP)

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| **A. Design & Planning Phase** | | | | | |
| 1. | Land acquisition | • Social Issue | • The land acquisition will be carried in accordance with the LAA 1894 and ADB's SPS, 2009 requirements. | BIPD and Revenue Department | BIPD |
| 2. | Assessment of water availability | • Failure of design | • Design works will ensure the assessment of water. Hydrological and flood & drought management analysis shall ensure the feasibility of project success. | Design Engineer | BIPD |
| **B. Implementation & Construction Phase** | | | | | |
| 1. | Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard | • Changes in land use Pattern<br>• Loss of vegetation<br>• Cultural conflict | • Location for establishment of campsite shall be duly discussed and approved by BIPD. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BID before establishment of campsite.<br>• Photographs of site before establishment of campsite shall be taken and it will be responsibility of the contractor to make site better or as good as original. A comparison report shall be submitted to Project Director, BWRDP before release of final payment. Site for camp site shall be selected keeping in view the cultural norms of the area to avoid undue interference of the Construction contractor's staff with the local residents. The land shall be rented for the | Construction Contractor | Supervision Consultant |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| | | | camp site and equipment yard. No resettlement is envisaged for this purpose. | | |
| 2. | Soil Contamination | Soil Contamination by Oil, petrol etc | • The contractor will be required to train its workforce in the storage and handling of materials like oils, diesel, petrol, other chemicals, concrete and cement, etc., that can potentially cause soil contamination.<br>• During on-site maintenance of construction vehicles and equipment, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.<br>• Oils, fuels and hazardous materials will be stored in appropriately banded areas. | CC | SC |
| 3. | Soil erosion/ silt run-off | Phenomenon may pose serious environmental impacts like landslides, slumps, slips and other mass movements. | • Restore/stabilize all the freshly cut surfaces around the borrow pits, steep slopes and along drainage channels as soon as possible;<br>• Seeding or plantation of erodible surfaces;<br>• Planning construction activities in such a way so as to avoid cutting of erodible surfaces and earth movement in rainy season;<br>• Trimming down of slopes; and<br>• The supervisory staff shall ensure timely compliance of these measures to reduce the risk of soil erosion. | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| 4. | Disposal of spoil | Negative impacts including silt runoff, change of land use, sedimentation of receiving water bodies and loss of aesthetic values may be caused on the receiving lands due to improper disposal of spoil. | • The spoil will be disposed of in an environmentally acceptable manner by transporting in enclosed containers and dumping at sites approved by the executing agency. The spoil material shall be filled in layers and properly rolled and sprinkled to avoid any negative environmental impacts. | CC | SC |
| 5. | Surface or Ground water contamination | 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.<br>• The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements.<br>• 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.<br>• 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<br>• Surface water quality monitoring on monthly basis for, Dissolved Oxygen, pH and Electric Conductivity (EC) with portable DO meter, pH meter and EC meter | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| 6. | Improper construction techniques and monitoring | Public inconvenience, traffic jams, unmanaged excavated material and dust problem due to excavation | • The supervisory/ monitoring staff should be experienced and qualified enough to handle the excavated material and its disposal in designated places without harming local environment. Also additional training may be provided. Supervision and training for the contractor's staff shall also be required. | CC | SC |
| 7. | Air Pollution | Dust and exhaust emissions may cause nuisance to the local resident | **Gaseous Emissions**<br>• All vehicles, used during construction activities, shall be in good condition and shall be properly tuned and maintained by the contractor in order to minimize the exhaust emissions;<br>• Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions;<br>• Open burning of solid waste from contractor's camps shall not be allowed.<br>• NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.<br>**Dust Emission**<br>• The material being transported or stored at the stockpiles will be kept covered with plastic to ensure protection of ambient air from fugitive emission during | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| | | | wind storm emissions. | | |
| 8. | Noise and vibration | Disturbances to local residents in the form of increased noise levels and vibration due to movement of construction machinery | • Selection of upto-date and well maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or with appropriate muffling devices;<br>• Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in its use;<br>• Preferably, restricting construction vehicle movements during night time;<br>• Machinery with low noise level or machinery with noise shielding and absorption should be used;<br>• The plants and equipment used for construction will strictly conform to noise standards specified in the NEQS;<br>• Vehicles and equipment used will be fitted, as applicable, with silencers and properly maintained;<br>• In populated areas, the construction activities will be restricted to be carried out between 6 / 7.a.m. and 20:00 p.m;<br>• Public hearings should be held to discuss appropriate solutions and materials to control noise (e.g. mud or brick walls, bushes, etc.); and | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| | | | • In accordance with the Environmental Monitoring Plan noise measurements will be carried out at locations and schedule specified to ensure the effectiveness of mitigation measures.<br>• Noise monitoring on construction sites as NEQS (weekly basis) through Noise meter | | |
