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Pashta Khan And Garambowad PIS Subproject

Prepared by Balochistan Irrigation Department and Agriculture and Cooperatives
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NOTES

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**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
PASHTA KHAN AND GARAMBOWAD PIS SUBPROJECT**

August 2021

A Joint Venture of
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Balochistan Water Resources Development Sector Project**

IEE Report OF PASHTA KHAN

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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
H ₂ S	Hydrogen Sulphide
IEE	Initial Environmental Examination
EHS	Environment, Health and Safety
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
MCM	Million Cubic Meter
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NO _x	Oxides of Nitrogen
NTU	Nephelometric Turbidity Unit
PEPA	Pakistan Environmental Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PHE	Public Health Engineering Department
PIS	Perennial Irrigation Schemes
PMD	Pakistan Meteorological Department
PPC	Pakistan Penal Code
PPEs	Personal Protection Equipment

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

EXECUTIVE SUMMARY

A. INTRODUCTION

1. This report presents the findings of an Initial Environmental Examination (IEE) study for the proposed Pashta Khan and Garambowad (PIS) Sub-project located in Mula 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 schemes are located north-east of Khuzdar in Pashta Khan area at a distance of about 64 km, that is 28 km north via N-25 Highway (RCD Highway) to Baghbana area and 36 km East on unpaved road and hilly track to scheme location. Pashta Khan and Garambowad (PIS) sub-projects are located at a distance of 7 km from each other and situated on Anjira River which drains into Mula River near Pashta Khan. It is located in tehsil Mula, district Khuzdar, Balochistan. Both schemes are taken as a single sub-project due to their close proximity and smaller size.

3. Main components of the sub-project consist of a 120 m long weir with a 3.5 km long perennial Irrigation channel and flood protection bunds, at Pashta Khan for irrigating command area of 753 ha and an off-take well with 5.5 Km long irrigation canal and flood protection bunds, were opted for Garambowad for irrigating command area of 94 ha. About 376 ha of potential command area was observed, which could be cultivated under sub-project.

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. In Pashta Khan, a weir is proposed to divert perennial flow to command area, which will assure extension of command area on higher elevations. The available perennial water will be utilized for irrigating extended command area so that farm income and livelihood of local people will be improved. In Garambowad, an off-take well is proposed to provide sustainable irrigation water to existing and available command area of Garambowad village along the river. The sub-project will also provide protection bunds along some reaches of channel, which is in toe of hills, to preserve it from floodwater. Availability of water round the year will increase productivity of area and enhance income generation activities in area.

8. Two options were considered for both locations. The first being an off-take well, as head works, with flood protection for command area with cross drainage structures. The other option being infiltration gallery along with lined irrigation channel up to command area. From economic analysis, option 2, a weir with conveyance system and flood protection bunds, were opted for Pashta Khan for irrigating command area of 753 ha and option 1, an off-take well with proper conveyance system and flood protection bunds, were opted for Garambowad for irrigating command area of 80 ha. About 376 ha of potential command area was observed, which can be cultivated under sub-project. The interventions of sub-project are given in the following Table A.

Sr. No.	Type of structure	Weir
Salient features of Pashta Khan		
1.	Coordinates of Weir	282525.34 m E, 3111470.28 m N Zone 42R
2.	Length of Weir (m)	120
3.	Height of Weir (m)	1.25
4.	Total Length of Canal (m)	16,500
5.	Left Canal (m)	6,500
6.	Right Canal (m)	10,000
7.	Time Division Structures (Nr.)	10
8.	Cross Drainage Structure (m)	300
9.	Fall Structures (Nr.)	8
10.	Flood Protection Bund (m)	1,381
11.	Water Storage Tanks (Nr.)	3
12.	Washing Structures (Nr.)	3
13.	Animal Drinking Structure (Nr.)	3
14.	Command Area (Ha)	753
Salient features of Garambowad		
1.	Coordinates of Off-take Well	278458.06 m E, 3116760.68 m N Zone 42R
2.	Length of Canal (m)	5,500
3.	Time Division Structures (Nr.)	5
4.	Cross Drainage Structure (m)	100
5.	Fall Structures (Nr.)	4

Sr. No.	Type of structure	Weir
6.	Flood Protection Bund (m)	1,125
7.	Water Storage Tanks (Nr.)	2
8.	Washing Structures (Nr.)	2
9.	Animal Drinking Structure (Nr.)	1
	Design Command Area (Ha)	94

D. PROJECT ALTERNATIVES

9. Two options were considered for both locations. The first being an off-take well, as head works, with flood protection for command area with cross drainage structures. The other option being infiltration gallery along with lined irrigation channel up to command area. From economic analysis, option 2, a weir with conveyance system and flood protection bunds, were opted for Pashta Khan for irrigating command area of 753 ha and option 1, an off-take well with proper conveyance system and flood protection bunds, were opted for Garambowad for irrigating command area of 80 ha. About 376 ha of potential command area was observed, which can be cultivated under sub-project.

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

Table B: Comparison of Alternatives

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

E. BASELINE CONDITIONS

- **Land Use:** The land rights are equitable and all residents have share in land. The land of Pashta Khan and Mengalabad is reported in cadastral record while land of Grambowad has no settlement record. The cultivated land in sub-project was 833 ha, which includes 753 ha in Pashta Khan and 80 ha in Grambowad. Farmers prefer to use floodwater for irrigation as it brings sediments enriched with nutrients and thus results in reduced fertilizer cost.
- **Geology:** The geological features of sub-project comprise of Eocene and Paleocene Sedimentary rocks. Areas adjacent to sub-project, including parts of command area, have underlying Cretaceous and Jurassic Sedimentary rocks.
- **Soils:** Soils in area generally comprise of shallow clay and clay loam. The area also comprises of shallow gravelly soil. The soils are slightly or moderately calcareous. No salinity-sodicity was encountered in these soils. The water is slightly saline, but not sodic.

- **Climate:** Khuzdar is at the apex of a narrow valley at an elevation of 1,237 metres (4,058 ft). Despite this altitude, Khuzdar like most of Balochistan has an arid climate with very low and erratic rainfall. Unlike most parts of the province, the heaviest average rainfall comes from the Asian monsoon in July and August, though this rainfall tends to be very erratic and, in many summers, there is no significant rain at all.
- **Surface Water:** According to hydrological study, an average annual gross estimated water availability of 31.5 MCM and 44.1 MCM at Garambowad and Pashta Khan sub-projects respectively. 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 Khajoor ,Babbur, Kandi, Devi, Kirri, Ber, Gujo, Merin, Gugul, Chill, Kulumurak, Grass: Nadak,
- **Fauna** includes Mammals: Asiatic Jackal (*Canis aureus*), Cape hare (*Lepus capensis*), Porcupine (*Hystrix indica*), Hedgehog(*Hemiechinus auritus megalotis*), Bush rat (*Goluda ellioti*) etc. Birds: Black Bittern (*Dupetor flavicollis*), Lesser Kestrel (*Falco naumanii*), See see partridge (*Ammoperdix griseogularis*), Grey Partridge (*Francolinus pondicerianus*), a number of sparrows, Finches, buntings, seasonal/migratory waterfowls, hawks, and sand grouse etc. Reptiles: Indian Cobra (*Naja oxiana*), Easter dwarf skink (*Ablepharus pannonicus*), Leaf nose viper (*Eristicophis macmahonii*) etc.
- **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 land and water rights mainly belongs to different clans of Zehri tribe including Nathwani, Bastohiand also some other tribes including Hasrani and Jattak. About 406 landholding households were reported in sub-project, which includes 200 Pashta Khan, 82 Grambowad and 124 Mengalabad.
- **Ethnicity and Tribes:** The main tribe living in the sub-project area are Zehri, Nathwani, Mengal, Channar, Daggani and Jattak. Brohi is spoken as the major language in the area while small number of the people can speak Urdu. The communities belong to Muslim religion group.
- **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 the current social survey, the literacy rate of the studied killies was less than 5 percent. These 5 percent were found only primary class education in male respondents. Amongst the female, out of 50 respondents, only 01 female was primary education. There is need to establish educational institutions in each killi to improve.
- **Livelihood:** Severe poverty prevails in the killies. Their lives are miserable due

to shortage of resources. The main occupation of the people of the project areas are agriculture and livestock rearing. The most of the farmers supplement their income from labor and shop keeping, transporters, private and government jobs etc. For cattle and sheep rearing large tracts of grazing land are still available. The monthly farm income ranged from Rs.4000 to 5000 while Rs.4000- to 4500 from off-farm income was recorded. The community hardly fulfill their domestic needs from their limited resources of income. There is potential to grow every type of fruit plants but due to shortage of water, could not sow. With the rehabilitation of water channels, the farmers would be able to plant fruit trees to generate income resulting reduce the poverty.

- **Social Facilities and Pressing Needs:** The situation regarding social facilities is very alarming in the sub-project area. No social and civic facilities were available in the surveyed killies. There was no facility of health in the local villages and residents have no direct access to the metaled road. Facilities of public transport are also very poor. Facilities of drinking water, sanitation and health are also missing. The facilities of primary school for boys and girls were available in both surveyed killies, but local communities were not satisfied because of poor buildings and non-availability of trained teaching staff.
- **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. At present, farmers are practicing agriculture from Mula River flow and rain fall water is also support for farming. Flood is damaging the standing crops during rainy season. Cropping is done during both the cropping seasons that is kharif and rabi for cultivation of cotton, rice, maize, onion, wheat, kharif - rabi vegetables, and fodders (sorghum & berseem/shaftal) under existing conditions depending upon farmers economic conditions.
- **Communications:** The schemes are located in north-east of Khuzdar in Pashta Khan area at a distance of about 52 km, that is 28 km north via N-25 Highway (RCD Highway) to Baghbana area and 24 km east on unpaved road and hilly track to scheme location.

F. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11. The risk assessment matrix is provided as Table 2 below.

Table 2: Impact Assessment Matrix

Activity / Impact	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
Design Phase				
Flooding	Likely	Major	High	Low
Seismic damage	Likely	Moderate	Medium	Low
Land Acquisition	Unlikely	Minor	Low	Low
Construction Phase				
Air Quality	Likely	Moderate	Medium	Low
Noise Pollution	Likely	Moderate	Medium	Low

Vibration impacts	Likely	Minor	Medium	Low
Solid waste generation incl. Spoil material	Likely	Moderate	Medium	Low
Resource Conservation	Likely	Minor	Medium	Low
Soil Contamination	Likely	Moderate	Medium	Low
Soil erosion/ silt run-off	Likely	Moderate	Medium	Low
Community Health and Safety	Likely	Minor	Medium	Low
Occupational Health and Safety	Likely	Moderate	Medium	Low
Traffic management	Likely	Minor	Medium	Low
Flora	Likely	Minor	Medium	Low
Fauna	Likely	Moderate	Medium	Low
Use of local water resources	Likely	Moderate	Medium	Low
Contamination of water resources	Likely	Moderate	Medium	Low
Social and Cultural Conflicts	Likely	Minor	Medium	Low
Religious and Cultural Heritage	Unlikely	Minor	Low	Low
Operation Phase				
Adequacy of O&M	Likely	Major	Medium	Low
Waste disposal in Canal	Unlikely	Minor	Medium	Low

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

- Land acquisition:** The improvement/rehabilitation works of the existing channels will not involve any land acquisition or demolition of any built up private properties as all civil works will be confined within the existing ROW. The Pashta Khan and Grambowad Perennial Irrigation Scheme included the improvement/rehabilitation of existing channels owned by BID and no additional land will be acquired. As per design, the rehabilitation activities will require 10.4 acres of land and the same quantity of land is already available owned by Balochistan Irrigation Department (BID). Temporary acquisition of land may be required for the contractor's construction and accommodation facilities.

Mitigation Measures: 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. By adopting the aforementioned measures, the impact would be of low significance. Contractor will be responsible to make contract with land owner(s), for temporary land acquisition on rent and will share contract agreement with PMO.

- Disposal of Soil Material:** Spoils will be generated from the excavation activities of channels and distribution canals. Disposal of spoil / surplus material may cause negative environmental impacts, if not properly mitigated during implementation of the proposed project. Potential impacts from spoils and its disposal are (i) land for disposal of spoil, (ii) conversion of those land areas 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:** During construction activities of the proposed project, 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 (NO_x), and particulate matter (PM). These emissions can deteriorate the ambient air quality of the project site and along the road leading to it. Furthermore, fuel combustion will also release smoke emissions.

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 (SSHSM) and a Standard Operational Procedure (SOP) to manage COVID-19 risks.

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

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

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

- **Use of local water resources:** There will be 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 purpose 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

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

G. ENVIRONMENTAL MANAGEMENT PLAN

14. 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.

15. 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 BID 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 (BID), District Environmental Officers of Khuzdar, Water User Associations (WUA) & Farmer Organizations (FOs) Chairman and Vice Chairman. BID will get input from WUA and FOs, randomly check the project operation in context of EMP and report to District Environment Officers annually.

16. 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

17. The EMP budget for the construction and operation phases of the project is 11.85 million PKR including training cost.

H. CONCLUSION

18. 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.

19. 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.

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

21. 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.

22. 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 therefore, it should be approved for implementation.

1. INTRODUCTION

1.1 GENERAL

23. 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.

24. 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.

25. 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.

26. 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.

27. 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.

28. The assignment under consideration involves conducting an Initial Environmental Examination of the Pashta Khan & Garambowad Sub-project (that is one of 11 sub-projects of the two river basins) proposed subproject in the Mula River Basin.

29. 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.

30. 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 PASHTA KHAN & GARAMBOWAD PIS SUBPROJECT

31. Areas of Pashta Khan and Garambowad are located at a distance of 7 km from each other on Anjira River which drains into Mula River near Pashta Khan. Schemes were bundled as one sub-project due to close proximity of smaller schemes. The infrastructure including head regulators, channels and other hydraulic structures were designed in isolation. Both the schemes were considered as one sub-project.

1.3 PROJECT LOCATION

32. Pashta Khan perennial irrigation scheme is proposed on Anjira River, a tributary of Mula River, in Pashta Khan. It is located in tehsil Mula, district Khuzdar, Balochistan. The proposed Pashta Khan weir lies in UTM Zone 42R at 282525.34 m E, 3111470.28 m N about 55.0 km from Khuzdar. Whereas Garambowad perennial irrigation schemes is located on Anjira River about 60 km from Khuzdar via Pashta Khan Road. The proposed Garambowad off-take well is located at elevation of 1173.0 m, UTM Zone 42R, 278458.06 m E, 3116760.68 m N. Garambowad village is located on left bank of river.

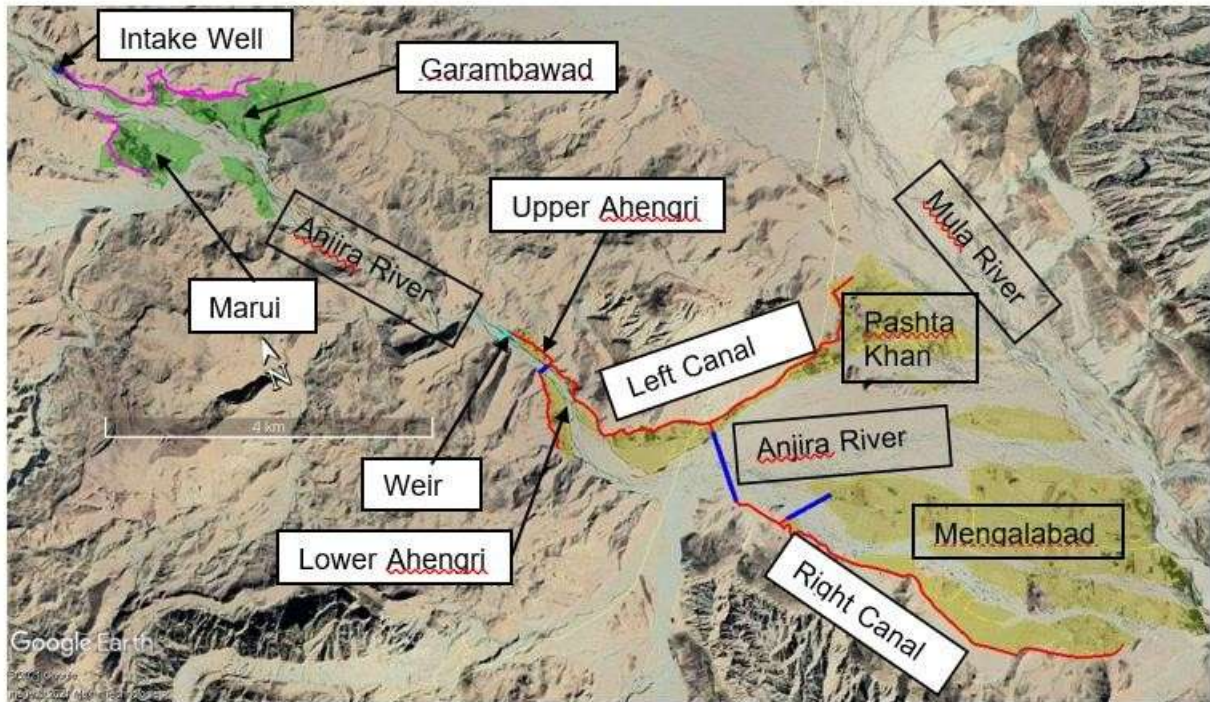
33. The schemes are located in north-east of Khuzdar in Pashta Khan area at a distance of about 52 km, that is 28 km north via N-25 Highway (RCD Highway) to Baghbana area, and 24 km east on unpaved road and hilly track to scheme location. Both schemes are located on bents at both right and left banks of Anjira River, surrounded by high mountains having little area on flat terrain (Figure 1-1).



Figure 1-1 Location of the Subproject

1.4 LAYOUT OF SUB-PROJECT

34. The subproject consists of a weir with conveyance system and flood protection bunds, at Pashta Khan for irrigating command area of 753 ha and an off-take well with proper conveyance system and flood protection bunds, were opted for Garambowad for irrigating command area of 94 ha. About 376 ha of potential command area was observed, which can be cultivated under sub-project. The layout of the project is shown in the Figure 1.2.



1-2: Layout of the Sub-project

1.5 SCOPE OF WORK

35. 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 Pashta Khan 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 by 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

36. The apex Pakistani law governing the subject of environment is the Pakistan Environmental Protection Act – 1997 (PEPA-97). Under Section 12 of the Act, it is mandatory for the proponents of the projects, 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.

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

38. 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.

39. For ADB's SPS, all loans and investments are subject to categorization in order 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.

40. 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 its potential adverse environmental impacts on human populations or environmentally important areas, (e.g., wetlands, forests, grasslands, and other natural habitats) are less adverse, site-specific, and reversible with the exception of a few.

41. According to ADB, an IEE is required for projects classified as 'Category B' in order to assess the potential for significant environmental impacts. Public consultation is a mandatory task that must be carried out as part of the IEE process.

42. Based on the above requirements of national and provincial regulations, as well as the ADB policy, an IEE of the proposed project has been carried out.

43. 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.

44. The IEE report has been prepared to ensure adequate environmental and social management during the lifecycle of the project for the previously mentioned interventions of the Pashta Khan and Garambowad subproject Schemes.

45. 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.

46. 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 for environmental management of project.