| 9. | Accidental damage to utilities in excavated areas | Damage to existing utilities like electricity poles causing inconvenience to the local people. | • Coordination between different utility departments shall be maintained to get the details of existing utilities (if any) before starting construction of the proposed Project.<br>• Have construction crews and supervisors be alert for buried historic, religious, and cultural objects and provide them with chance find procedures to follow if such objects are discovered. Provide incentives for recovery of objects and disincentives for their destruction. | CC | SC |
| 10.. | Traffic disruption | Disruption to flow of traffic especially in the area where excavation would be done on main village road; operation of excavator and movement of vehicles carrying construction materials will certainly hamper the existing traffic movement. This may cause inconvenience to public mobility. | • Construction traffic hindrance should be avoided by providing proper diversion and signage.<br>• Traffic management plan will be prepared by the contractor after consultation with RE for its implementation. | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| 11. | Occupational Health and Safety | Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling and transport of hazardous construction material.<br>Spread of COVID-19 to workers and community | • 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.<br>• Working at heights and in confined spaces should be done after obtaining approvals from the safety supervisors and should regularly be monitored.<br>• Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them.<br>• 24 hours' security should be provided by the contractor at the Labor Camp and Batching Plant.<br>• Taking into account the prevailing pandemic situation and the guidance issued by Government of Pakistan "Health & Safety of Building and Construction Workers during COVID-19 outbreak", the contractor will prepare Site Specific 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/ | CC | SC |
| 12. | Rain effect | Extreme weather conditions such as rainfall during the monsoon season. | • Construction work should be phased in such a way that meets the demand of the climatic variations of the project area. | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| 13. | Flora | Cutting of shrubs, bushes and some trees may get involved during the construction phase of the proposed project resultant to disturb the existing ecology of the area. | • The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.<br>• The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands.<br>• Five (5) saplings of plants should be planted in compensation of cutting of one (01) tree. | CC | SC |
| 14. | Fauna | Fauna may also be disturbed during the construction phase of the project. | • Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will warn their labor accordingly. | CC | SC |
| **Social Impacts during Construction Phase** | | | | | |
| 1 | Impacts on Local Communities/ Work force | During the construction phase, general mobility of the local residents and their livestock in and around the project area is likely to be hindered. Likewise access to the natural resource may be affected. This particularly applies to the women and children. | • The contractor will ensure that the mobility of the local communities, particularly women and children, and their livestock should not hinder by the construction activities. The contractor will provide alternate and safe track for community quite at a distance away from the construction areas. Similarly, appropriate crossing points will be provided at the access road during its construction for daily works and having free access to the natural resources of the local population. | Construction Contractor | Supervision Consultant |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| 2 | Social disruption | The presence of outside construction workers inevitably causes some degree of social disruption and even active disputes with the local community as a result of social/cultural differences. | • The Contractor will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly. | CC | SC |
| 3 | Safety and noise hazards | The night time working will be having intrinsic problems relating to safety and noise hazards for the communities. | • It is desirable that the night time working may be avoided at places where settlements are very close to the construction sites.<br>• The Contractor will share the plan and schedule of night time working with the Supervision Consultants for approval. | CC | SC |
| 4 | Gender Issues | The rural women actively participate in outdoor socio-economic activities such as livestock rearing, bringing of potable water, etc. which may also be affected by the project activities.<br>The induction of outside labor may create social and gender issues due to the unawareness of local customs and norms. | • The Contractor will have to select specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population particularly women.<br>• Contractor will warn the staff strictly not to involve in any un-ethical activities and to obey the local norms and cultural restrictions particularly with reference to women. | CC | SC |
| 5 | Safety Hazards for local people | Occurrence of accidents/incidents during the construction activities. | • All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.<br>• Protective fencing to be installed around the Camp to | CC | SC |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility | |
|---|---|---|---|---|---|
| | | | | Execution | Monitoring |
| | | | avoid any accidents. | | |

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

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility |
|---|---|---|---|---|
| **C. Operation & Maintenance Phase** | | | | |
| 1. | Adequacy of operation and maintenance (O & M) | No or Inadequate operation and maintenance of canal will be main hindrance to obtain project objectives | • Carrying out repair of damaged canal linings if any bank holes, repairs of cattle and washing 'ghats' and carry out extensive annual maintenance programmes on structures and canal, and insurance of adequate irrigation water supply at the tails in the proposed canal command area.<br>• The investment made must be maintained in the long term, off-farm O & M will be the responsibility of the project and it should be sustainable.<br>• Ensure community participation in management and operation of the irrigation system and provide necessary training about it.<br>• Maintenance of on-farm structures will be the | EA Staff |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility |
|---|---|---|---|---|
| | | | responsibility of the individual landowner. | |
| 2. | Conflicts caused by unavailability or improper distribution of water in the area | Social issues | • Agreements between different communities/tribes<br>• Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face<br>• 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.<br>• 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. | EA Staff |
| 3. | Disposal waste (connection of waste streams) in the Canal | Degradation of irrigation water and Health issues | • Proper monitoring of canal alignment and disconnect all identified waste streams | EA Staff |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility |
|---|---|---|---|---|
| 4. | Use of fertilizers & pesticides | • Banned fertilizer & pesticides will cause health issues<br>• 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;<br>• 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. | EA Staff |
| 5. | Risk due to Natural Hazard i.e. Flooding and Earthquakes | System sustainability | • Emergency Response Plan for Breaching of Canal will be followed | EA Staff |
| 6. | Flora (Vegetation) | To maintain and look after the plantation | • The plant species planted against the trees cut should be properly maintained throughout their initial growth period in terms of water requirement and necessary nutrients. Therefore, proper care of newly planted trees will need special care;<br>• An awareness campaign targeted on the neighborhood farmers will be carried out to popularize the planting of trees. Saplings should be provided on subsidized rates.<br>• Raising of dense plantation on both sides of the canal | EA Staff |

| S. No. | Aspect | Project Impact | Mitigation Measures | Responsibility |
|---|---|---|---|---|
| | | | will not only mitigate the adverse impacts of construction on vegetation, but it will also improve the landscape appearance and enhance its aesthetic beauty. Enough space is available as service area on both sides of the proposed canals for raising sufficient number of plants species; | |
| 7. | Fauna (Animal community) | To provide alternate crossings for animals and livestock | • Provision of animal / livestock alternate road crossing at suitable locations to facilitate their movement and Installation of sign board for the link users to avoid accidents.<br>• Passages and alternate crossings will be looked after properly for clearance and available for the free movement of the wild life and livestock. | EA Staff and wildlife department |

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

### 8.1.9 Planning for Implementation of EMP

345. NOC and Other Approvals

- **BEPA Approval Process**

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

- **Stakeholder Coordination**

347. 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.

348. 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.

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

## 8.2 Training

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

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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.

352. The training consultant will organize training courses for Proponent and Contractor staff to train them in specialized areas such as air and noise pollution monitoring and water quality monitoring etc. The details of this training program are presented in Table 8-3.

**Table 8-3: 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<br>• Contractor<br>• project staff<br>• Project Implementation Staff | 1 day |
| Training consultants/ organizations specializing in social management and monitoring | Short seminars and courses on: Social awareness | • Project staff dealing<br>• in Social/lands<br>• 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 |

## 8.3 Communication & Documentation

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

- **Data Recording and Maintenance**

354. 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**

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**

355. 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.

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

- **Social Complaint Register**

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

- **Photographic Records**

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

Grievance Redressal Mechanism

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

- ***Principles***

360. 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.

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

362. All minor complaints regarding land or property disputes that can be resolved should be resolved immediately on the site at the village level Displaced Person Committees (DPCs)/ Farmer Organizations (FOs). In case the concerned parties are unable to resolve the said dispute on the site, the DP may make a complaint to the Grievance Redress Committee (GRC) at the subproject level/district/basin level (PMO/PIO), the details of which

are provided herein below. The focus of the GRM is to resolve issues in a customarily appropriate fashion and record details of the complaint, the complainant and the resolution.