1.7 MORE SPECIFIC OBJECTIVES OF IEE REPORT

47. 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 the ADB safeguards policies 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

48. 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

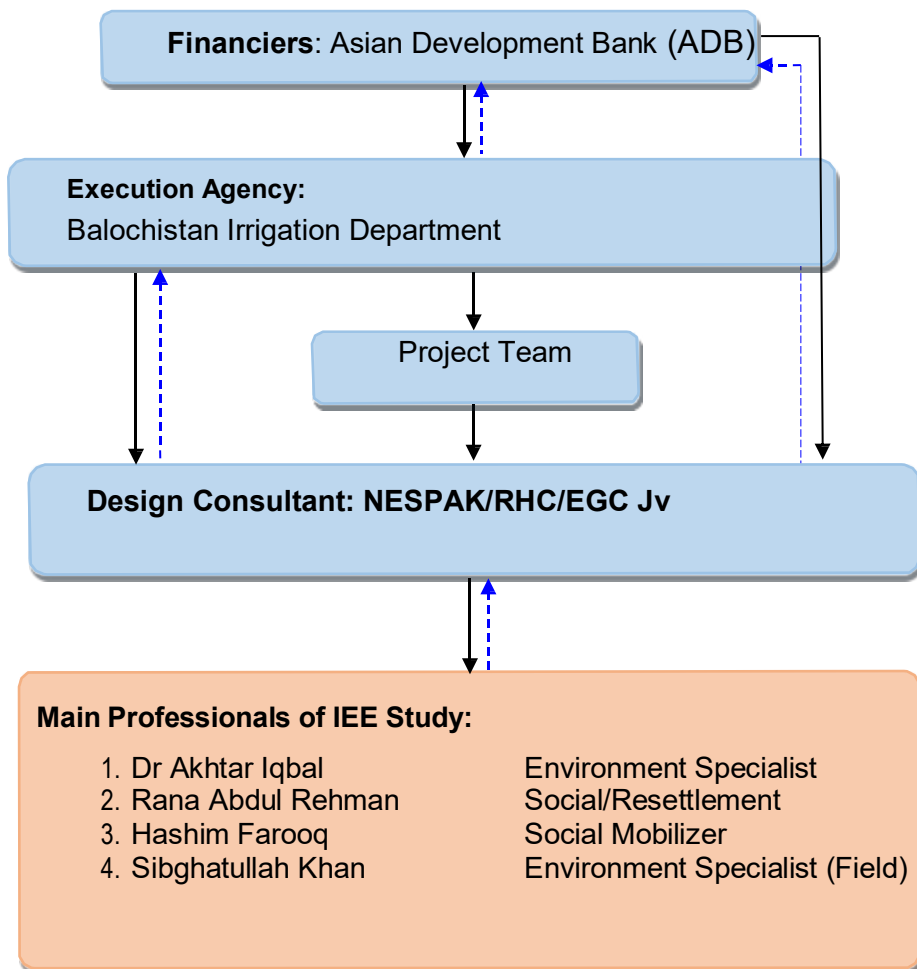
Chapter No. 6: Public Consultations

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

49. 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

50. 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.

51. 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 would be drawn up based on the NCS. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP).

52. 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.

53. 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

54. 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.

55. 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

56. 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.

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

58. "For the irrigation water, the strategy is clear that evolving Water Resource Management System and Institutional Framework will be central to sustainable water use in the province. The theme is pillared on undertaking river basin wide management of water with greater focus on the flood irrigation Sailaba, and creating water storages on all strategic locations in the river basins and handling the Sailaba irrigation and dams command area in an integrated manner. Under the Strategy, GoB will support establishment of Drip Irrigation Manufacturing Plants in the province under PPP mode for providing either front-end or back-end subsidy to get a system introduced with full institutional support. There is an 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

59. 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.

60. 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 were 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 have 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.

61. 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 based on field surveys, including detailed engineering design, and prepare all necessary documents required for decision making.

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

2.6 ENVIRONMENTAL LEGISLATIONS

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

2.6.1 National Regulations

64. 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

65. 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

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

67. 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

68. After the 18th Constitutional amendments, the subject of environment vides 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.

69. 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.

70. 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).

71. 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

72. 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.

73. 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.

74. 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

75. 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 act 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.

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

2.6.6 The Antiquities Act, 1975

77. 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

78. 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

79. Government of Pakistan issued Guidelines “Health & Safety of Building and Construction Workers during COVID-19 outbreak” to Managing COVID-19 Risks while Commencing Work in Construction Project, on 11 April 2020. Taking into account these guidelines, the contractor will prepare 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

80. 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

81. 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

82. 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

83. 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

84. 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)

85. 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.

86. 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

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

88. The IEE 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”.

89. In the light of significance attached by ADB to various environmental impacts, Project is classified as ‘Category B’ project, wherein an IEE is required.

90. 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. The results of the assessment indicate that the projects are unlikely to cause significant adverse impacts. This 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.

91. Thus, an 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

92. 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 SPS-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's are informed and consulted during project preparation and implementation.

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

Table 2-1 ADB Safeguard Policy 2009 Relevant to Project

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

		are culturally appropriate, and gender and intergenerationally inclusive.	proposed project.
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2.8.3 ADB’s Accountability Mechanism Policy 2012

94. The Accountability Mechanism aims to provide an independent and effective forum for people impacted by ADB-assisted projects to voice their concerns and seek solutions, as well as to request a compliance review of any 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.

95. 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.

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

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

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

2.8.5 Relevant International Treaties

- **Convention on Biological Diversity**

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

98. 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**

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

2.9 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS

100. 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.

101. In order to select the most stringent standards applicable, a comparison of local (NEQS) and international i.e., International Financing Corporation (IFC)/ World Health Organization (WHO) and United States Environmental Protection Agency (USEPA) regulations have been made, as shown in Table 2-2 below. For air quality, comparison was only possible for pollutants having same averaging periods in NEQS, IFC and WHO. WHO for ambient air quality are more stringent in comparison to USEPA and NEQS standards, in the case of most pollutants. So, WHO standards will be used.

102. Similar to the standards for air quality, the comparison of noise standards provided in Table 2-3 clearly shows that NEQS for noise are more stringent in comparison to the WHO/IFC standards so these will be used to compare with baseline noise values. The only exception is the daytime noise level standard for Industrial areas where the WHO/IFC standard is more stringent (70 dB (A)) in comparison to NEQS (75 dB (A)) and so for this particular parameter, the WHO/IFC standard will be used.

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

104. Similar to the standards for air and noise quality, the comparison of drinking water quality standards provided in Table 2-4 clearly shows that NEQS for biological and physical parameters of drinking water quality are same as for WHO standards except for Total hardness as CaCO₃. NEQS for chemical, toxic inorganic and organic parameters are mostly similar/comparable to zinc, residual chlorine, Phenolic compounds (as Phenols) mg/l, Polynuclear aromatic hydrocarbons (as PAHs) g/l. WHO for Lead and Zn are more stringent comparatively. No WHO standards will be used to compare with baseline values.

Table 2-2 Applicable Most Stringent Air Quality Standards*

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

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

Table 2-3 Applicable Most Stringent Noise Standards

Category of Area/Zone	Limit in dB(A) Leq			
	NEQS		WHO	
	Day Time 06:00 – 22:00	Night Time 22:00-06:00	Day Time 07:00 – 22:00	Night Time 22:00-07:00
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70

Industrial area (C)	75	65	70	70
Silence zone (D)	50	45	55	45

105. 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 International and Local Drinking Water Quality Standards

Parameter	Unit	NEQS	WHO/IFC
Bacterial			
E-Coli	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Total Coliform	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Physical			
Color	TCU	≤ 15 TCU	≤ 15 TCU
Taste	No objectionable/Acceptable	No objectionable/Acceptable	No objectionable/Acceptable
Odor	No objectionable/Acceptable	No objectionable/Acceptable	No objectionable/Acceptable
Turbidity	NTU	< 5 NTU	< 5 NTU
Total Hardness	mg/l	< 500 mg/l	--
TDS	mg/l	< 1000	< 1000
pH		6.5-8.5	6.5-8.5
Chemical			
Aluminum	mg/l	≤0.02	0.2
Antimony	mg/l	≤0.005 (P)	<0.02
Arsenic	mg/l	≤0.05 (P)	0.01
Barium	mg/l	0.7	0.7
Boron	mg/l	0.3	0.3
Cadmium	mg/l	0.01	0.003

Chloride	mg/l	<250	250
Chromium	mg/l	≤0.05	0.05
Copper	mg/l	2	2
Cyanide	mg/l	≤0.05	0.07
Fluoride	mg/l	<1.5	1.5
Lead	mg/l	≤0.05	0.01
Manganese	mg/l	≤0.5	0.5
Mercury	mg/l	≤0.001	0.001
Nickel	mg/l	≤0.02	0.02
Nitrate	mg/l	≤50	50
Nitrite	mg/l	≤3	3
Selenium	mg/l	0.01 (P)	0.01
Residual Chlorine	mg/l	0.2-0.5 at consumer	-
Zinc	mg/l	5.0	3

106. 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 Ringelmann Chart at a distance of 6 meters or more.				
2	Carbon Monoxide	<u>Emission Standards:</u> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 0 10px;">New</td> <td style="padding: 0 10px;">Used Vehicles</td> </tr> <tr> <td style="text-align: center;">4.5%</td> <td style="text-align: center;">6%</td> </tr> </table>	New	Used Vehicles	4.5%	6%	Under idling conditions: non-depressive infrared detection through gas analyzer
New	Used Vehicles						
4.5%	6%						
3	Noise	85 db (A)	Sound-meter at 7.5 meters from the source				

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Table 2-6: National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (Mg/L, Unless Otherwise Defined)

S. No.	Parameter Standards	Value
1.	Temperature	40°C
2.	pH value (acidity/basicity)	6-10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20°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 (SO ₄ ²⁻)	600mg/L
14.	Sulphide (S ²⁻)	1.0mg/L
15.	Ammonia (NH ₃)	40mg/L
16.	Pesticides, herbicides, fungicides and	0.15mg/L
17.	insecticides Cadmium ⁽⁴⁾	0.1mg/L
18.	Chromium (4) (trivalent and hexavalent)	1.0 mg/L
19.	Copper ⁽⁴⁾	1.0mg/L
20.	Lead ⁽⁴⁾	0.5mg/L
21.	Mercury ⁽⁴⁾	0.01mg/L
22.	Selenium ⁽⁴⁾	0.5mg/L
23.	Nickel ⁽⁴⁾	1.0mg/L
24.	Silver ⁽⁴⁾	1.0mg/L
25.	Total toxic metals	2.0 mg/L
26.	Zinc	5.0mg/L
27.	Arsenic	1.0mg/L
28.	Barium	1.5mg/L
29.	Iron	2.0mg/L
30.	Manganese	1.5mg/L
31.	Boron	6.0mg/L
32.	Chlorine	1.0mg/L

Explanations:

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

3. THE PROJECT

3.1 BACKGROUND

107. The Pashta Khan perennial irrigation scheme is proposed on Anjira River, a tributary of Mula River, in Pashta Khan. It is located in tehsil Mula, district Khuzdar, Balochistan. The proposed Pashta Khan weir lies in UTM Zone 42R at 282525.34 m E, 3111470.28 m N about 55.0 km from Khuzdar. Whereas Garambowad perennial irrigation schemes is located on Anjira River about 60 km from Khuzdar via Pashta Khan Road. The proposed Garambowad off-take well is located at elevation of 1173.0 m, UTM Zone 42R, 278458.06 m E, 3116760.68 m N. Garambowad village is located on left bank of river. The schemes are located in north-east of Khuzdar in Pashta Khan area at a distance of about 52 km, that is 28 km north via N-25 Highway (RCD Highway) to Baghbana area and 24 km east on unpaved road and hilly track to scheme location. Both schemes are located on bents at both right and left banks of Anjira River surrounded by high mountains having little area on flat terrain (Figure 1-1).

3.2 COMPONENTS OF THE PROJECT AND SCOPE OF WORK

108. Main components of the sub-project include; (a) construction of Pashta Khan weir & head regulators, (b) guide bund / flood protection works (c) construction of Garambowad Intake Well, and (d) lining of unlined existing channels, and (d) Construction of Canal Structures.

109. Details of scope of work for the sub-project are presented in Table 3-2 below:

Table 3-1 : Scope of Work for Pashta Khan and Garambowad sub-project

Total Command Area (Ha)	833
Total Available Water (MCM)	31.5 & 44.1
Pashta Khan	
Type of structure	Weir
Coordinates of Weir	282525.34 m E, 3111470.28 m N Zone 42R
Length of Weir (m)	120
Height of Weir (m)	1.25
Total Length of Canal (m)	16,500
Left Canal (m)	6,500
Right Canal (m)	10,000
Time Division Structures (Nr.)	10
Cross Drainage Structure (m)	300
Fall Structures (Nr.)	8
Flood Protection Bund (m)	1,381
Water Storage Tanks (Nr.)	3
Washing Structures (Nr.)	3
Animal Drinking Structure (Nr.)	3
Garambowad	
Command Area (Ha)	753
Type of structure	Off-take Well
Coordinates of Off-take Well	278458.06 m E, 3116760.68 m N Zone 42R

Length of Canal (m)	5,500
Time Division Structures (Nr.)	5
Cross Drainage Structure (m)	100
Fall Structures (Nr.)	4
Flood Protection Bund (m)	1,125
Water Storage Tanks (Nr.)	2
Washing Structures (Nr.)	2
Animal Drinking Structure (Nr.)	1
Design Command Area (Ha)	94

3.2.1 Weir

110. Pashta Khan Weir has been designed for the crest length of 120.0 m including 3m wide under sluice bay. The proposed crest level of under sluice weir is 1.0m lower crest level of main weir and 3m x 1m gate to control the head water level for irrigation supply. End sill is provided at the end of stilling basin, to dissipate the energy of flowing water to avoid damages to the structure. 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 3-4 and Figure 3-5.

Table 3-2: Design Parameters for Pashta Khan Weir with Undersluice

Sr.#	Description	Main Weir	Undersluice
1	Weir Crest Length (m)	117.0	3.0
2	Crest Width (m)	6.0	6.0
3	Main Weir Crest Elevation (m asl)	1101.25	1100.25
4	Undersluice Gate Top Level (m asl)	-	1101.25
5	Undersluice Gate Size (HxW) m	-	1 x 3
6	Design Flood 50 Year Return Period (m ³ /s)	1068.0	1068.0
7	Safety Check Flood 100 Year Return Period (m ³ /s)	1251.0	1251.0
8	Highest Flood Level 50 Years Year Return Period (m asl)	1104.28	1104.28
9	Highest Flood Level 100 Years Year Return Period (m asl)	1104.65	1104.65
10	Side Wall Top Elevation (m asl)	1106.0	1106.0
11	Stilling Basin Length (m)	25.0	25.0
12	Stilling Basin Width (m)	117.0	3.0
13	Stilling Basin Elevation (m asl)	1097.5	1097.5
14	End Sill Elevation (m asl)	1099.0	1099.0
15	Tail Water Elevation (m asl)	1102.2	1102.2
16	Upstream Cutoff Depth (m)	1.5	1.5
17	Downstream Cutoff Depth (m)	4.2	4.2
18	Downstream Stone Apron Length (m)	10.0	10.0

o Structural Elements of the Weir

111. Energy dissipaters, in form of stilling basin are required to dissipate to destroy the excess energy of flowing water in order to prevent scour, undermining of structure and

damage form waves. Stilling basin length is 25 m to accommodate the jump within the stilling basin. Its floor level is adopted as 1097.50 m asl.

112. 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 provided 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.

113. 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.