### ❑ ***Objectives***

363. The objectives of the GRM are to:

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

### ❑ ***Structure of Grievance Redress Mechanism***

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

#### *1. Displaced Person Committees (DPCs)*

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

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

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

366. 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.

367. 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.

368. 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.

369. GRC will perform following functions:

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

### 3. *BID/ Project Level*

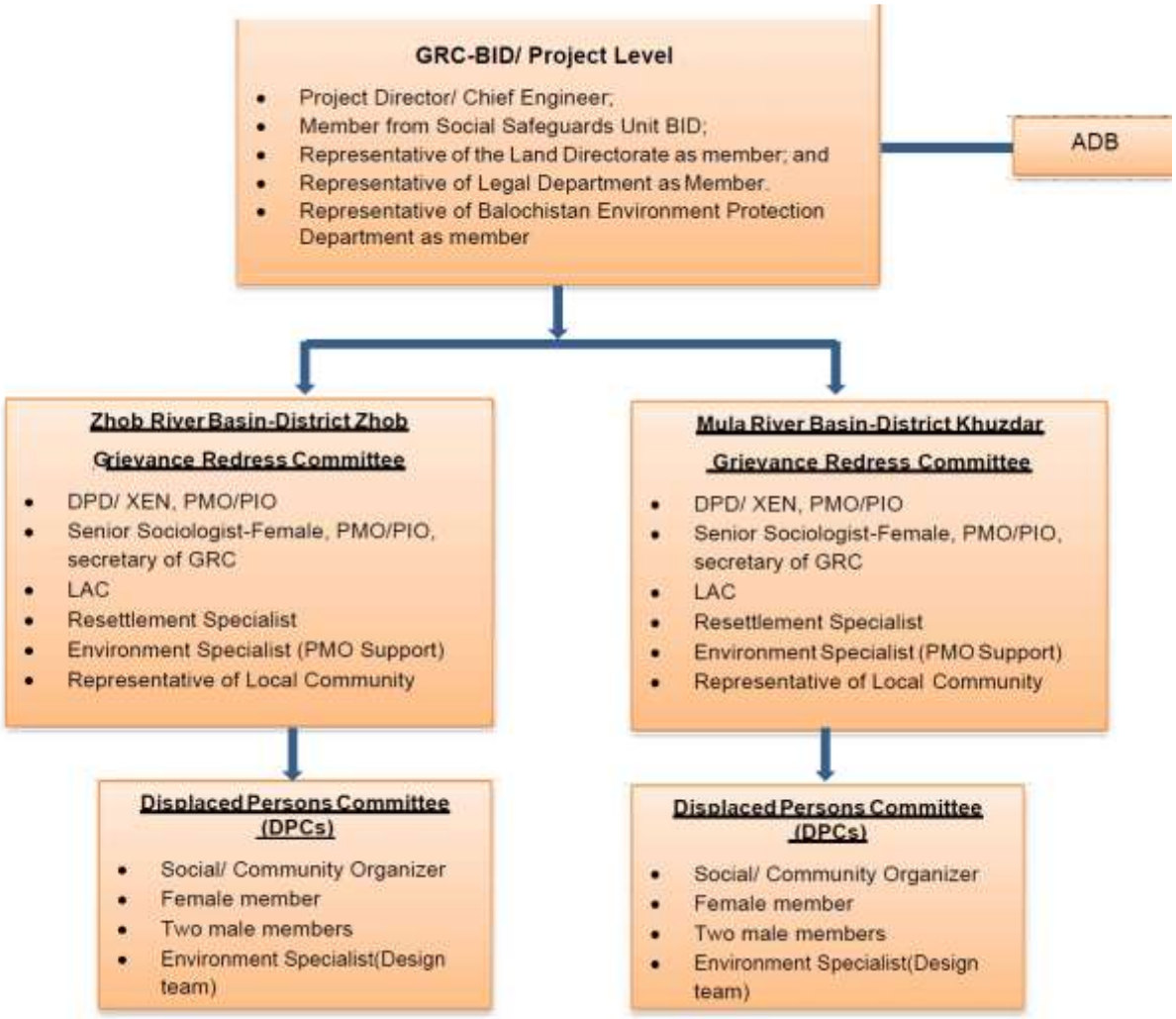
370. BID shall constitute a Grievance Redress Committee (GRC) at BID/ project level. The committee will have following composition:

- 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.

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

**Figure-1: Organogram for GRM**




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

- ***Grievance Redress Proceedure***

373. 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:

374. 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.

375. 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.

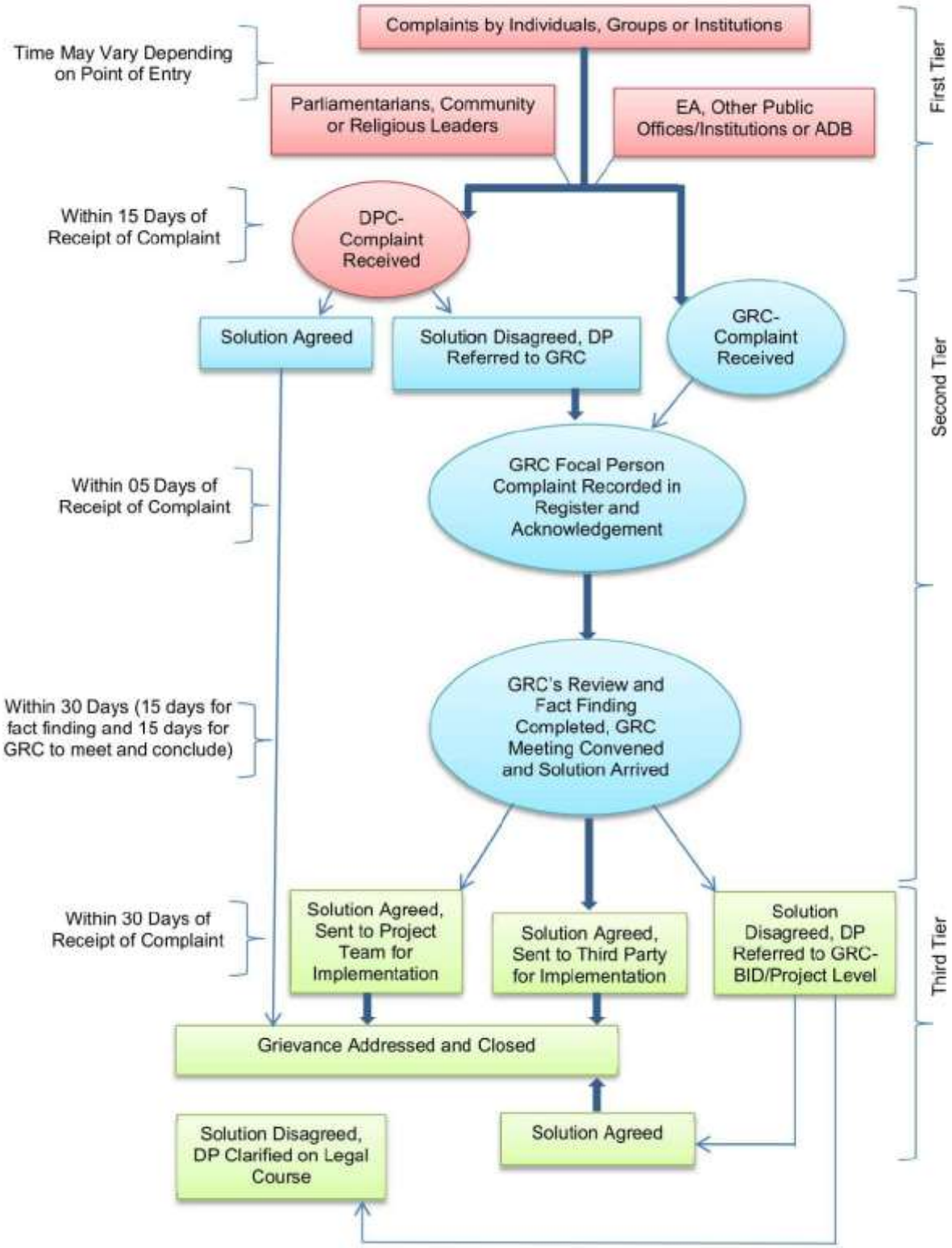
376. Disputes on land title, land compensation awarded and payable under law and apportionment of compensation will be dealt under the grievance redress mechanism provided in the LAA-1894. Environmental issues will be dealt according to Balochistan environmental protection act 2012 and ADB SPS 2009 guidelines.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