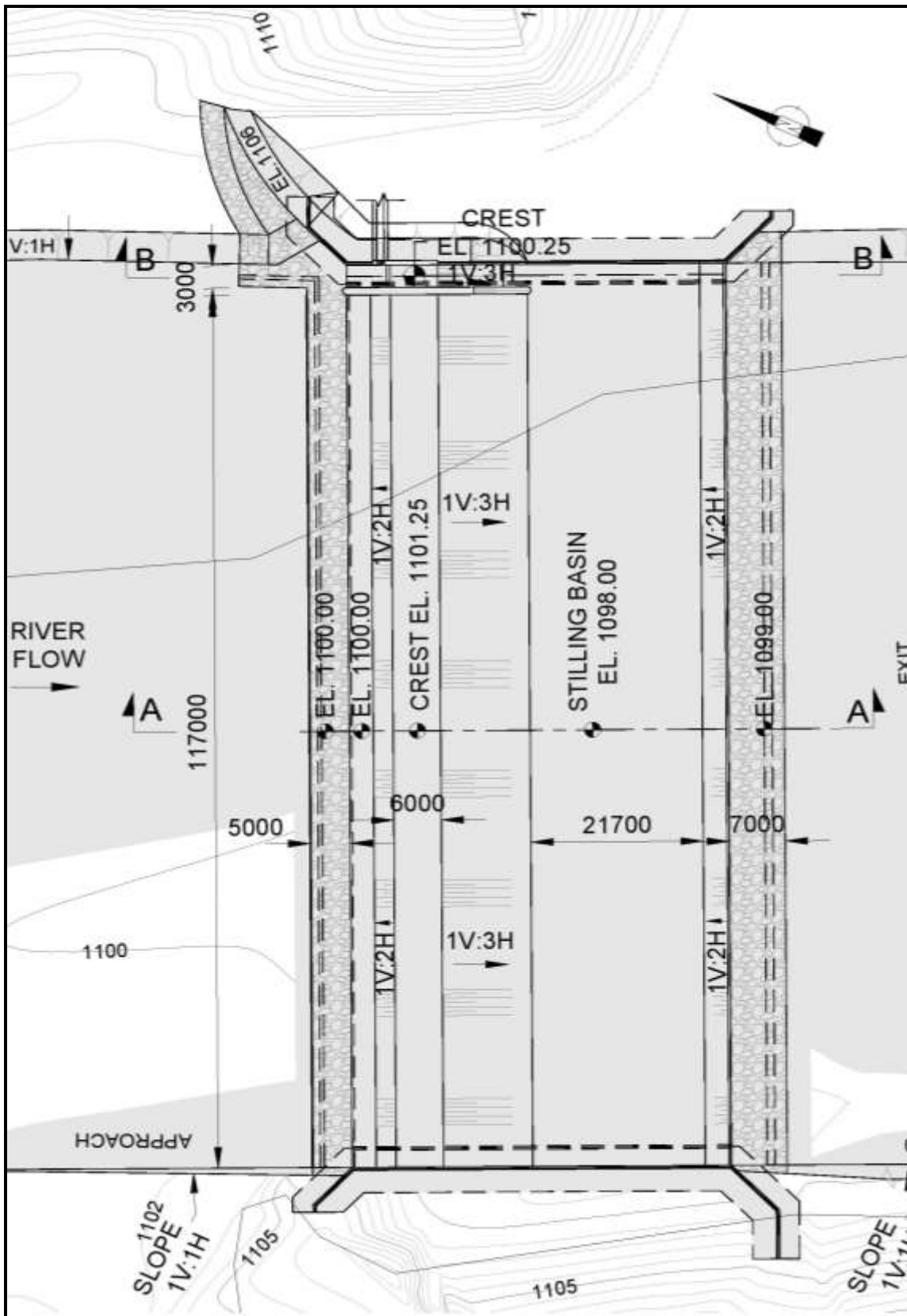


Figure 3-1: Layout Plan of Pashta Khan Weir

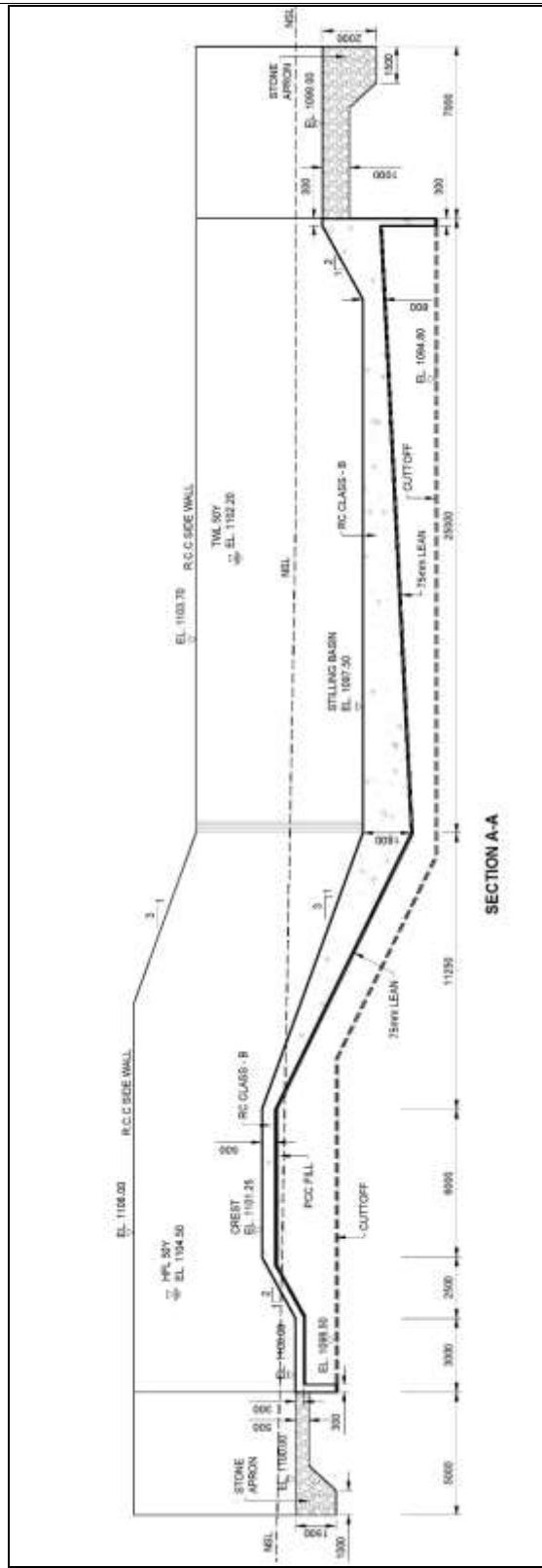


Figure 3-2: Longitudinal Section of Pashta Khan Main Weir

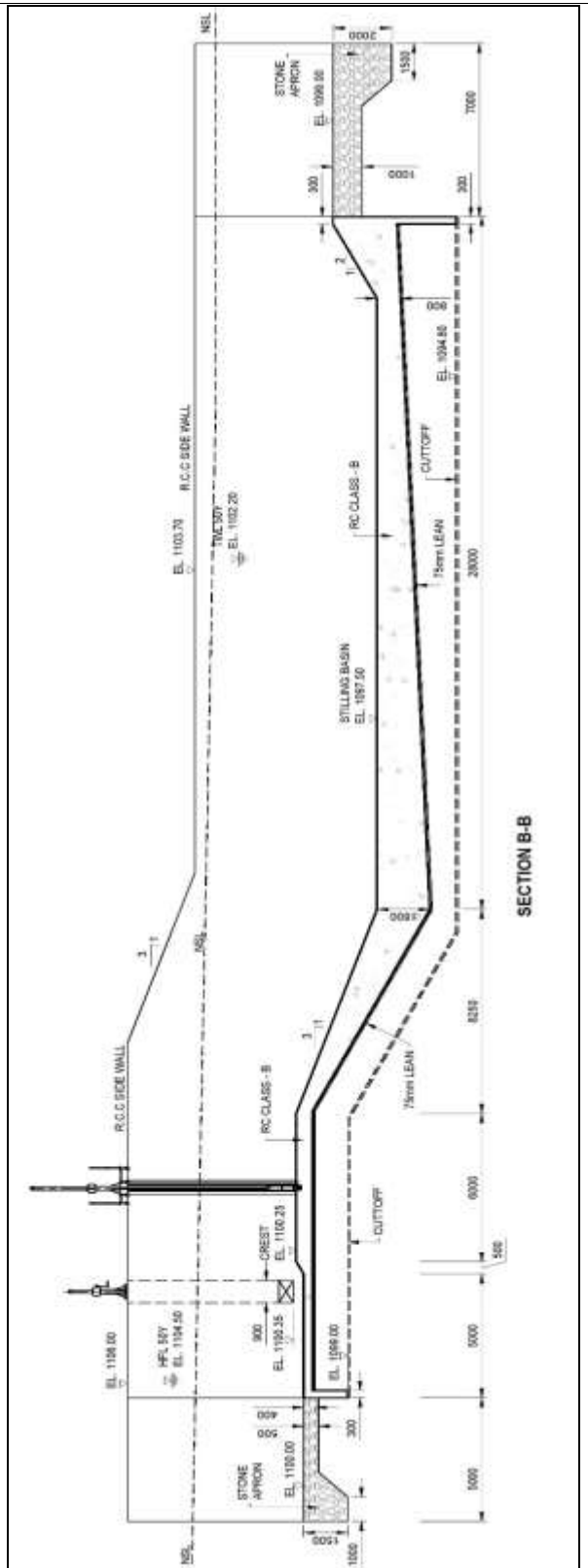


Figure 3-3: Longitudinal Section of Pashta Khan Weir Under Sluice

○ **Head Regulator Irrigation Channel**

114. The Head Regulator of Pashta Khan Irrigation channel is designed after the provision of undersluice structure in the weir for maximum requirements of 0.45 m³/sec for entire command area of irrigation system.

115. Head Regulator is placed in the left sidewall of under sluice structure. The opening size of 0.90 m x 0.65 m and its crest is provided at a height of 0.10 m from the crest of undersluice i.e. 1100.25 m asl. Difference between design head water level i.e. 1101.25 and channel full supply level 1101.00 is sufficient to feed the canal.

116. Head regulator would be mechanically operated with the help of gate (0.90 m width x 0.65 m height) by providing the operating platform. Plan and sections of Head Regulator is shown in the Figure 3-4.

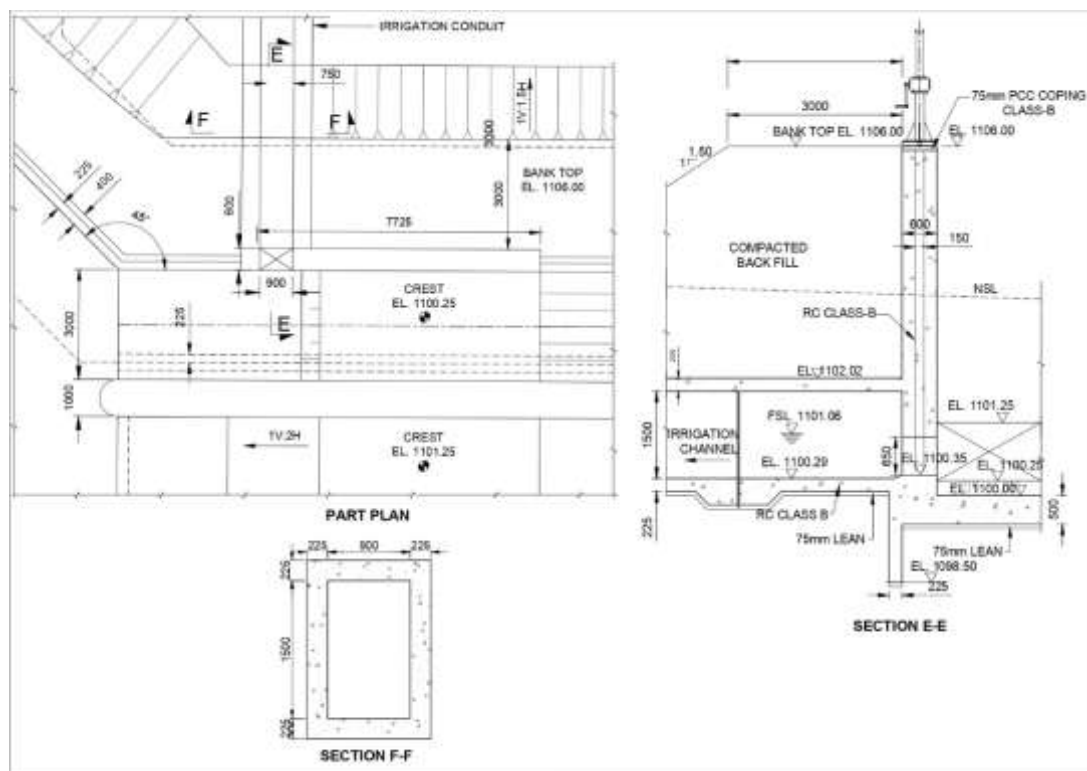


Figure 3-4: Pashta Khan Channel Head Regulator

3.2.2 OFFTAKE WELL AT GRAMBOWAD

117. A free intake proposed where surface water can be diverted from the river into a channel without the need for a diversion structure. Free intakes are provided where the construction cost of diversion structure is higher as relative to the command area available. Free intakes are only provided where river bed is stable and water can be diverted without the need of any additional structures. In this case, there is an available command area of approximately 80.0 ha. The pre-feasibility study also proposes a free intake system, which includes the cost analysis for its implementation. Free intakes operating successfully are relatively rare in the project area. To make the intake well successful, an efficient approach channel plays vital role to guide / bring the river perineal water supply for irrigation.

118. Circular intake well having diameter equals to 2.5m has been designed with opening size of 1.3 m x 1.3 (W X H). Top level of intake well has been fixed corresponding to Highest Flood Level – HFL with sufficient free board.

119. Intake well is equipped with trash rack to control floating debris, and mechanical gate to protect the channel from higher / flood flows and its foundation will be well below the scour depth for design floods.

3.2.3 FLOOD PROTECTIN BUNDS

120. Natural floodplains have reported to be affected frequently during high floods due to persistent damage to command area. The rehabilitation work under Pashta Khan & Garambowad subproject entails construction of new levees where required.

121. Earthen embankments, flood levees and protection bunds are included in the design adjacent to river banks for protection of natural floodplains for 50-year return period flood, and ensure the safety of protection works for 100-year return period flood without over topping though free board. With provision of these levees, discharge carrying capacity of Anjira River would be increased providing protection to area adjacent to river. Flood protection works are designed along those reaches where previous large floods have inundated existing command area i.e., flood of 1995. Embankment levees are designed for portions of new command area lying in floodplain. The flood modelling shows that lower lying portion of Garanbowad is vulnerable to flood and requires protection works for existing command area. Similarly, in upstream left portion, in Pashta Khan, some existing cultivation is prone to floods.

122. After construction of protection bunds, an additional area would be made available on left over bank that will be included as new command area. For design of protection bunds, river analysis and floodplain mapping have been done using Hydrologic Engineering Center's River Analysis System (HEC RAS) model.

123. A total of six (06) protection bunds have been provided. Details of the bunds are as follows:

Table 3-3: Details of Protection Bunds

Sr. No.	Description	River Bank	Length of Proposed Bund (m)	Protection
1.	Garanbowad Protection Bund -1	Left	320.0	Low lying Command
2.	Garanbowad Protection Bund -2	Left	575.0	Low lying Command
3.	Garanbowad Protection Bund -3	Left	230.0	Low lying Command
4.	Pashta Khan Protection Bund -1	Left	362.0	Low lying Command
5.	Pashta Khan Protection Bund -2	Left	591.0	Low lying Command
6.	Pashta Khan Protection Bund -3	Right	428.0	Outlet of Syphon - 3

124. Typical Cross Section of Protection Bund is shown in Figure 3-5 below and layout of all protection bunds is shown in Figure 3-66 to Figure 3-77 below.

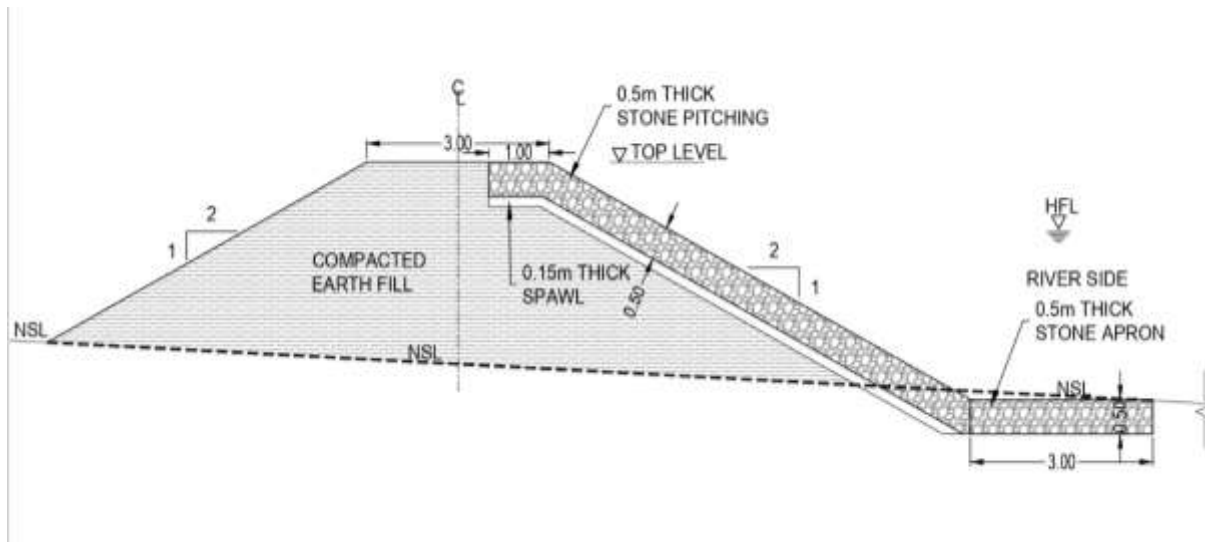


Figure 3-5: Typical Cross Section of Protection Bund



Figure 3-6: Layout of Garambowad Flood Protection Bunds

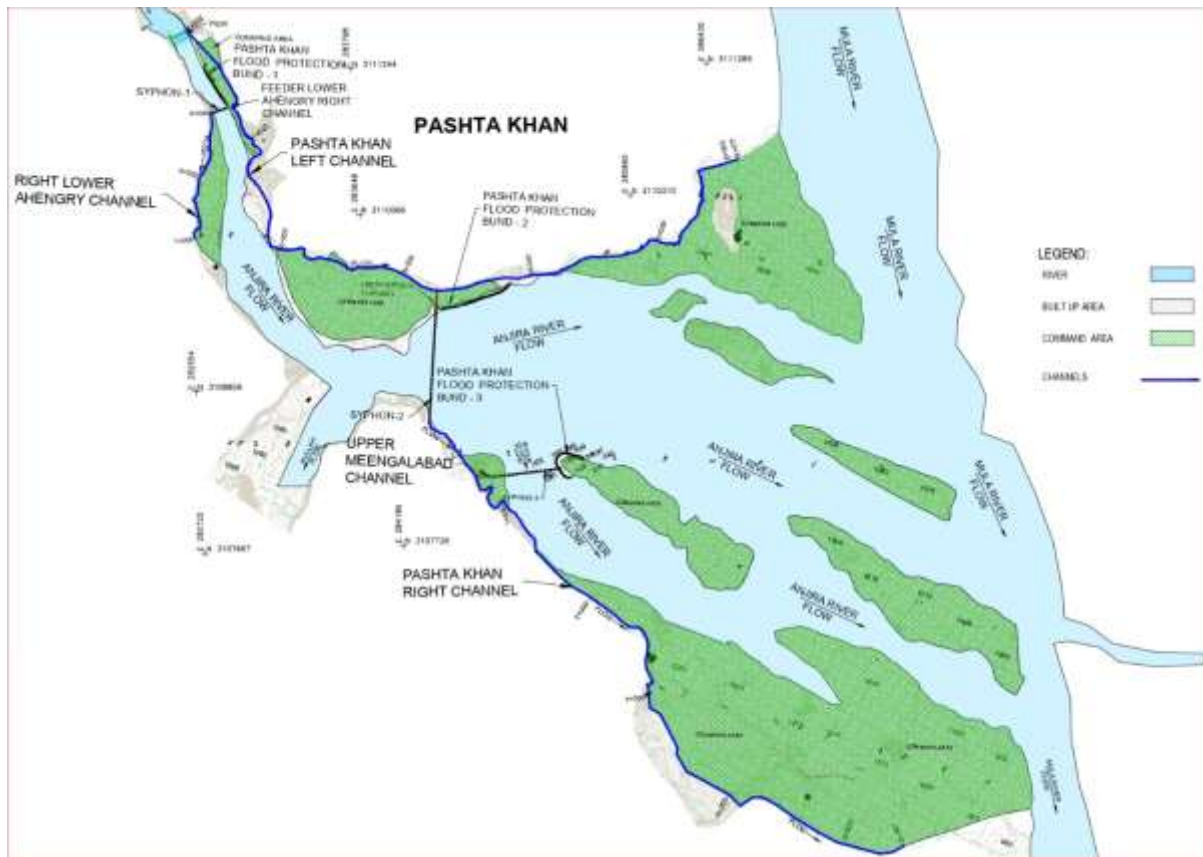


Figure 3-7: Layout of Pashta Khan Flood Protection Bunds

3.2.4 IRRIGATION SYSTEM

125. Pashta Khan and Garambowad both schemes are located on Anjira River at a distance of 7 km from each other which drains into Mula River near Pashta Khan. Both the schemes were considered as one sub-project. The irrigation system of Pashta Khan comprises main canal offtakes from left side of the proposed weir and Garambowad scheme has free intake at left bank of Anjira river with a lined stone masonry channel. The proposed sub-project will use perennial surface flow for irrigation. Pashta Khan and Garambowad perennial irrigation schemes will bring 833 ha under cultivation out of which 456 ha is already under cultivation, while 377 ha will be additional command area.

126. Pashta Khan Command areas lies on both banks of Anjira River. It is difficult to construct the channel on right bank due to vertical bank and cutting of rock. Total flow has been diverting on left side and for right side for command area of Ahengri and Mangalabad, flow is diverted through syphon on right side. Main channel off takes from the left side of the proposed weir. The length of main channel is 6.190 km and right channel off take from main channel at RD 3+370 for Mangalabad and length is 5+291 km.

127. A rectangular cross section with plan concrete in bed and stone masonry in side walls is adopted for lining of perennial channels. A roughness coefficient 'n' of 0.020 has been adopted considering combined effects of concrete in bed and stone masonry in 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 adopted slope resulted in minimum possible cut and fill volumes and maximum

command levels. Summary of Design parameters of lined channel are given in Table 3-5 to 3-8 respectively.

Table 3-4 Design Parameters of Left Main Channel of Pashta Khan

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+710	0.45	0.020	0.00111	0.90	0.71	0.71	0.39
0+710 to 3+350	0.40	0.020	0.004	0.90	0.40	1.12	0.35
3+350 to 5+650	0.15	0.02	0.004	0.75	0.23	0.87	0.37
5+650 to 6+190	0.15	0.02	0.004	0.70	0.25	0.87	0.37

Table 3-5 Design Parameters of Right Main Channel of Pashta Khan

RD (Km)	Discharge (m ³ /s)	Manning "n"	Bed Slope m/m	Bed Width (m)	Flow Depth (m)	Velocity (m/s)	Free Board (m)
0+000 to 1+000	0.25	0.020	0.004	0.75	0.33	1.00	0.37
1+000 to 1+450	0.25	0.020	0.004	0.75	0.33	1.00	1.17
1+450 to 5+292	0.25	0.020	0.004	0.75	0.33	1.00	0.37

Table 3-6: Design Parameters of Upper Left Channel of Garambowad

RD (Km)	Discharge (m ³ /s)	Manning "n"	Bed Slope m/m	Bed Width (m)	Flow Depth (m)	Velocity (m/s)	Free Board (m)
0+000 to 0+450	0.16	0.020	0.00323	0.50	0.39	0.81	0.35
0+450 to 1+300	0.16	0.020	0.00629	0.50	0.30	1.05	0.35
1+300 to 2+550	0.16	0.020	0.00078	0.50	0.71	0.45	0.35
2+550 to 3+773	0.05	0.020	0.00085	0.5	0.27	0.37	0.35

Table 3-7: Design Parameters of Lower Left Channel of Garambowad

RD (Km)	Discharge (m ³ /s)	Manning "n"	Bed Slope m/m	Bed Width (m)	Flow Depth (m)	Velocity (m/s)	Free Board (m)
0+000 to 0+300	0.10	0.020	0.00125	0.50	0.40	0.51	0.35
0+300 to 0+979	0.10	0.020	0.0020	0.50	0.33	0.61	0.35

3.2.5 Canal Structures

128. A number of structures are proposed on each canal including road crossings, sumps, syphon, supper passage, aqueduct, flow division and time division /off-take structures. Various structures along the canal length are provided where necessary. Other structures included for water use by community in command areas include washing structure and other social structures are also provided on all channels. Number and type of structures provided on each channel are given in Table 3-9.

Table 3-8: Number of Structure on Channels of Pashta Khan & Garambowed Subproject

Name of Channel	Total Length (km)	Fall Structure	Sumps	Culvert	Aqueduct	Flow/Time Division Structure	Syphon	Tail Structure	Social Structure
Pashta Khan Left Channel	6+190	16	1	3	3	23	2	1	7
Pashta Khan Right Channel	5+291	12	4	1	4	16	1	1	2
Pashta Khan Right Ahengri Channel	1+000	2	-	-	-	4	-	1	
Garambowed upper Left Channel	3+773	-	-	-	1	4	-	1	-
Garambowed Lower Left Channel	0+979	3	-	-	-	6	-	1	3

(a) Flow Division Structures

129. 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 during walk through survey and on the basis of topographic survey. Flow division structure sizes are provided according to the command area and where incoming discharge is more than 0.15 cumec. The size of opening has been calculated by using the weir formula. Detail drawings of flow division structures are given in Volume II of Drawings.

(b) Time Division Structures

130. Time division structures have been provided to divert the flow from main channel to secondary channel (water course). The structure comprises stone masonry /concrete walls with concrete floor and gated (shutter) openings to feed flow from distributary channel to water course. The gates used in these structures are simple steel sliding shutters. The size of opening to divert water from main channel to water course has been calculated by using the weir formula.

131. Time division structures has been provided on each channel as per existing locations and as requirement of FO during walk-through survey. Detail drawings of time division structure are given in Volume II of Design Report. Design of flow/time structures worksheet has been given in Appendix 7.1.

(c) Gates (Steel Shutter)

132. To regulate the flow from canal to water course steel shutter gates are provided to each time division structure. The gates are simple steel shutter, manufactured from one eighth inch thick steel plate. In order to prevent the gate from rusting both the gate and frame are hot dip galvanised after fabrication. The gates are fixed to the structure by means of a steel

chain, one end of which is welded to the gate handle and the other is fixed to a steel ring embedded into the concrete of the structure. The chain must be long enough to allow the gate to be used in multiple gate frames.

Fall Structures

133. Fall structures are required on channel where to dissipate the excess head. When constructing channels on steeply sloping ground, it is important to ensure that the velocity remains at a level that will not disrupt a lined channel. Sometimes, the ground surface may be steep and sometimes it may be very irregular with abrupt change of grade. In such cases, a level drop is provided to step down the canal bed and then it is continued with permissible slope until another step down is necessary. This is done to avoid unnecessary huge earth work in filling.

134. These falls allow the upstream water to fall with sudden impact on downstream. The downstream acts like cushion for the upstream water and dissipate extra energy. This cushion will be formed by depressing the floor below the downstream bed of the channel.

135. Where incoming water fall height is more than 2.0 m, baffle type fall has been provided. The chute slope is designed 2: 1 or flatter, extending to below the channel bottom. In baffle fall multiple rows of baffle piers on the chute prevent excessive acceleration of the flow, and provide a reasonable terminal velocity, regardless of the height of fall.

Road Culverts

136. Culvert has been provided to cross the channels to facilitate the vehicular access with in the scheme. Reinforced concrete box culvers are provided to cross the road. Additional free board has been provided in the channel under the road crossing for cleaning. Detail drawings has been provided in Volume II Drawings.

Inverted siphons

137. Inverted siphons are provided to convey water by gravity under the rivers, roads or other structures. A syphon is a closed conduit designed to flow full and under pressure. Trash rack has been provided upstream of the syphon to prevent entry of trash into the syphon. Three numbers of syphons have been provided to cross the channel flow under the Anjira River.

Aqueduct

138. 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 in the nullah/ river. At several locations, canals are aligned transverse to river. Therefore, aqueducts are provided. The proposed aqueduct is a rectangular section with concrete trough. The size of aqueducts is adjusted according to incoming flow from canal. It will allow transverse river flow to pass below it without affecting canal.

Super passages

139. Super passages are provided where channel in cut and drainage flow is to pass over the channel. Super passages are provided on perennial channel 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 to be determined as per site condition. Upstream and downstream bed protection have been provided to ensure that the structure is not undermined by local scour.

3.2.6 Social Structures

140. 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 structure's location was selected as per their requirements. Washing structure, animal drinking trough and wuzu structures are provided as per their requirement at appropriate locations.

3.2.7 Proposed Mechanical Works

141. All existing gates installed at outlets perennial irrigation channel shall be rehabilitated/upgraded along with the hoisting system. 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.

3.3 MAJOR QUANTITIES OF WORKS

142. Quantities of various items of works for the construction of Pashta Khan & Garambowad subproject project will be worked out from drawings prepared based at detailed design stage.

Table 3-9 Dimensions/Parameter of Works

No.	Project Components	Unit	Quantities /Parameters
1	New weir at Pashta Khan & Garambowad	No.	1
2	Raising of flood protection bunds	As per design/dgws	
3	Aqueducts	No.	2
4	Super passage	No.	2
5	Culverts	No.	11
6	Time diversion structure	No.	213
7	Rip-Rap Works	As per design/dgws	
8	Lining of Channels	m	20265
9	Siphon	No.	1
10	Mechanical Works/Gates	No.	2
11	Sumps/Man hole	No.	2
12	Studs in River	No.	6
13	Social structures	No.	4

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

3.4 CONSTRUCTION SCHEDULE

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

145. **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.

146. **Activity – 2:** *Construction of weir & irrigation channels* which includes: construction/rehabilitation of weir and stilling basin, rehabilitation of irrigation channels, stone masonry, weir abutment walls, syphons, aqueduct, road culvert, super passage, washing and animal drinking structures, bunds, studs, inspection paths along channel, cross drainage structures along channel length, mechanical works/gates.

3.5 PROPOSED CONSTRUCTION SCHEDULE AND PROJECT COST

147. 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. Total cost of the civil works of the subproject is estimated and is Rs. 698.340 million based on market rates. Proposed construction schedule is provided in Figure 3-8.

Rehabilitation of Weir & associated Structures:

148. 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. It is expected that the project contract will be awarded to the contractor in the fourth quarter of 2021.

149. 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.

150. 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.

151. 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.

3.6 CONSTRUCTION EQUIPMENT

152. Table 3-11 shows a tentative list of construction equipment required by the contractor to enable him to undertake this work and meet the prescribed schedule.

Table 3-10: List of Construction Equipment Required by the Contractor

Sr. No.	Description	No. Required
1	Bulldozer D8 with ripper (Blade capacity = 12.9 m ³)	1
2	Motor Grader cat 14G or Equivalent	1
3	Front End Loader Bucket capacity = 6 m ³	2
4	Sheep foot roller for core compaction (10-ton capacity)	2
5	Dump Trucks (capacity = 14 m ³)	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
13	Jeeps	2

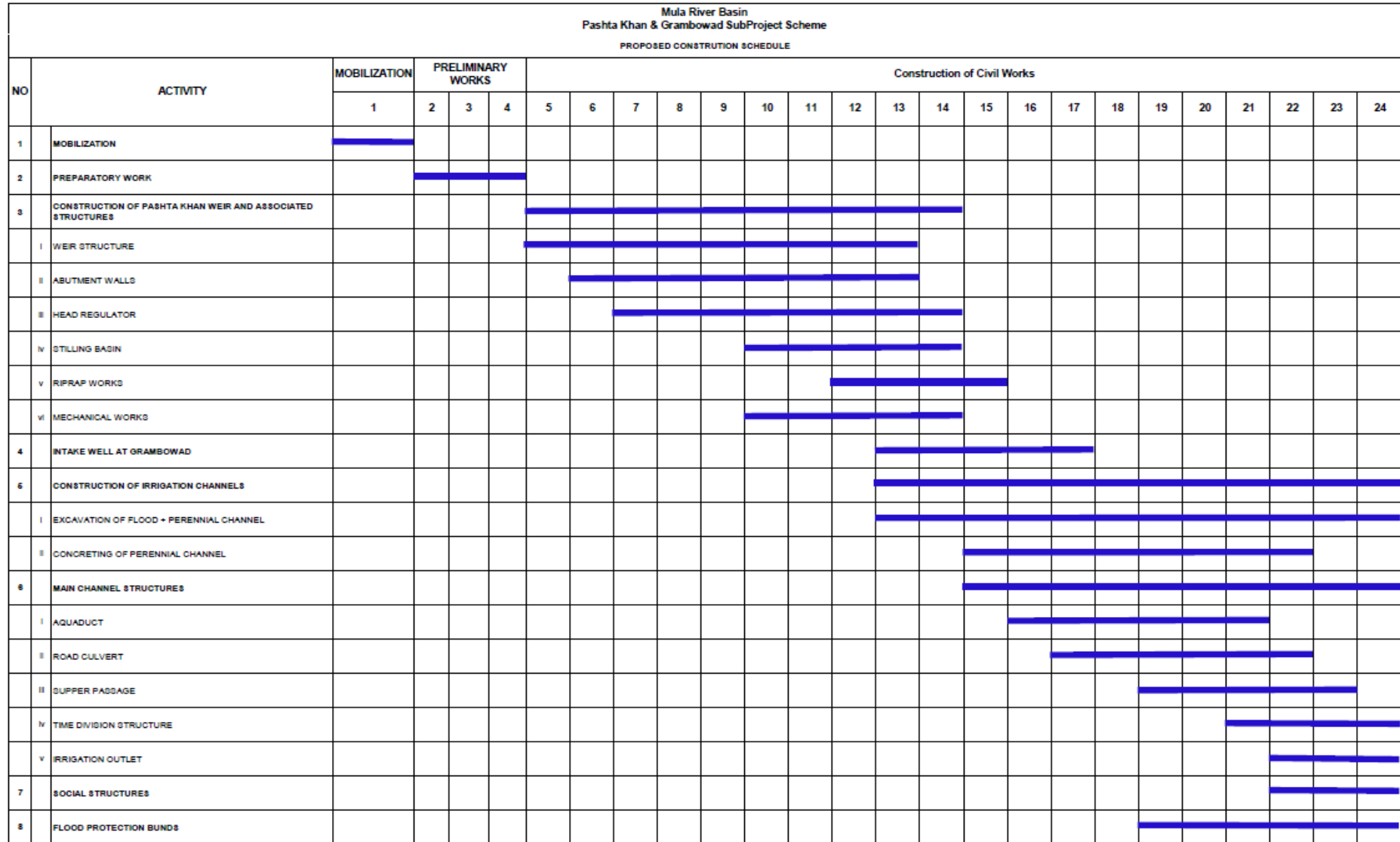


Figure 3-8: Proposed Construction Schedule

4. ENVIRONMENTAL AND SOCIAL BASELINE

4.1 GENERAL

153. 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 stakeholder consultation and technical visits conducted by the environment team.

4.2 AREA OF INFLUENCE

154. 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.

155. 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 Land Use

156. The land rights are equitable and all residents have share in land. The land of Pashta Khan and Mengalabad is reported in cadastral record while land of Grambowad has no settlement record. The cultivated land in sub-project was 833 ha, which includes 753 ha in Pashta Khan and 80 ha in Grambowad. Farmers prefer to use floodwater for irrigation as it brings sediments enriched with nutrients and thus results in reduced fertilizer cost.

4.3.2 Geology and Land forms

157. The geological features of sub-project comprise of Eocene and Paleocene Sedimentary rocks. Areas adjacent to sub-project, including parts of command area, have underlying Cretaceous and Jurassic Sedimentary rocks. The sub-project is located at tail of Anjira River, a tributary of Mula River. The sub-project is proposed on relatively narrow gorges where river is bounded by high mountains on both sides. At Pashta Khan, river is 185 m wide and at an elevation of 1104 m above mean sea level, while at Garambowad, river is 220 m wide and 1175 m above mean sea level. The river is very steep in this reach, typically on a 1:100 slope.

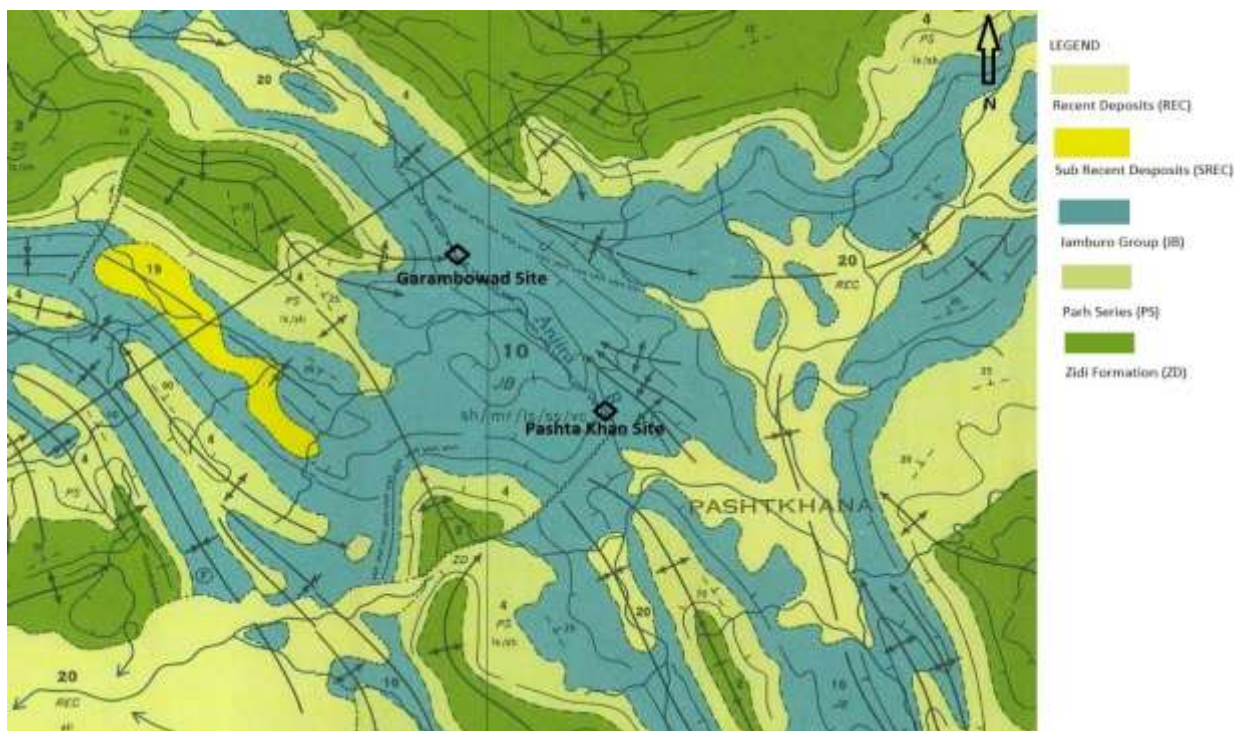


Figure 4-1: Regional Geological Map of Pashta Khan and Garambowad PIS Subproject Area

4.3.3 Topography

158. High mountains surround the sub-project area of Pashta Khan and Garambowad. The terrain is generally flat in the sub-project and its command area. The valley slopes of the Garambowad Site are moderate to steep whereas at the Pashta Khan Site is steep. The average altitude of the Pashta Khan and Garambowad PIS sub-project site command area is 1060 m and 1150 m respectively above mean sea level. The overall relief at Pashta Khan Site is 440 m (1060~1500m) and 300 m (1150~1450m) at the Garambowad sub-project site.

159. The sub-project site is bounded by mountain ranges as Shinkai Ghar in the North, 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.).

4.3.4 Soils

160. Soils in area generally comprise of shallow clay and clay loam. The area also comprises of shallow gravelly soil. The soils are slightly or moderately calcareous. No salinity-sodicity was encountered in these soils. The water is slightly saline, but not sodic.

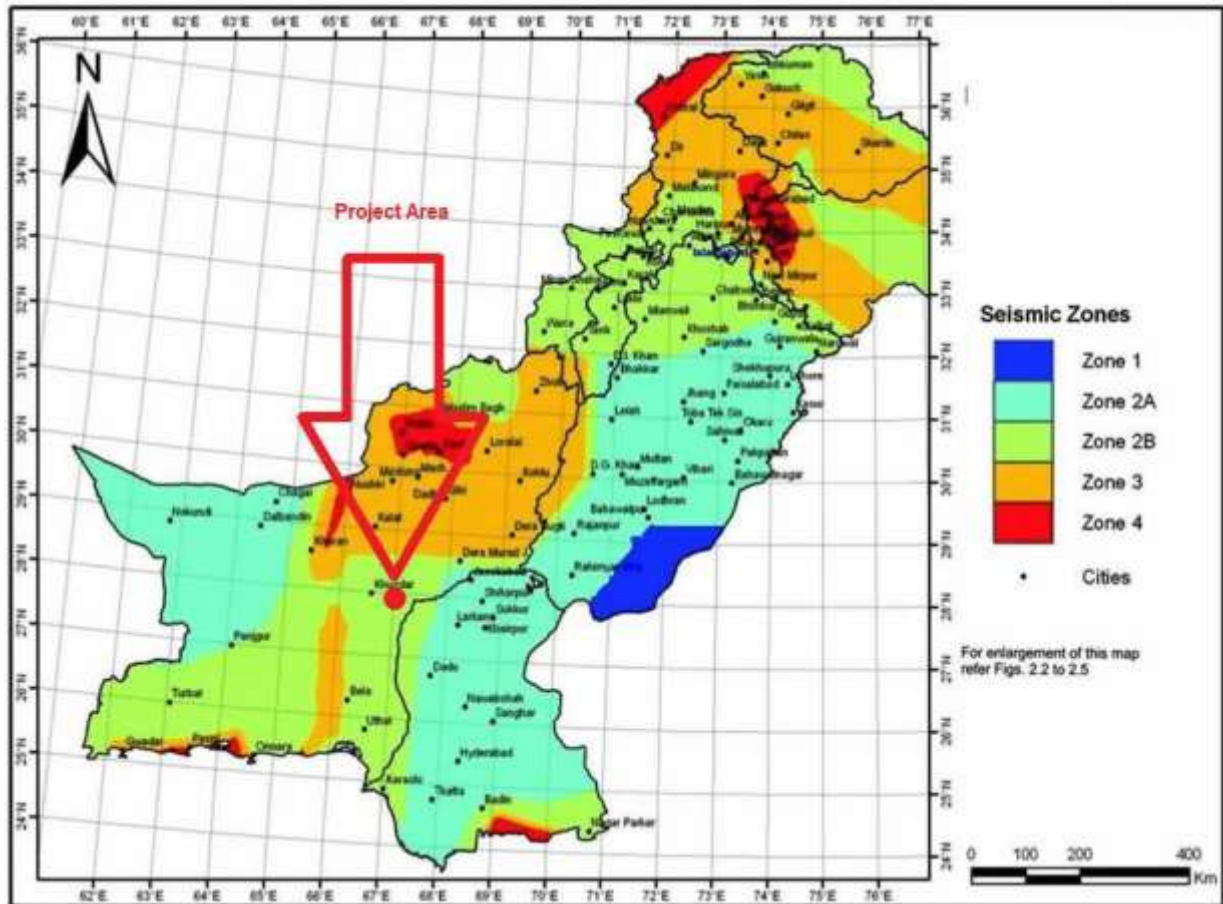
4.3.5 Seismicity

161. 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.

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

163. As per latest seismic zoning map of Balochistan, the Project area lies in zone 2B with PGA value ranging from 0.16g to 0.24g. This zone is liable to MSK VI or less and is classified as the Low Damage Risk Zone. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macroseismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence. The updated Seismic Zoning Map of Pakistan is shown below as Figure 4-2.