**Table-30: 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.<br><br>**b.** If unsettled, grievance can then be lodged to the GRC or DOR/LAC to proceed | **a.** First, complaints resolution will be attempted at site (village level) through the involvement of the PMO/DPC/FO.<br><br>**b.** If unresolved, a grievance will be lodged to the GRC, which will acknowledge receipt of |

| | |
|---|---|
| under law and communicate decision in least possible time.<br><br>**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.<br><br>**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. | the complaint within 5 days.<br><br>**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.<br><br>**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**



## 8.4 Environmental Management Cost

377. The budget presented in Table 8-4, 8-5 & 8-6 will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

## Environmental Management Cost

**Table 8-4. 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** | | | | | | |
| Air quality | CO, NOx, SOx, $PM_{10}$ | Construction site, batching plant site, and access road/borrow area, nearby village (SC will guide) | 4<br>(Total= 32) | Quarterly | Proponent[1]<br>(though Environmental lab) | 800,000 |
| Ground Water Quality | Physical-chemical parameters, biological contamination, heavy metals | Nearby Construction site | 1<br>(Total=8) | Quarterly | Proponent (though Environmental lab) | 112,000 |
| Surface Water Quality | Physical-chemical parameters, biological contamination, heavy metals | Nearby Construction site and community | 2<br>(Total= 16) | Quarterly | Proponent (though Environmental lab) | 224,000 |
| Noise Level | | Construction site,camp site, access roads, nearby community | 4<br>(Total= 32) | Quarterly | Proponent (though Environmental lab) | 64000 |
| **A. Sub-Total** | | | | | | **Rs.12,00000** |
| **During Operation & Maintenance Period(one year)** | | | | | | |
| Air quality | CO, NOx, Sox, $PM_{10}$ | PMU will guide | 2<br>(Total = 4) | Bi-annually | Proponent(BID) | 50000 |
| Ground Water Quality | Physical-chemical parameters, biological contamination, heavy metals | | 1<br>(Total = 2) | Bi-annually | Proponent(BID) | 28,000 |
| Surface Water Quality | Physical-chemical parameters, biological contamination, heavy | | 1<br>(Total = 2) | Bi-annually | Proponent(BID) | 28,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | metals | | | | | |
| Noise Level | | | 4<br>(Total = 8) | Bi-annually | PMU, BWRDP | 16,000 |
| **B. Sub-Total** | **Rs. 1,22000** | | | | | |
| **Total (A+B)=** | **Rs. 13,22000** | | | | | |

**Table 8-5: Cost of Proponent**

| Sr. No | Description | Amount |
|---|---|---|
| 1 | Environmental Monitoring cost for construction & operation period (from Table 8-4) | Rs. 13,22000 |
| 2 | Tree Compensation cost | Rs. 300000 |
| 3 | Tree Plantation Cost | Rs. 200000 |
| 4 | Training & Community Engagement Cost | Rs. 150,000 |
| **Total Cost** | **Rs. 19,72000** | |

**Table 8-6: Cost of Contractor**

| Sr. No | Description | Amount |
|---|---|---|
| 1 | Contractor Environmental Engineer salary @ Rs. 80,000/month | Rs. 19,20000 |
| 2 | Health & safety measures to manage COVID-19 | Rs. 500,000 |
| 3 | Noise monitoring, Dissolved Oxygen, pH and Electric Conductivity (EC) of the water Monitoring on Monthly Basis[2] | Rs. 250,000 |
| **Total Cost** | **Rs. 26,70000** | |

**Total EMP Cost = Rs. 46,42000**

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

# 9. COCLUSIONS AND RECOMMENDATIONS

## 9.1 GENERAL

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

**Findings and Recommendations**

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

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

381. No involuntary settlement is involved. No indigenous persons reside or will be affected by the proposed interventions in the areas of influence. Land owner of land on which new Perennial Irrigation Canal will be constructed will give land free of cost, and one encroacher will be compensated.

382. 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.

383. 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.

384. 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.

385. 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.

386. 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. 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.

387. 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.

388. 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.

389. 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.

## 9.2 Conclusions

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

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

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

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