Figure 4-2: Seismic Zoning Map of Pakistan



Source: Geological Survey of Pakistan

CLIMATE OF THE PROJECT AREA

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

165. The catchment area of Garambowad and Pashta Khan are mostly influenced by climatic stations of Khuzdar and Kalat. Upper part of the catchment areas is influenced by Kalat. A brief of the various climatic parameters of both the meteorological stations have been described hereunder:

4.4 Climate of Khuzdar

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

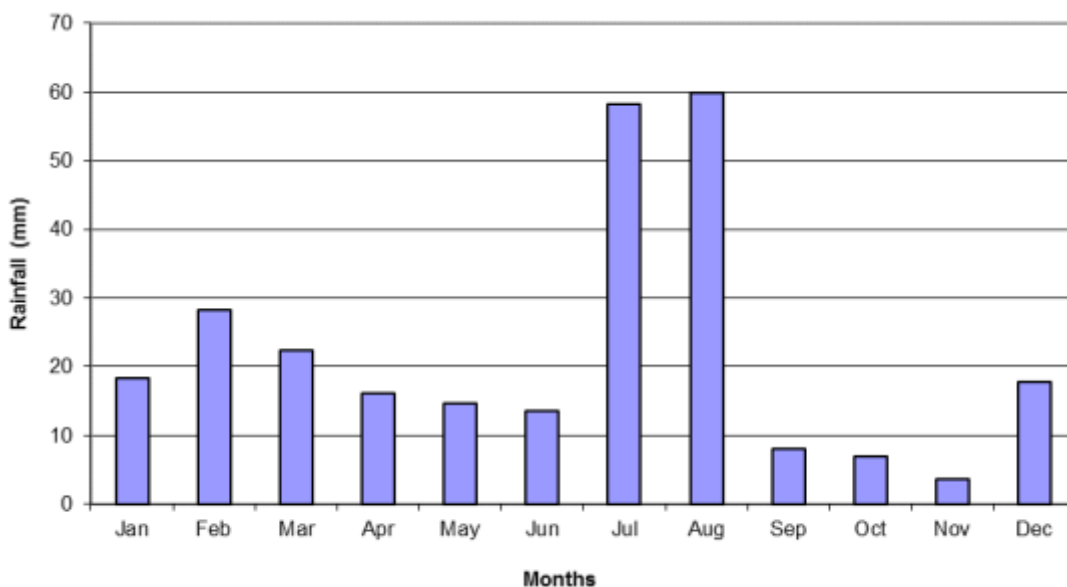
4.4.1 Precipitation

167. Mean monthly rainfall data and the number of rainy days recorded at the Khuzdar Met Station are given in Table 4-1. The average annual rainfall of the area is about 267.9 mm (10.54 inches) (Ref. 1), while on the average the maximum monthly rainfall is 59.9 mm during the month of August and a minimum of 3.7 mm in November. July and August are the months of with maximum rainfall, which is about 45% of the annual rainfall. Winter rains generally occur during the months of January and February, whereas, November is normally the month with least precipitation. The distribution of average monthly rainfall is shown in Figure. 4-3 below.

Table 4-1 Mean Monthly Rainfall in Khuzdar

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

Figure 4-3 Monthly Distribution of Rainfall at Khuzdar



4.4.2 Temperature

168. The mean daily temperature ranges from (June being the hottest month) 27.1°C to 31.1°C in the summer season (May to September) and 10.6°C to 13.0°C in winter season (December to February). Mean monthly temperature in June rises to a highest value of 31.1°C and falls to the lowest value of 10.6°C in January. June, July and August are the hottest months in summer season. December, January and February are the coldest months in winter season. The monthly averages of minimum, maximum and mean daily temperatures are given in Table 4-2 and shown graphically in Fig. 4-4.

Table 4-2: Mean Monthly Temperatures in Khuzdar

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

Source (Pakistan Meteorological Department)

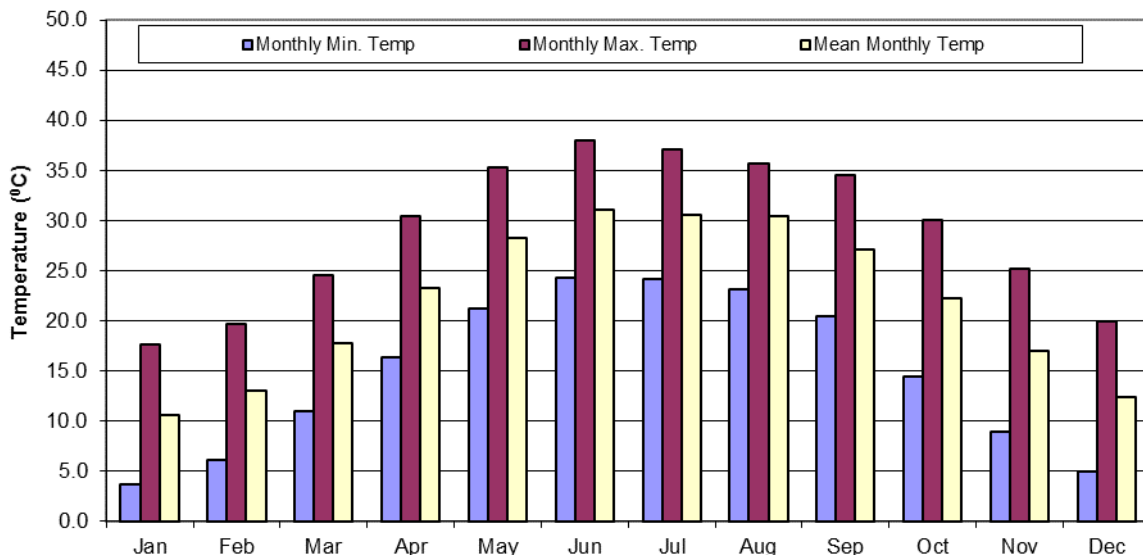


Figure 4-4 Mean Monthly Temperatures in Khuzdar

4.4.3 Relative Humidity

169. 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 4-3. At 00:00 hr the relative humidity varies

from lowest value of 39.7 % in May to highest value of 65.9 % in August. At 12:00 hr the lowest value is 15.6 % in May to highest value of 30.8 % in August.

Table 4-3: Mean Monthly Relative Humidity in Khuzdar

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

Source (Pakistan Meteorological Department)

4.4.4 Wind Speed

170. The mean monthly wind speed in knots is given in Table 4-4. 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.

Table 4-4: Mean Wind Speed at Synoptic Hours in Khuzdar

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

4.4.5 Hydrology and Flood assessment

171. The hydrological assessments covered the estimation of water availability and design flood at the intake and weir site. The catchment area at both the locations i.e., Garambowad and Pashta Khan schemes are 1048 km² and 1461 km² respectively. 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 215 mm. Rainfall runoff for Garambowad and Pashta Khan sub-projects using Khuzdar and Kalat rainfall data for the period 1971-

2018 worked out to be 23.2 MCM and 32.5 MCM respectively (runoff factor 0.1023). In order to estimate the perennial flows in stream, baseflow records of Mula river at Naulang have been transposed to Garambowad and Pashta Khan sub-projects site which are about 8-11 ft³/s and 11-15 ft³/s respectively during various months of the year. In order to estimate the base flow volumes on conservative side these flows have been converted to flow volumes which works out to be about 8.3 MCM and 11.6 MCM at Garambowad and Pashta Khan sub-projects respectively. In total, hydrological calculations result in an average annual gross estimated water availability of 31.5 MCM and 44.1 MCM at both the sites.

172. For estimation of flood flow, one-day annual maximum rainfall data record of Khuzdar and Kalat stations is used. Rainfall Frequency Analysis was carried out using Gumbel's Extreme Value Type-1 Distribution and Log Pearson Type-III. Results by Gumbel Extreme Value Type I best fit. Using the rainfall depth for various return periods, its temporal distribution over the catchment areas and on the basis of Synthetic Unit Hydrograph technique, the estimated peak flood is given in Table 4-5.

Table 4-5: Estimated Peak Discharges of Various Return Period at Garambowad and Pashta Khan

Return Period (Years)	Estimated Rainfall Depth		Estimated Peak Floods			
			At Garambowad		At Pashta Khan	
	(in)	(mm)	(ft ³ /s)	(ft ³ /s)	(ft ³ /s)	(ft ³ /s)
25	2.62	66.6	25,522	723	31438	890
50	2.93	74.3	30,685	869	37733	1,068
100	3.23	82.0	35,967	1,018	44169	1,251

4.4.6 Ambient Air Quality

173. 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.

174. 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)

175. Ambient air quality parameter as per site conditions only includes Suspended Particulate Matters was spot monitored on Mula River (Haatachi Khizran). Table 4-6 below shows average 24 hours results. The equipment used for air monitoring is Hazdust EPAM 5000 and test method is USEPA PM10, 2.5 method 201a. The results range from 0 to 15 µg/m³ details are presented in Annexure – 3 of this report.

Table 4-6 Ambient Air Quality Results (Suspended Particulate Matters)

S. No.	Location	Test Results (µg/Nm ³)	NEQS/WHO (avg. 24 hrs. µg/m ³)
1	Mula River (Hatachi Khizran)	BDL	500

4.4.7 Ambient Noise

176. Under this assignment, ambient noise level was measured at Mula River(Hatachi Khizran), which range between 32-41 dB(A). This range corresponds to a low-level noise atmosphere of the rural areas, associated with some of vehicular traffic. The details of the analysis are presented in Annexure – 3 of this report.

177. Ambient noise levels were measured and the average 2 hours monitoring results are given as following in Table 4-7. Noise monitoring was done with a type 1 noise meter.

Table 4-7 Summarized Results of Noise Monitoring

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

Source: Monitored in the Project Area by Laboratory Team.

178. Sensitive receptors are people or other organisms that may have a significantly increased sensitivity or exposure to contaminants by virtue of their age and health (e.g., schools, day care centers, hospitals, nursing homes), status (e.g., sensitive or endangered species), proximity to the contamination, dwelling construction (e.g., basement), or the facilities they use (e.g., water supply well). The location of sensitive receptors must be identified in order to evaluate the potential impact¹. There are no sensitive receptors within the area. The nearest villages are about 1-2 kms away.

4.4.8 Water Quality

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

Table 4-8: Water Quality of the project area

#	Parameter	UoM	Mula River (Hatachi Khizran) 313763.63E 3104294.59 N	NEQS	WHO/IFC
1	Turbidity	NTU	BDL	<5	<5
2	Total Suspended solids	mg/L	BDL	<1000	<1000
3	Total Dissolved Solids	mg/L	357	<1000	<1000
4	pH		7.99	6.5-8.5	6.5-8.5
5	Aluminum	mg/L	BDL	≤ 0.2	0.2
6	Antimony	mg/L	BDL	≤0.005	0.02
7	Arsenic	mg/L	BDL	≤0.005	0.01

¹ http://www.smchealth.org/sites/main/files/file-attachments/651311584receptor_survey.pdf

8	Barium	mg/L	BDL	0.7	0.7
9	Boron	mg/L	BDL	0.3	0.3
10	Cadmium	mg/L	BDL	0.01	0.003
11	Chromium	mg/L	BDL	≤ 0.05	0.05
12	Copper	mg/L	BDL	2	2
13	Lead	mg/L	BDL	≤ 0.05	0.01
14	Manganese	mg/L	BDL	≤ 0.5	0.5
15	Nickel	mg/L	BDL	≤ 0.02	0.02
16	Mercury	mg/L	BDL	≤ 0.001	0.001
17	Selenium	mg/L	BDL	0.01	0.01
18	Zinc	mg/L	BDL	5.0	3

4.5 BIOLOGICAL ENVIRONMENT

4.5.1 Flora

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

Table 4-9 Floristic List in Khuzdar District

#	Taxon	Family	Life form	Vernacular name
01	<i>Acacia nilotica</i>	Fabaceae	Tree	Babbur
02	<i>Acacia sengal</i>	Fabaceae	Shrub	Babbur
03	<i>Prosopis cineraria</i>	Fabaceae	Tree	Kandi
04	<i>Prosopis glandulosa</i>	Fabaceae	Shrub	Kandi
05	<i>Prosopis juliflora</i>	Fabaceae	Shrub	Devi
06	<i>Tamarix sultanii</i>	Tamaricaceae	Shrub	Kirri
07	<i>Zizyphus nummularia</i>	Rhamnaceae	Shrub	Ber
08	<i>Aerva javanica</i>	Amarantheaceae	Shrub	Gujo
09	<i>Periploca aphylla</i>	Ascalpidaceae	Shrub	
10	<i>Capparis decidua</i>	Capparidiaceae	Shrub	
11	<i>Haloxylon recurvum</i>	Amarantheaceae	Shrub	
12	<i>Suaeda fruticosa</i>	Amarantheaceae	Shrub	
13	<i>Suaeda ferinosa</i>	Amarantheaceae	Shrub	
14	<i>Grewia domaine</i>	Malvaceae	Shrub	
15	<i>Alhaji marorum</i>	Fabaceae	Shrub	
16	<i>Salvadora oleoides</i>	Salvadoraceae	Shrub	
17	<i>Salvadora persica</i>	Salvadoraceae	Shrub	
18	<i>Heliotropium sp</i>	Boragenaceae	Shrub	Merin

19	Calligonum polygonoides	Polygonaceae	Shrub	
20	Rhazya stricta,	Apocynaceae	Shrub	
21	Euphorbia caducifolia	Euphorbiaceae	Shrub	
22	Commiphora mukal	Burseraceae	Shrub	Gugul
23	Inula montaine	Asteraceae	Herb	Kulumurak
24	Inula grantoides	Asteraceae	Herb	Kulumurak
25	Grewia tenex	Malvaceae	Shrub	Chill
26	Phoenix dyctylefera	Palmea	Tree	Khajoor
27	Cymbopogon sp	Poaceae	Grass	
28	Cenchrus sp	Poaceae	Grass	
29	Aristida sp	Poaceae	Grass	Nadak
30	Chrysopogon sp	Poaceae	Grass	
31	Sericostoma	Boraginaceae	herb	

4.5.2 Fauna

180. Fauna of the project area includes

#	Taxon	Common name	Life form	Abundance Status	Conservation Status
1.	Vulpes griffithii	Hill fox	Mammals	Occasional	LC
2.	Hysrix indica	Porcupine	Mammals	Common	LC
3.	Felis libyca	Desert Cat	Mammals	Occasional	LC
4.	Hyaena	Striped Hyaena	Mammals	Occasional	LC
5.	Vulpes	Desert Fox	Mammals	Occasional	LC
6.	Canis aureus	Asiatic Jackal	Mammals	Occasional	LC
7.	Canis lupus	Wolf	Mammals	Occasional	LC
8.	Hemiechinus auritus megalotis	Hedgehog	Mammals	Common	LC
9.	Goluda ellioti	Bush rat	Mammals	Common	NE
10.	Lepus capensis	Cape hare	Mammals	Common	LC
11.	Ammoperdix griseogularis	See-see Partridge	Bird	Reported	LC
12.	Dupetor flavicollis	Black Bittern	Bird	Reported	LC
13.	Falco peregrinus	Peregrine Falcon	Bird	Reported	LC
14.	Pterocles coronatus	Crowned Sandgrouse	Bird	Migratory	LC
15.	Falco naumanii	Lesser Kestrel	Bird	Reported	LC
16.	Falco concolor	Sooty	Bird	Reported	LC

		Falcon			
17.	Pterocles lichtensteini	Close-barred/ Lichtenstein Sandgrouse	Bird	Reported	LC
18.	Francolinus pondicerianus	Grey Partridge	Bird		LC
19.	Pseudibis papillosa	Black Ibis	Bird	Reported	LC
20.	Corvus ruficollis	Brown-necked Raven	Bird		LC
21.	Varanus griseus knoiecznyi	Indian desert monitor	Reptile		LC
22.	Naja	Indian Cobra	Reptile	Common	LC
23.	Ablepharus pannonicus	Easter dwarf skink	Reptile		LC
24.	Eristicophis macmahonii	Leaf nose viper	Reptile		NE

4.6 SOCIO-ECONOMIC BASELINE STRUCTURE

4.6.1 Demography

181. The land and water rights mainly belong to different clans of Zehri tribe including Nathwani, Bastohi and also some other tribes including Hasrani and Jattak. About 406 landholding households were reported in sub-project, which includes 200 Pashta Khan, 82 Grambowad and 124 Mengalabad (Table 4-10 below).

Table 4-10: Demography of the Sub-project Area (during 2021)

Name of Killi	Total HHs	Total Population	Male	Female
Pashta Khan	200	1187	613	574
Grambowad	82	544	275	269
Mengal abad	124	664	353	311
Total	406	2395	1241	1154

4.6.2 Tribes/Caste, Language and Religion

182. The main tribe living in the sub-project area are Zehri, Nathwani, Mengal, Channar, Daggani and Jattak. Brohi is spoken as the major language in the area while a small number of the people can speak Urdu. The communities belong to the Muslim religion group.

4.6.3 Literacy Ratio

183. A person was treated as literate if he or she could read newspaper and write a simple letter in any language. According to the current social survey, the literacy rate of the studied killies was less than 5 percent. These 5 percent were found only primary class education in male respondents. Amongst the female, out of 50 respondents, only 01 female had primary education. There is a need to establish educational institutions in each killi to improve the literacy ratio.

4.6.4 Main Occupation of the Respondents

184. Severe poverty prevails in the killies. Their lives are miserable due to shortage of resources. The main occupation of the people of the project areas are agriculture and livestock rearing. The most of the farmers supplement their income from labor and shop keeping, transporters, private and government jobs etc. For cattle and sheep rearing large tracts of grazing land are still available. The monthly farm income ranged from Rs.4000 to 5000 while Rs.4000- to 4500 from off-farm income was recorded. The community hardly fulfil their domestic needs from their limited resources of income.

185. There is potential to grow every type of fruit plant but due to shortage of water, could not sow. With the rehabilitation of water channels, the farmers would be able to plant fruit trees to generate income resulting in poverty reduction.

4.6.5 Social Facilities & Pressing Needs

186. The situation regarding social facilities is very alarming in the sub-project area. No social and civic facilities were available in the surveyed killies. There was no facility of health in the local villages and residents have no direct access to the metaled road. Facilities of public transport are also very poor. Facilities of drinking water, sanitation and health are also missing. The facilities of primary school for boys and girls were available in both surveyed killies, but local communities were not satisfied because of poor buildings and non-availability of trained teaching staff. The overall facilities in all surveyed killies were recorded as follow in Table-11 below which indicated very poor condition:

Table 4-11: Table Social Amenities Available in the Surveyed Killies

Facilities	Pashta Khan	Mengalabad
Hospital/Dispensary	No	No
RHU	No	No
School/college	No	No
Bank	No	No
Vet. Dispensary	yes	No
Shop	Yes	Yes
Post office	No	Yes
Telephone/Mobile	Mobile	Mobile
Drainage/sewerage	No	No
Police Check post	Levis	No
Grain Market	No	No
Private Dispenser	Yes	No

187. Provision of basic facilities is the obligation of the relevant department and is the right of the inhabitants of the area. Pressing needs expressed by the local people are:

- Proper irrigation infrastructure and Irrigation water supply throughout the year;
- Rehabilitation of existing irrigations structures irrigating each killi separately;
- Land-levelling through the department because the poor farmers cannot afford the expenditures;
- Supply of clean drinking water; and
- Market linkage road to get better price of agricultural products, fruits and livestock.

188. Like other killies of the area, the issues and problems are almost the same as below:

- The common concerns of the participants were related to the damages of crops, suspension irrigation water during the construction activities and movement of heavy vehicles and machineries in the residential area.
- There are three main villages in the command area of Killi Pashta Khan, Grambowad and Mengalabad. All showed their concern over social mobility of the women during construction works. They demanded a check and balance to control unwanted activities

5. ANALYSIS OF ALTERNATIVES

5.1 PROJECT NEED AND JUSTIFICATION

5.1.1 Existing Irrigation System

189. Perennial surface flow is diverted to irrigate existing command area in Pashta Khan and Garambowed Villages. At Pashta Khan, the flow is diverted to existing commands area locally constructed head up bund called ganda, which is made of stone, debris and bushes. The river flow is guided by an earthen unlined channel (Figure 5.1) to command area. At some places, lined channels were also existing (Figure 5.2).

190. At Garambowad, the local farmers also constructed earthen bund with stone and bushes to divert river perennial flow for their command area (Figure 5.3) which is on the left side of the river. An earthen channel (Figure 5.4) takes flow to command area. The locals have constructed pipe aqueducts (Figure 5.5), at river crossings. The farmers to guide the perennial flow to the earthen diversion bund (Figure 5.6) have constructed an approach channel.

191. To improve the existing Irrigation system, the Consultants have a two-prong approach are 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.

192. The consultant followed an approach of assessing the improvement condition of the irrigation system and improvement in future reliability of irrigation supply for increase in cropping intensity by analysis and design. The diagnostic analysis was based on review of project related documents, field visits, walk through survey, consultation with the farmers and other stakeholders and gathering information on the indigenous irrigation practices. Based on the above information, it is assessed that the irrigation system is unlined and in bad shape. The Diversion arrangement to divert the perennial flow in to command area is damaged. The existing unlined irrigation system in both villages are in bad condition and maximum irrigation water is wasted.

193. There is considerable perennial flow in the river that can be used for irrigation through effective diversion and can bring additional land under cultivation. The floodwater in river also causes damage to existing diversion earthen bunds which requires engineering solution. Absence of proper flow diversion structure restricts villagers to use perennial flow.

194. This project will assure water supplies to 456 ha existing commands, and also adding 377 ha new command area in 8 villages of Pashta Khan and one village of Garambowad, Flood protection for project area villages with proper distribution of readily available water with little investment and optimum productivity.

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



Figure 5-1: Existing bund for diversion of flow



Figure 5-2: Existing lined Channel



Figure 5-3: Earthen diversion bund for Garabowed



Figure 5-4: Earthen channel for Garambowed command area



Figure 5-5: Pipe aqueduct on Garambowad channel



Figure 5-6: Upstream guide channel for diversion bund of Garabowed

5.1.2 No Project Alternative

o Pashta Khan and Garambowad Subproject

196. Current irrigation system is unlined and in bad shape. The Diversion arrangement to divert the perennial flow in to command area is damaged. The existing unlined irrigation system in both villages are in bad condition and maximum irrigation water is wasted. The floodwater in river also causes damage to existing diversion earthen bunds which requires engineering solution. Absence of proper flow diversion structure restricts villagers to use perennial flow and is adversely affecting the irrigation capability of the command area.

5.1.3 New Project Interventions

o Alternatives

197. The following two options were considered at Pashta Khan and Garambowad Subproject

- A water intake structure, as head works, with proper flood protection works for canal system and lining the entire water channel to the command area including drainage structures.
- An infiltration gallery connected to collection chambers (off-take well) and irrigation channels, which brings water to command area.

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

199. The objective of the project is to provide more irrigation water to the existing and available command area Pashta Khan and Garambowad Villages.

200. The subproject will also provide with the flood protection bund along some reaches of command area to preserve it from flood water. The provision of permanent infrastructure will improve system efficiency by reducing losses and conveyance times between the source and outlets. Availability of water round the year will increase productivity of the area and enhance income generation activities in the area.

201. **Table 5-1** below provides comparison of alternatives with respect to cost, design and environment:

Table 5-1: Comparison of Alternatives

Parameters	Weir	Infiltration Gallery
Cost	Costly	Cheaper
Design	Weir can only be operateable during surface flow of river.	Infiltration gallery can provide water to agricultural field around the year

Perceived Environmental Impacts	Soil erosion, loss of natural vegetation, deployment of external labor force.	Soil erosion, loss of natural vegetation, deployment of external labor force.
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202. Comparison of alternative as mentioned in Table 5-1 shows that the infiltration gallery is the best alternative with respect to cost and availability of water for whole year.

6. PUBLIC CONSULTATION AND DISCLOSURE

6.1 GENERAL

203. 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.

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

- Inform the public about what is the 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 STAKEHOLDER IDENTIFICATION

205. During the field survey different stakeholders identified were the local residents, local women, and general public. These were selected as being close proximity to the project area and project innervations can affect them directly.

6.3 PUBLIC CONSULTATION CONDUCTED

206. Public consultation plays a vital role in studying the affect and impacts of the sub-project on the stakeholders. These consultations have vital role in obtaining the views and perception of the possible affected community for preparing the useful and sustainable policy to implement the sub-project. In this regard, consultations were conducted with the local people residing in the adjacent villages in the Sub-project area of different locations/reaches of the Pashta Khan & Grambowad schemes. The discussions focused on environmental and social impacts of the rehabilitation works on the local communities.

207. The list of consultation with male respondents is provided below in Table 6-1, while photographs of the male consultations is provided in Figure 6-1.

208. Table 6-1: List of Male Participants

Killi Pashta Khan		
Sr. No.	Name	Occupation
1	Faqeer Ahmad	Farmer
2	Abdur Rehman	Farmer
3	Rasool Bukhsh	Farmer
4	Noor Ahmad	Farmer
5	Sikander	Farmer
6	M.Afzal	Farmer
7	Abdul Qadoos	Farmer
8	Abdullah	Farmer
9	Jameel Ahmad	Farmer
10	M.Asiam	Farmer
11	Abdul Nabi	Farmer
12	M.Javed	Farmer
13	Inayatullah	Farmer
14	Hamid Ali	Farmer
15	M.Alam	Farmer
Killi Mengalabad		
1	Abdul Rehman	Farmer
2	Allah Bukhsh	Farmer
3	Muhammad Umer	Farmer
4	Dur Muhammad	Farmer
5	Ali Muhammad	Farmer
6	Sahb Khan	Farmer
7	M.Yousaf	Farmer
8	Gohram Khan	Farmer
9	Rehmatullah	Farmer
10	Haji Khan	Farmer
11	Raheem Bukhsh	Farmer
12	Long Khan	Farmer
13	Shabbir Ahmad	Farmer
14	Ghulam Murtaza	Farmer
15	Abdul Qadoos	Farmer
16	Abdul Raheem	Farmer

6.4 Consultation with Female Respondents

209. The gender and social Consultation revealed extreme poverty in the area. Women used to handle all the chores and outside regarding limited agriculture and livestock with their partners. The participants were pleased with the proposed irrigation project. They think that their land will become fertile and valuable with the supply of surface irrigation water. Over all women were not educated as out of total, 50 females of Pashta Khan and Mengalabad killies were consulted, only one female was having middle class education. All were working as housewives. High-priority needs demanded by the community were clean drinking water as it was most distinctive need of the community because they have to fetch water from on every day basis for drinking purpose. The list of consultation with female respondents is provided in Table 6-2 below, while photographs of the females' consultations in Pashta Khan village is provided in Figure 6-2. The females of Mengalabad killi did not allow the team to take their pictures of consultation.

Table 6-2: List of Female Participants

S.No	Name	Education	Occupation
Killi Pashta Khan			
1	Naz Bibi	Nil	House wife
2	Fatima	Nil	House wife
3	Zainab	Nil	House wife
4	Fatima	Nil	House wife
5	Jan Bibi	Nil	House wife
6	Rahima	Nil	House wife
7	Safia	Nil	House wife
8	Hajra	Primary	House wife
9	Sakina	Nil	House wife
10	Razia	Nil	House wife
11	Naheeda	Nil	House wife
12	Rasheeda	Nil	House wife
13	Jannat Khatoon	Nil	House wife
14	Maryam	Nil	House wife
15	Sabira	Nil	House wife
16	Zulekha	Nil	House wife
17	Fareeda	Nil	House wife
18	Sher Bano	Nil	House wife
19	Gul Naz	Nil	House wife
20	Sara	Nil	House wife
21	Amina	Nil	House wife
22	Zubaida	Nil	House wife
23	Salma	Nil	House wife
24	Taj Bano	Nil	House wife
25	Savera	Nil	House wife
26	Kalsoon	Nil	House wife
27	Faiza	Nil	House wife
28	Khan Bibi	Nil	House wife
29	Zahida	Nil	House wife
30	Bilqeess	Nil	House wife
31	Shahida	Nil	House wife
32	Noor Bibi	Nil	House wife
Killi Mengalabad			
1	Jamal Khatoon (1)	Nil	House wife
2	Noor Bibi	Nil	House wife
3	Zamurd	Nil	House wife
4	Jamila	Nil	House wife
5	Amna	Nil	House wife
6	Shah Bibi	Nil	House wife
7	Sakina	Nil	House wife
8	Jam Bibi	Nil	House wife
9	Jannat Khatoon(2)	Nil	House wife
10	Shah Bibi (2)	Nil	House wife
11	Dur Bibi	Nil	House wife
12	Jannat Khatoon(3)	Nil	House wife
13	Rehana	Nil	House wife
14	Afsana	Nil	House wife
15	Zakia	Nil	House wife

16	Sameera	Nil	House wife
17	Mah Bibi	Nil	House wife
18	Hasina	Nil	House wife

210. The following were the objectives of Gender Consultation:

- Create awareness among the women about gender activities provided in the GAP and ensure their participation;
- Identification of potential female activists in the project catchment areas to harmonize with the project initiatives;
- Assessment of opportunities to develop and implement gender specific intervention in the project;
- Assess Social and Environmental impacts of project interventions
- Create awareness among women about the subprojects and its 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 rearing 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.

6.5 Consultation Findings:

211. The consolidated response, comments and recommendations of the primary stakeholders on the project are the following:

- (i) Dust emission is expected to be generated during the implementation of the project.
- (ii) Noise during construction will affect the day-to-day activities on project site and nearby government buildings. The recommendation is to use construction equipment that produce less noise and fence the area undergoing construction activities;
- (iii) Use smaller construction vehicles to avoid road degradation and vehicular accidents in areas on narrow roads. Consider routes with wider roads and less-populated areas for large construction vehicles;
- (iv) Discussed about the use of water and sanitation/toilets for workers and staff of awarded contractor.
- (v) The sub-project at district Khuzdar has been examined for likely IR impacts, and categorized and dealt with according to ADB social safeguards policy, as provided in SPS 2009. It was found that the construction/rehabilitation of Pashta Khan perennial irrigation sub-project had no IR issues. It does not involve any land acquisition or resettlement impacts as the rehabilitation works include the improvement of existing channels owned by the BID and the land is already owned by the Government. With the described mitigation measures effectively implemented and monitored, the Project can

achieve its goals of significant benefits for farming communities while keeping environmental impacts at an acceptably low level.

212. The suggestions, comments and recommendations were incorporated in the final technical detailed design and environmental management plan (EMP) of the project.

6.6 FUTURE CONSULTATION AND DISCLOSURE

The public consultation and disclosure program with the stakeholders will remain a continuous process throughout the project implementation and will include the following:

(i) IEE DISCLOSURE

213. The IEE report for the original loan will be disclosed on ADB's website. The IEE report and other relevant documents will also be made available at: (i) offices of implementing and executing agencies; and (ii) awarded contractor's office. It will be ensured that hard copies of IEE is kept at places which is conveniently accessible to all primary stakeholders.

(ii) CONSULTATION DURING CONSTRUCTION PHASE

214. The following consultation should be conducted during the construction phase: (a) public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and (b) meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and to provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

(iii) PROJECT DISCLOSURE .

215. Further disclosure of the project details during the construction phase may include: (a) public information campaigns (via newspaper, flyers, and media) to explain the project to the wider city population and prepare them for disruptions they may experience once construction is underway; (b) public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents; (c) formal disclosure of completed project reports by making copies available at PMO office, and informing the public of their availability; and (d) providing a mechanism through which comments can be made.

6.7 CONCLUSIONS and RECOMMENDATIONS

216. The Balochistan Water Resources Development Project (BWRDP) aims to support the Government in water sector planning, management and investment on water sector infrastructure in selected river basins. It will assist the government for investment to improve water storage and supply infrastructure at the Zhob and Mula River basins and improve agricultural farm productivity;

217. The sub-project at district Khuzdar has been examined for likely IR impacts, and categorized and dealt with according to ADB social safeguards policy, as provided in SPS 2009. It was found that the construction/rehabilitation of Pashta Khan perennial irrigation sub-project had no IR issues. It does not involve any land acquisition or resettlement impacts

as the rehabilitation works includes the improvement of existing channels owned by the BID and the land is already owned by the Government.

218. With the described mitigation measures effectively implemented and monitored, the Project can achieve its goals of significant benefits for farming communities while keeping environmental impacts at an acceptably low level.

Figure 6-1: Photographs of Male/Female Consultation



Consultation in Pashta Khan Village

Consultation in Mengalabad Village



Gender Consultation in Pashta Khan Village

7. ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 GENERAL

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

7.2 METHODOLOGY FOR IMPACT SCREENING

220. Determining the significance of potential environmental impacts and their effects enables the identification of necessary mitigation and benefit enhancement measures as well as an estimation of the related financial costs associated with the impacts of a project. An impact can be either beneficial or adverse and is assessed by comparing the quality of the baseline conditions with the predicted quality once the project is under implementation or in place.

221. The procedure for determining the level of risk associated with each potential impact is described below. The likelihood that the activity will have an effect on the environment, as well as the consequence of the effect occurring, are used to assess risk. It is frequently described as follows:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

Table 7-1: Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventive measures are not applied	3
Unlikely	May occur once or twice during the activity if preventive measures are not applied	2
Rare	Unlikely to occur during the project	1

Table 7-2: Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding communities	5
Major	The action will cause major adverse damage on the environment or surrounding communities.	3
Moderate	No or minimal adverse environmental or social impacts	2
Minor	No or minimal adverse environmental or social impacts	1

Table 7-3: Risk Score Table

Likelihood	Consequence			
		Catastrophic	Major	Moderate
Certain	25	15	10	5
Likely	15	9	6	3
Unlikely	10	6	4	2
Rare	5	3	2	1

Risk: Significant: 15-25
 Medium: 6-10
 Low 1-5

222. Any 'Medium' to 'Significant' risk requires an environmental management measure to manage the potential environmental risk. Judgment will be required concerning the application of an environmental management measure to mitigate low risk situations.

223. The impact assessment matrix presenting the potential impacts and expected impacts during the different project development phases are presented in the Table 7-4 below.

Table 7-4: Impact Assessment Matrix

Activity / Impact	Likelihood	Consequence	Impact (Consequence x likelihood)	Residual Impact
Design Phase				
Assessment of water availability	Likely	Moderate	Medium	Low
Land acquisition	Likely	Moderate	Medium	Low
Construction Phase				
Soil Contamination	Likely	Moderate	Medium	Low
Soil erosion/ silt run-off	Likely	Moderate	Medium	Low
Disposal of spoil	Likely	Moderate	Medium	Low
Surface or Ground water contamination	Likely	Moderate	Medium	Low
Use of Local water resources	Likely	Moderate	Medium	Low
Air Pollution	Likely	Moderate	Medium	Low
Noise and vibration	Likely	Moderate	Medium	Low
Flora	Likely	Minor	Medium	Low
Fauna	Likely	Minor	Medium	Low
Impacts on Local Communities/ Work force	Likely	Moderate	Medium	Low
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Likely	Minor	Medium	Low
Gender Issues	Likely	Moderate	Medium	Low
Safety hazards	Likely	Moderate	Medium	Low
Induced Traffic	Likely	Minor	Medium	Low
Occupational Health and Safety	Likely	Moderate	Medium	Low
Operation Phase				
Adequacy of operation and maintenance (O	Likely	Moderate	Medium	Likely

& M)				
Conflicts caused by unavailability or improper distribution of water in the area	Likely	Minor	Medium	Likely
Disposal waste (connection of waste streams) in the Canal	Likely	Minor	Medium	Likely

7.3 EXPLANATION OF THE IMPACT ASSESSMENT

224. 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

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

Mitigation Measures

226. Design works have ensured the proper assessment of water availability. According to hydrological study, an average annual gross estimated water availability of 31.5 MCM and 44.1 MCM at Garambowad and Pashta Khan sub-projects respectively.

o Land acquisition:

227. The improvement/rehabilitation works of the existing channels will not involve any land acquisition or demolition of any built up private properties, as all civil works will be confined within the existing ROW. The Pashta Khan and Grambowad Perennial Irrigation Scheme included the improvement/rehabilitation of existing channels owned by BID and no additional land will be acquired. As per design, the rehabilitation activities will require 10.4 acres of land and the same quantity of land is already available owned by Balochistan Irrigation Department (BID). Temporary acquisition of land may be required for the contractor's construction and accommodation facilities.

o Mitigation Measures

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

229. Contractor will be responsible to make contract with land owner(s), for temporary land acquisition on rent and will share contract agreement with PMO.

7.3.2 Construction Phase

Land Resources

230. 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.

o **Disposal of Soil Material**

231. 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.

o **Soil Erosion**

232. 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**

233. 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.

234. This impact would be of moderate significance.

❖ Mitigation Measures

235. 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**

236. 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**

237. 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

238. 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 etc. The section also describes mitigation measures to manage these impacts.

o **Use of Local Water Resources**

239. 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.

o **Contamination of Water Resources**

240. 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

241. 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**

242. 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.

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

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

244. 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 safely dispose of scraped material, and subsequently 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 be removed from site and be brought to adequate handling, recycling or disposal facilities.

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

- Fuels, lubricants and other hazardous material will have to be properly stored in adequate containers in sites equipped with retaining structures, including oil skimmers for the treatment of contaminated runoff water.
- Repair and maintenance work on machines and vehicles will only be done in specific places designed and equipped for this purpose (oil skimmer). These must be at a safe distance from the stream/nullah. No washing of vehicles will be done in or near the stream/nullah.
- Water contaminated with concrete will have to be collected in sedimentation ponds and, if required, will have to be 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

246. 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**

247. 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

248. 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

249. Emissions of noxious gases from movement of heavy machinery, batching plant, 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**

250. 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 at 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 it should be ensured that the workers wear the PPE properly during working on site.
- The contractor will prepare dust management plan (**Annexure 7**)

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

251. 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**

252. 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 are 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**

253. 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**

254. 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 with 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

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

o **Flora**

256. Cutting of few trees and bushes is not 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 fulfil the camps requirements). The cutting of small trees and shrubs will cause degradation of local environment as under:

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

o **Fauna**

- **Mammals and Reptiles**

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

258. 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. 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.

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

260. 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**

261. 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

o **Flora**

262. 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 of 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**

263. 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**

264. 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**

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

Mitigation Measures

- Location for establishment of campsite shall be duly discussed and approved by BID. This will include provision for solid waste disposal, latrines / soak pits etc. Soak pits shall be properly designed approved by BID before establishment of campsite.
- Photographs of site before establishment of campsite shall be taken and it will be responsibility of the contractor to make site better or as good as original. A comparison report shall be submitted to Project Director, BWRDSP 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**

266. 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**

267. 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**

268. 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**

269. 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 7.2.

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

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

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

270. 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 neighboring country. In Balochistan Province, Confirmed COVID-19 cases were 12,560, recoveries 11,460 and deaths 141 till 24th 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**

271. 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**

272. 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.
 - The Contactor will obtain approval from the Engineer before using the local water resources.
 - 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**

273. 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 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 be involved 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**

274. 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 be open to the population of the nearby villages, to directly benefit from the project.
- Cordon off the work areas where necessary.
- The storage of all solid waste must be carried out to prevent the attraction, harbouring, or breeding of insects or rodents, and to eliminate conditions harmful to public health or that create safety hazards, odours, unsightliness, or public nuisances.
- Contractor will prepare and follow accident/incident investigation procedure (**Annexure 8**)

o **Impact on Induced Traffic**

- Construction traffic hindrance should be avoided by providing proper diversion and signage.
- Traffic management plan (**Annexure 9**) will be prepared by the contractor after consultation with RE for its implementation.
- GRM will be 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 (Template attached as **Annexure 4**) 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 (**Annexure 5**) 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.

o **Graves, Cultural and Historical Sites**

275. 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.

276. 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, contractor will follow Chance Find Procedure (**Annexure 6**), 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)**

277. 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**

278. 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.

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

279. 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

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

o **Use of fertilizers & pesticides**

281. 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

282. 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.

283. 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.

284. This EMP addresses all the significant impacts that are identified during the impact's 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

285. 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

286. 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

287. 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.

288. 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

289. 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

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

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

291. 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

292. 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 Pashta Khan and Garambowad subproject. 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

293. The successful implementation of the Environmental Management Plan requires the involvement of concerned stakeholders, each fulfilling a different but vital role to ensure sound environmental management and compliance during the construction phase.

294. The key players involved during construction stage of the proposed project are following

- Project Management Unit through SC’s Environment Specialist-PMO Support
- Balochistan Environment Protection Agency (BEPA)
- SC’s Environmental Engineer/Scientist; and
- Contractor’s Environmental Engineer/Scientist.

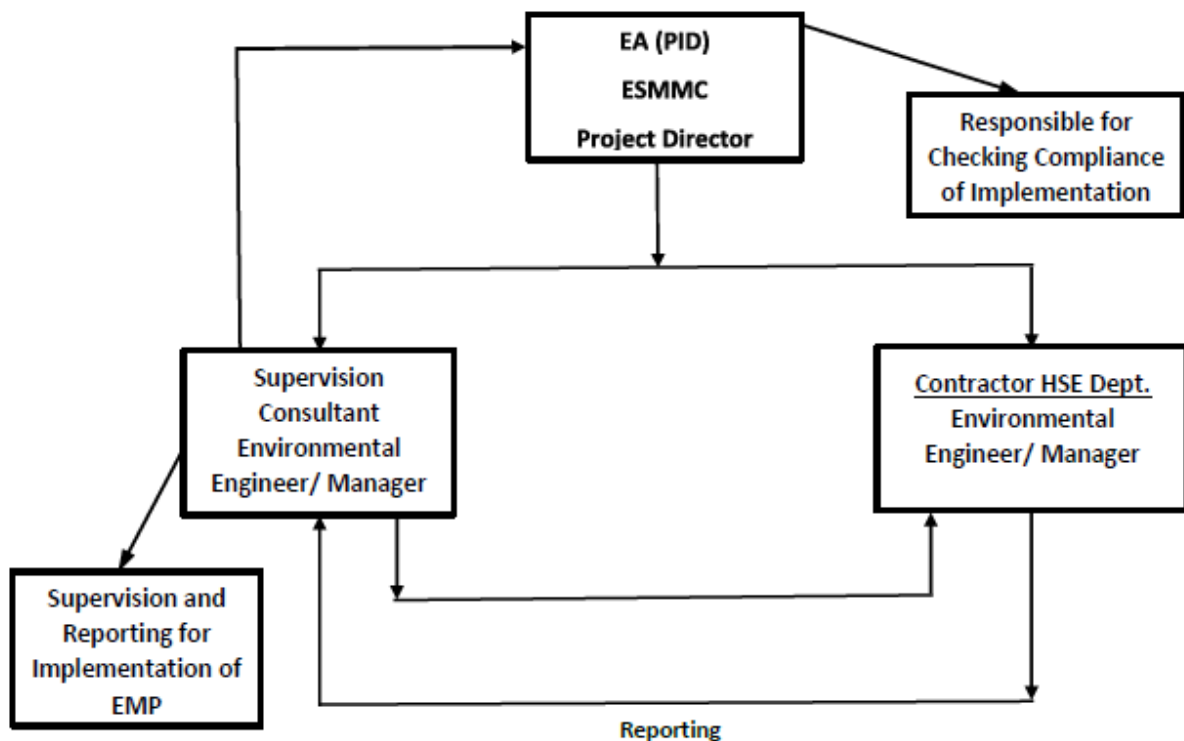


Figure 8-1: Organizational Setup for Implementation of EMP (Construction Phase)

Roles and Responsibilities

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

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

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

- Ensuring that required environmental training is provided to the concerned staff.
- Carrying out random site visits to the construction site to review the environmental performance of the construction contractors.
- Review monitoring reports for the progress of environmental related activities.
- Make sure that the construction contractor is implementing the additional measures suggested by the supervision consultant in environmental monitoring reports.
- To assist contractor for obtaining necessary approval from the concerned departments.
- Maintaining interference with the other lined departments / stakeholders.
- Reporting to Balochistan EPA on status of EMP Implementation.
- Reporting to ADB on status of EMP implementation.

b) **BEPA**

297. BEPA is the regulatory authority for issuance of NOC for the proposed sub-projects. As part of its mandate, protection of environment is its responsibility. Therefore, this agency will undertake inspection (as and when required) of project activities with respect to the protocols as defined in the EMP. Environmental Protection Authority (EPA) Balochistan has issued the No Objection Certificate (NOC)-**Annexure 2**. The specific roles of key functionaries are described hereafter.

c) **Supervisory Consultant: Resident Engineer**

298. Resident Engineer (RE) Roles and Responsibilities

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

d) **Supervisory Consultant: Environmental Specialist-Field**

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

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

e) Construction Contractor: Environmental Engineers / Managers

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

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

f) Employees/ Workers Responsibility/ Obligations

301. Employees / workers have obligation to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions at work. The other responsibilities are

- To cooperate with employer in assisting them to fulfill their statutory duties.
- Comply with safety instructions and procedures.
- Use all safety equipment properly and do not tamper it.
- Not to interfere with deliberately or misuse anything provided, in accordance with health and safety legislation, to further health and safety at work.

□ Reporting Mechanism

302. 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.

303. 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

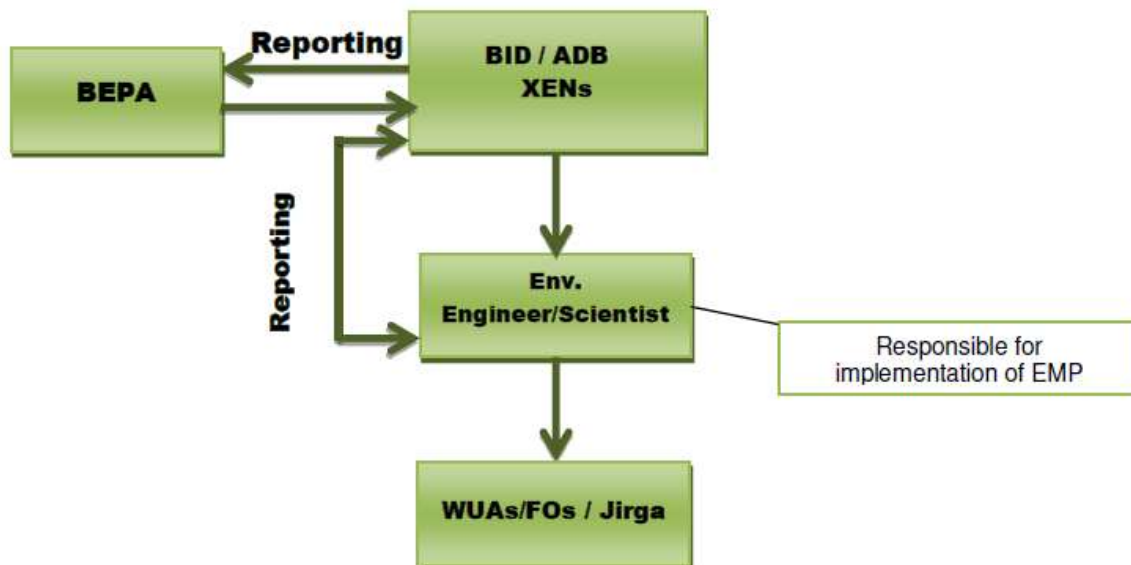
304. The implementation of the proposed EMP involves inputs from various functionaries. Construction Contractor will be primarily responsible for ensuring implementation and reporting of the mitigation measures proposed in the EMP, which will be part of the contract

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

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

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



• Roles and Responsibilities

a) Environmental Engineer/Scientist

306. 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

307. 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

308. 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 prerequisite 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	<ul style="list-style-type: none"> To minimize resettlement and other social adverse impacts, proposed rehabilitation works is being 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. By adopting the aforementioned measures, the impact would be of low significance. Contractor will be responsible to made contract with land owner(s), for temporary land acquisition on rent and will share contract agreement with PMO. 	BID and Revenue Department	BID
B. Implementation & Construction Phase					
1.	Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	<ul style="list-style-type: none"> Changes in land use Pattern Loss of vegetation Cultural conflict 	<ul style="list-style-type: none"> Location for establishment of campsite shall be duly discussed and approved by BID. This will include provision for solid waste disposal, latrines / soakpits etc. Soakpits shall be properly designed approved by BID before establishment of campsite. Photographs of site before establishment of campsite shall be taken and it will be responsibility of the contractor to make site better or as good as original. A comparison report shall be submitted to Project Director, BWRDSP before release of final payment. Site for camp site shall be selected keeping in view the cultural norms of the area to avoid undue 	Construction Contractor	Supervision Consultant

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			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.		
2.	Soil Contamination	Soil Contamination by Oil, petrol etc	<ul style="list-style-type: none"> The contractor will be required to train its workforce in the storage and handling of materials like oils, diesel, petrol, other chemicals, concrete and cement, etc., that can potentially cause soil contamination. 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 banded areas. 	CC	SC
3.	Soil erosion/ silt run-off	Phenomenon may pose serious environmental impacts like landslides, slumps, slips and other mass movements.	<ul style="list-style-type: none"> Restore/stabilize all the freshly cut surfaces around the borrow pits, steep slopes and along drainage channels as soon as possible; Seeding or plantation of erodible surfaces; Planning construction activities in such a way so as to avoid cutting of erodible surfaces and earth movement in rainy season; Trimming down of slopes; and The supervisory staff shall ensure timely compliance of these measures to reduce the risk of soil erosion. 	CC	SC
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.	<ul style="list-style-type: none"> 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

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
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.	<ul style="list-style-type: none"> Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade quality. The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements. Appropriate measures for disposal of sewage – such as septic tank and soaking pits shall be prepared by contractor and submitted for approval to the Project Director, BWRDSP. 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 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
6.	Improper construction techniques and monitoring	Public inconvenience, traffic jams, unmanaged excavated material and dust problem due to excavation	<ul style="list-style-type: none"> 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	<p><u>Gaseous Emissions</u></p> <ul style="list-style-type: none"> 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; Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>are needed to minimize the hazardous emissions;</p> <ul style="list-style-type: none"> Open burning of solid waste from contractor's camps shall not be allowed. NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works. <p><u>Dust Emission</u></p> <ul style="list-style-type: none"> The material being transported or stored at the stockpiles will be kept covered with plastic to ensure protection of ambient air from fugitive emission during wind storm emissions. 		
8.	Noise and vibration	Disturbances to local residents in the form of increased noise levels and vibration due to movement of construction machinery	<ul style="list-style-type: none"> Selection of up to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or with appropriate muffling devices; Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in its use; Preferably, restricting construction vehicle movements during night time; Machinery with low noise level or machinery with noise shielding and absorption should be used; The plants and equipment used for construction will strictly conform to noise standards specified in the NEQS; Vehicles and equipment used will be fitted, as applicable, with silencers and properly maintained; In populated areas, the construction activities will be restricted to be carried out between 6 / 7.a.m. and 20:00 p.m.; Public hearings should be held to discuss appropriate 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
			<p>solutions and materials to control noise (e.g., mud or brick walls, bushes, etc.); and</p> <ul style="list-style-type: none"> 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. 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.	<ul style="list-style-type: none"> Coordination between different utility departments shall be maintained to get the details of existing utilities (if any) before starting construction of the proposed Project. 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.	<ul style="list-style-type: none"> Construction traffic hindrance should be avoided by providing proper diversion and signage. Traffic management plan will be prepared by the contractor after consultation with RE for its implementation. 	CC	SC
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	<ul style="list-style-type: none"> 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 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		hazardous construction material. Spread of COVID-19 to workers and community	<ul style="list-style-type: none"> 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. 24 hours' security should be provided by the contractor at the Labor Camp and Batching Plant. 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/ 		
12.	Rain effect	Extreme weather conditions such as rainfall during the monsoon season.	<ul style="list-style-type: none"> Construction work should be phased in such a way that meets the demand of the climatic variations of the project area. 	CC	SC
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.	<ul style="list-style-type: none"> The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed. The Contractor's staff and labor 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. 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.	<ul style="list-style-type: none"> Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will warn their labor accordingly. 	CC	SC

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
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.	<ul style="list-style-type: none"> 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
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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> It is desirable that the night time working may be avoided at places where settlements are very close to the construction sites. 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. The induction of outside labor may create social and gender issues due to the unawareness of local customs	<ul style="list-style-type: none"> The Contractor will have to select specific timings for the construction activities particularly near the settlements, in order to cause least disturbance to the local population, particularly women. 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

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility	
				Execution	Monitoring
		and norms.			
5	Safety Hazards for local people	Occurrence of accidents/incidents during the construction activities.	<ul style="list-style-type: none"> All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel. Protective fencing to be installed around the Camp to avoid any accidents. 	CC	SC

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	<ul style="list-style-type: none"> 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. 	EA Staff
2.	Conflicts caused by unavailability or improper distribution of	Social issues	<ul style="list-style-type: none"> Agreements between different communities/tribes <p>Perennial irrigation schemes may function smoothly in normal conditions and circumstances but do face problems during extraordinary situations, i.e., when</p>	EA Staff

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
	water in the area		<p>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.</p> <ul style="list-style-type: none"> 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. 	
3.	Disposal waste (Connection of waste streams) in the Canal	Degradation of irrigation water and Health issues	<ul style="list-style-type: none"> Proper monitoring of canal alignment and disconnect all identified waste streams 	EA Staff
4.	Use of fertilizers & pesticides	<ul style="list-style-type: none"> Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff 	<ul style="list-style-type: none"> 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. 	EA Staff
5.	Risk due to Natural Hazard i.e., Flooding and Earthquakes	System sustainability	<ul style="list-style-type: none"> Emergency Response Plan for Breaching of Canal will be followed 	EA Staff

S. No.	Aspect	Project Impact	Mitigation Measures	Responsibility
6.	Flora (Vegetation)	To maintain and look after the plantation	<ul style="list-style-type: none"> 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; 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. Raising of dense plantation on both sides of the canal 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; 	EA Staff
7.	Fauna (Animal community)	To provide alternate crossings for animals and livestock	<ul style="list-style-type: none"> 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. 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

309. NOC and Other Approvals

(i) BEPA Approval Process

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

(ii) Stakeholder Coordination

311. 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.

312. 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.

313. 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

314. 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.

315. 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.

316. 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	Contractor staff; Project Implementation Staff	1 day
Training consultants/ organizations specializing in social management and monitoring	Short seminars and courses on: Social awareness	Project staff dealing in Social/lands matters	1 day
Training consultants/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	Contractor's staff	2 days
GRM awareness trainings by Supervision consultants	Introduction to Grievance Redress Mechanism (GRM), Procedures for lodging grievances, Role of GRM officers and their responsibilities, Steps for investigation and resolution of grievances	Contractor Staff, GRM committee members	1 day

8.3 Communication & Documentation

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

(iii) Data Recording and Maintenance

318. 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

(iv) Meetings

319. 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.

320. 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.

(v) Social Complaint Register

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

(vi) Photographic Records

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

8.4 Grievance Redressal Mechanism

323. 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 all project interventions and ensure smooth and fair implementation of subproject activities.

□ Principles

324. 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.

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

326. 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**

327. 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**

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

Displaced Person Committees (DPCs)

329. 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

330. 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)

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

331. 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.

332. 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.

333. 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.

334. 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.

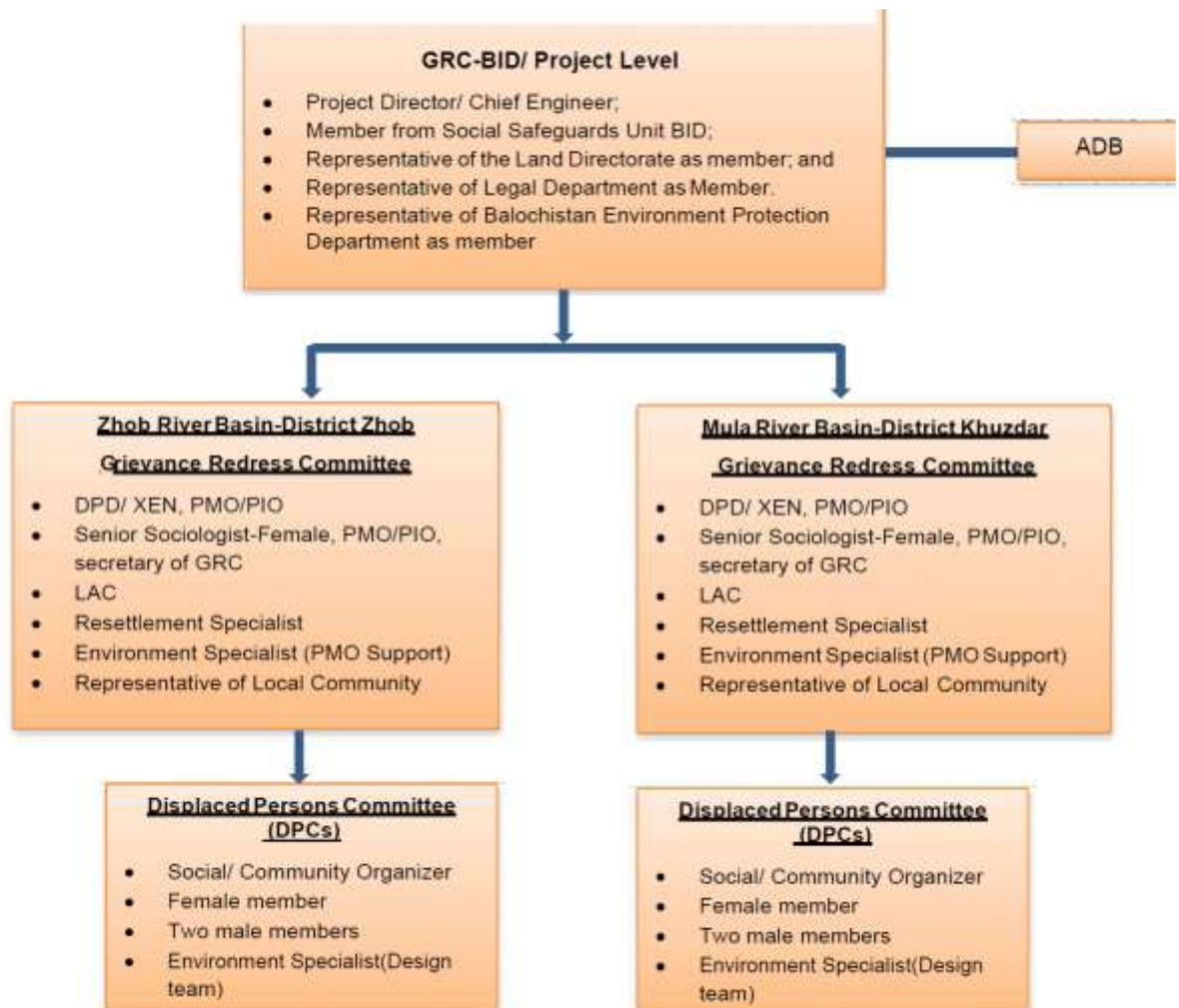
BID/ Project Level

335. 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.

336. 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 8-2: Organogram for GRM



337. 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 Procedure**

338. 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:

339. 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 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.

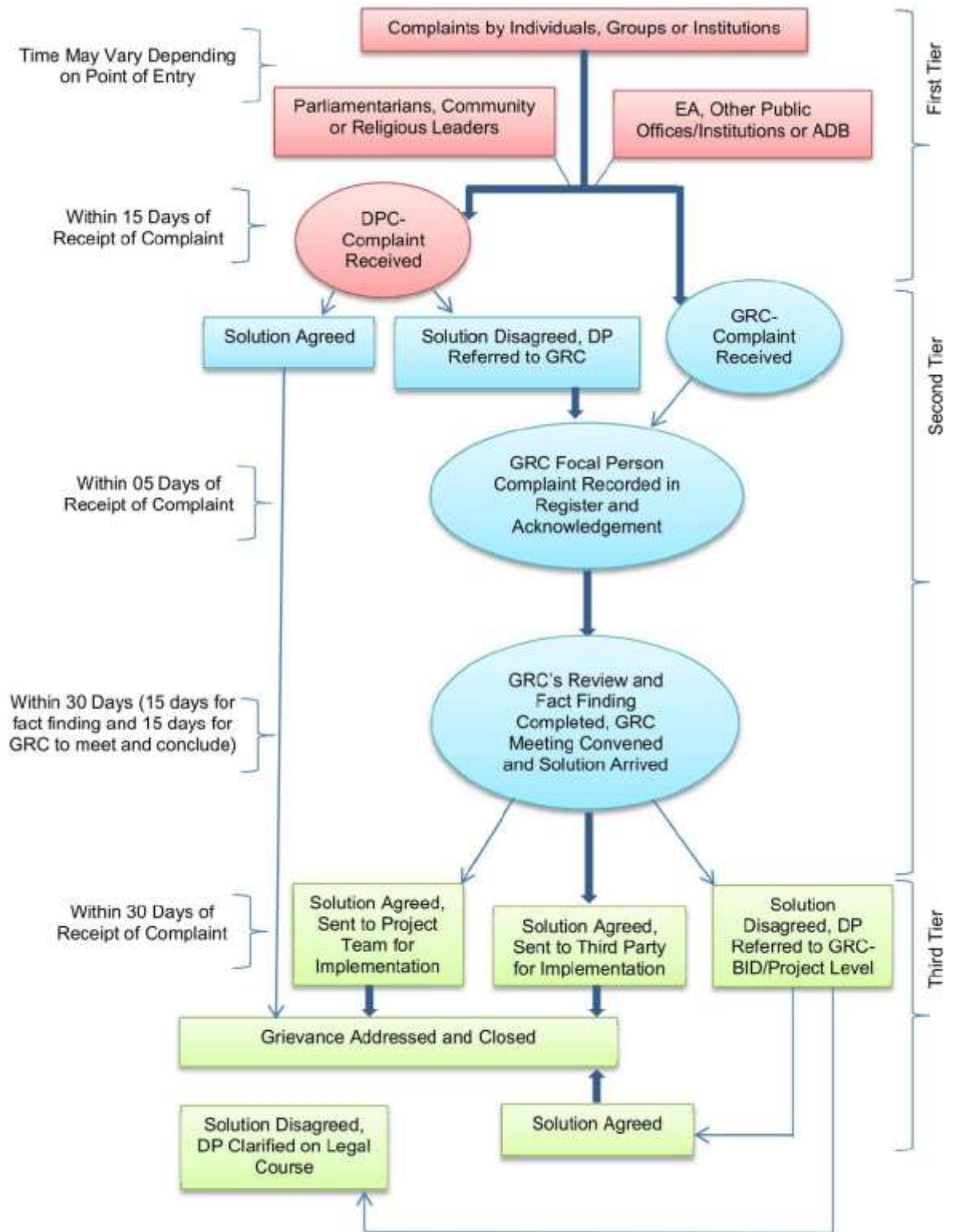
340. Nonetheless, the complainant will be at liberty to access the formal legal course if he is dissatisfied with the GRC findings and recommendations. If GRC fails to conclude its recommendations either due to some technical or legal constraint, the GRC will immediately report the issue to BID/project 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.

341. 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-8-4.

Table 8-4: Grievance Redressal Process

Land/Crop Compensation Issues	Project/ Other Issues (Including Environmental)
<p>a. First, complaint resolution will be attempted at site (village level) through the involvement of the PMO/DPC/ FO.</p> <p>b. If unsettled, grievance can then be lodged to the GRC or DOR/LAC to proceed under law and communicate decision in least possible time.</p> <p>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.</p> <p>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.</p>	<p>a. First, complaints resolution will be attempted at site (village level) through the involvement of the PMO/DPC/FO.</p> <p>b. If unresolved, a grievance will be lodged to the GRC, which will acknowledge receipt of the complaint within 5 days.</p> <p>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.</p> <p>d. If the complainant is not satisfied, he can pursue further by submitting to the appropriate court of law.</p>

Figure 8-3: Grievance Process and Time Frame



8.5 Environmental Management Cost

342. The budget presented in Table 8-5, 8-6 & 8-7 will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

Table 8-5. 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, NO _x , SO _x , PM ₁₀	Construction site, batching plant site, and access road/borrow area, nearby village (SC will guide)	4 (Total= 32)	Quarterly	Proponent ¹ (though Environmental lab)	800,000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals	Nearby Construction site	1 (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 (Total= 16)	Quarterly	Proponent (though Environmental lab)	224,000
Noise Level		Construction site, camp site, access roads, nearby community	4 (Total= 32)	Quarterly	Proponent (though Environmental lab)	64000
A. Sub-Total						Rs.12,00000
During Operation & Maintenance Period(one year)						
Air quality	CO, NO _x , So _x , PM ₁₀	PMU will guide	2 (Total = 4)	Bi-annually	Proponent (BID)	50000
Ground Water Quality	Physical-chemical parameters, biological contamination, heavy metals		1 (Total = 2)	Bi-annually	Proponent (BID)	28,000
Surface Water Quality	Physical-chemical parameters, biological contamination, heavy		1 (Total = 2)	Bi-annually	Proponent (BID)	28,000

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

Table 8-6: Cost of Proponent

Sr. No	Description	Amount
1	Environmental Monitoring cost for construction & operation period (from Table 8-4)	Rs. 13,22000
2	Tree Plantation Cost	Rs. 200000
3	Training & Community Engagement Cost	Rs. 200,000
Total Cost	Rs. 17,22000	

Table 8-7: Cost of Contractor

Sr. No	Description	Amount
1	Contractor Environmental Engineer salary @ Rs. 80,000/month	Rs. 19,20000
2	Health & safety measures manage (PPE's, First aid etc.) cost	Rs. 700,000
	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. 300,000
Total Cost	Rs. 34,20000	

Total EMP Cost = Rs. 51,42000

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

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

Findings and Recommendations

344. 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 relevant mitigations.

345. No Objection Certificate for the proposed subproject interventions has been acquired from Balochistan EPA under Balochistan Environmental Protection Act 2012.

346. 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 be given land free of cost, and one encroacher will be compensated.

347. 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.

348. 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.

349. 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.

350. 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 presently, would change to lush green valley through provision of irrigation water.

351. 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 labourers 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.

352. 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.

353. 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.

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

9.2 Conclusions

355. 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:

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

ANNEXURES

Annexure 1: Rapid Environmental Assessment Checklist

The projects are screened through Rapid Environmental Assessment (REA) checklist to determine environmental categorization. The environmental and social rapid screening depicts that:

the subproject will not require any land acquisition;
 the subproject will not involve any involuntary resettlement
 the subproject does not fall in any protected area.

Screening Questions	Yes	No	Remarks
Project Site Is the project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area		x	
Wetland		x	
Mangrove		x	
Estuarine		x	
Buffer zone of protected area		x	
Special area for protecting biodiversity		x	
Potential Environmental Impacts Will the proposed project cause.....			
Loss of precious ecological values (e.g. result of encroachment into forest/swampland or historical/cultural buildings/area, disruption of hydrology of natural waterways, regional flooding and drainage hazards)?		x	
Conflicts in water supply rights and related social conflicts?		x	
Impediments to movements of people and animals?		x	
Potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		x	
Insufficient drainage leading to salinity intrusion		x	
Over pumping of groundwater, leading to salinization and ground subsidence?		x	Limited use of water for project activities which will not be significant
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		x	
Dislocation or involuntary resettlement of people?		x	No dislocation or involuntary resettlement of people will occur
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups		x	
Potential social conflicts arising from land tenure and land use issues?		x	No land acquisition will be required
Soil erosion before compaction and lining of canals?			N/A
Noise from construction equipment?	x		It will be managed through mitigation measures and will be documented in EMP

Screening Questions	Yes	No	Remarks
Dust during construction?	x		It has moderate Impact for labors during construction, but It will be managed by water sprinkling. Dust generated will be managed through sound planning and good management practices with implementation of EMP
Waterlogging and soil salinization due to inadequate drainage and farm management?		x	
Leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		x	
Reduction of downstream water supply during peak seasons?		x	
Soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?		x	
Soil erosion (furrow, surface)?		x	
Scouring of canals?		x	
Clogging of canals by sediments?		x	
Clogging of canals by weeds?		x	
Seawater intrusion into downstream freshwater systems?		x	
Introduction of increase in incidence of waterborne or water related diseases?		x	
Dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?	x		The subproject does not have usage of any hazardous chemicals during construction. However, health and safety measures for laborers will be taken to implement HSE Plan that will be developed and documented in EMP
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	x		Local people will be employed as much as possible from close by villages/ towns and the same will be documented in EMP
Social conflicts if workers from other regions or countries are hired?	x		Priority will be given to local for employment and the same will be documented in EMP
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	x		Earth work will not lead to any risk for community during construction time, however, Health and safety Plan and Emergency response procedures will

Screening Questions	Yes	No	Remarks
			be prepared and implemented. The same will be documented in EMP.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	x		Safety measures for community will be taken to avoid any risk and consequence. It will be documented in EMP. However, it has major positive impact, because the construction of the new dam will save community/infrastructure from flood threat if any.
Climate Change and Disaster Risk Questions			
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?	x		Project area is prone to floods and earthquakes. Appropriate engineering measures to minimize negative impacts, such as designing water diversion structures on the basis of calculating 500 years return period of Nullahs to maintain downstream flows and considering seismic resilience in construction.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased glacial melt affect delivery volumes of irrigated water; sea level rise increases salinity gradient such that source water cannot be used for some or all of the year)?	x		climate resilience considerations will be incorporated into the project design and Restoration and rehabilitation of water conservation structures will be done
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		x	
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by diverting water in rivers that further increases salinity upstream, or encouraging settlement in earthquake zones)?		x	

Annexure 2: NOC from Balochistan EPA

BALUCHISTAN ENVIRONMENTAL PROTECTION AGENCY

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

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

ENVIRONMENTAL APPROVAL

To

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



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

Location of Project: District Khuzdar

Date of filling of EIA: 08-10-2020

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

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

8. Any change in the approved project shall be communicated to Balochistan Environmental Protection Agency and approval of the same shall be obtained from this Agency.
9. An emergency Response Plan should be established to address the natural and DDMA anthropogenic hazards/catastrophe in coordination with Provincial Disaster Management Authority (PDMA).
10. The proponent shall ensure to take effective measures (installation of protection walls, Gabion walls etc.) for land stabilization and prepare a comprehensive plantation plan at pre-identified dumping sites after land leveling by consulting with relevant authorities.
11. The proponent / Contractor shall make sure the safety and security of wild animals and their habitats at the project site and its environs with the prior consultation and strictly adhering to the guidelines of concerned wildlife authorities.
12. The proponent shall ensure that emission level of machinery are within permissible limits and ensure that work shall not be carried out at night hours.
13. The proponent shall plant 500,000 indigenous forest trees in consultation with Forest Department. The Forest Department shall also take measures for protection and maintenance of these trees and maintain their proper record.
The proponent shall ensure that the farmers of tail shall not be affected due to the project oration. Proper share of the water should be made available without any deviation.
The proponent shall redress the objection / concerns of neighbors/ stakeholder on priority basis (if any at any stage).
16. Maximum skilled and unskilled jobs after fulfilling the eligibility criteria shall be given to the local community.
17. The proponent shall ensure availability of downstream E-Flow during construction and operational phases of the project as per design and maintain record thereof.
18. Given to the geology, topography, terrain and demography of the project areas, pre-identified sites shall be utilized for quarrying purpose so that the issues like land degradation, soil erosion, sedimentation of water bodies and potential threats to the human life & properties and public infrastructure could be avoided.
19. The proponent will install standby power generators (if required) adopting sound proofing techniques and it shall be equipped with chimney with proper height to discharge the hot gases / smoke.
20. After completion of project, project area (camp site, workshops, batching plant and stockpile sites) should be restored to its regional condition. For this purpose documentation in terms of videos and photographs should be kept in record.
21. The proponent shall, before commencing construction of the Project, acknowledge acceptance of the stipulated conditions by executing an Undertaking in the form prescribed in Schedule VII of Review of IEE/EIA Regulations 2000.
22. The proponent should ensure the compliance of COVID-19 SOPs for laborers/workers at camp site and construction site.
23. The proponent shall be liable for correctness and validity of information supplied to this Department by the Environmental Consultant.
24. The proponent shall be liable for compliance of Regulations 13, 14 and 19 of IEE / EIA Regulations, 2000, regarding approval, confirmation of compliance, entry, inspections and monitoring.



7685-88
27/11/20

25. The Proponent shall facilitate BEPA's team during inspection and monitoring project activities.
26. This approval shall be treated as null and void if or any of the conditions mentioned in the approval, BEPA, 2012, Rules and Regulations, Guidelines and instructions is / are not complied with or committed by the proponent or his/her agent or employee.
27. This approval shall be valid (for commencement of construction) for the period of Three Years from the date of issue under the Regulation 17 of IEE/EIA Regulation, 2000.
28. This approval can be withdrawn at anytime without any prior notice if deemed necessary in the Public / National interest.
29. EPA reserves the right to impose any other condition based on its monitoring.
30. This approval does not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law in force.

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27/11/20


DIRECTOR GENERAL

Copy forwarded for information to:-


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



DIRECTOR GENERAL



Annexure 3: Secondary Environmental Monitoring Data

Ambient Air Quality Monitoring Results



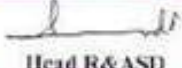




PERAC RESEARCH & DEVELOPMENT FOUNDATION

TEST REPORT		Page 12 of 12	
Customer's Name	M/s NEC Consultant (Pvt) Ltd	Test Report No	2421K/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7020-7029
Sample Description	SPM, $\mu\text{g}/\text{Nm}^3$ Analysis	Sampling Date	16-05-2017

Code #	LOCATION	TEST RESULTS
7020	Chutta	12
7021	Wandari	14
7022	Kbadri	15
7023	Jhakaro	11
7024	Acharwand	Nil
7025	Sinjori	4
7026	Hitachi Khizma Infiltration Gallery	Nil

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

Rev. No: 0	Date: 11-01-2000	P-10-05
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Noise Level Results



PERAC RESEARCH & DEVELOPMENT FOUNDATION

TEST REPORT	Page 11 of 12
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Customer's Name	M/s NEC Consultant (Pvt) Ltd	Test Report No	24211/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7010-7019
Sample Description	Noise Analysis	Sampling Date	16-05-2017

TEST RESULTS

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

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

Rev. No. 0	Dated: 21-01-2010	P-10-02
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Surface Water Tests Results



PERAC RESEARCH & DEVELOPMENT FOUNDATION



TEST REPORT		Page 07 of 12	
Customer's Name	M/s NEC Consultant (Pvt) Ltd	Test Report No	2421F/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7006
Sample Description	Surface Water (Hatachi-Khizran Infiltration gallery)	Sampling Date	16-05-2017

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

 Prepared by	 Section in charge (E)	 Head R&SD
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The analysis is based on sample(s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment (I.R.C.O.F.). We have no responsibility and warranty or representation in connection with which such report is used.

Rev. No. 0 | Total: 21-01-2000 | P-10/05

Annexure 4: Occupational Health and Safety Plan

General

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank/IFC EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

a. Screening and regular unannounced checking of workers

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

b. Minimizing hazards and risks at the workplace.

To ensure safety at all work sites, the following will be carried out:

i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.

ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.

iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.

iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks, they will not be more than 6 feet high.

v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.

vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;

vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontals.

viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.

ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.

x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.

xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

c. Provision of Personal Protective Equipment

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

i. High visibility clothing for all personnel during road works must be mandatory.

ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.

iii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.

iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.

v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.

vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.

vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.

viii. Safety nets shall be provided when workplaces more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table 4.1 PPE Requirement List

Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

i. Provision of dispensaries by the individual EPC contractor.

ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.

iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.

iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

e. Record Maintenance and Remedial action

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

f. Compensation for Injuries and Death

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

g. Awareness Programs

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.

ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

h. Nomination of a Health and Safety Focal Person

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

i. Function as the focal person/representative for all health and safety matters at the workplace;

-
- ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;
 - iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;
 - iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;
 - v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

Annexure 5:Emergency Response Plan

PURPOSE

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

- (i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.
- (ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

- (i) Construction Accident
- (ii) Road & Traffic Accident
- (iii) Hazardous material spills
- (iv) Structure collapse or failure
- (v) Trauma or serious illness
- (vi) Sabotage
- (vii) Fire
- (viii) Environmental Pollution
- (ix) Loss of person
- (x) Community Accident

RESPONSIBILITIES

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in Table 5.1 below.

Table 5.1 Emergency Response Team

Action Group	Responsibility
Emergency Coordinator	<ul style="list-style-type: none"> • Overall control of personnel and resources. • The Emergency Coordinator will support and advise the Site Safety Supervision as necessary. • Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also, assure proper coordination of news release with appropriate corporate staff or other designated people.
Site Safety Supervision (Emergency Commander)	<ul style="list-style-type: none"> • Overall responsibility for activating emergency plan and for terminating emergency actions. • Be alternative of emergency response chairpersons.

Action Group	Responsibility
	<ul style="list-style-type: none"> • Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth. • Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger. • Notify outside authorities if assistance is required. • Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation. • Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency. • Establish and appoint all emergency organization structure and team. • Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency. • Ensure resources available to purchase needed emergency response equipment and supplies. • Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan. • Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency. • The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.
Security Team	<ul style="list-style-type: none"> • Ensure that the exit route is regularly tested and maintained in good working order. • Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel. • Assist with strong/activation of services during an emergency. • Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.
Rescue & Medical Team	<ul style="list-style-type: none"> • Protect the injured from further danger and weather. • Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital. • Remain familiar with the rescue activities and rescue apparatus. • Assist outside medical services personnel when they arrive
General Administration Team	<ul style="list-style-type: none"> • Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	<ul style="list-style-type: none"> • Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team.

Action Group	Responsibility
	<ul style="list-style-type: none"> Coordinate emergency plan with the government authorities, local community.
Environment Team	<ul style="list-style-type: none"> In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	<ul style="list-style-type: none"> Call up of personnel into the safe location for protective life and property. Take immediate and appropriate action while Emergency Response Team is being mobilized. Keep in touch with the Emergency Commander Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary. Provide and maintain emergency equipment of their responsible areas.
Other Staff and Employees	<ul style="list-style-type: none"> All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team. Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.

PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.

Figure 5.1. Emergency Procedure for Fire

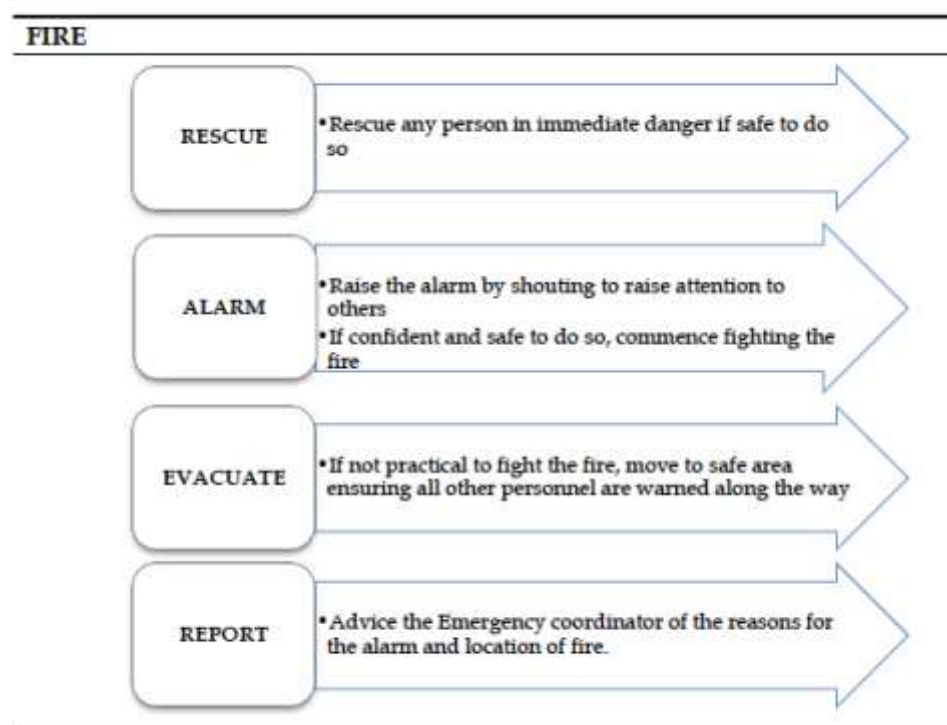
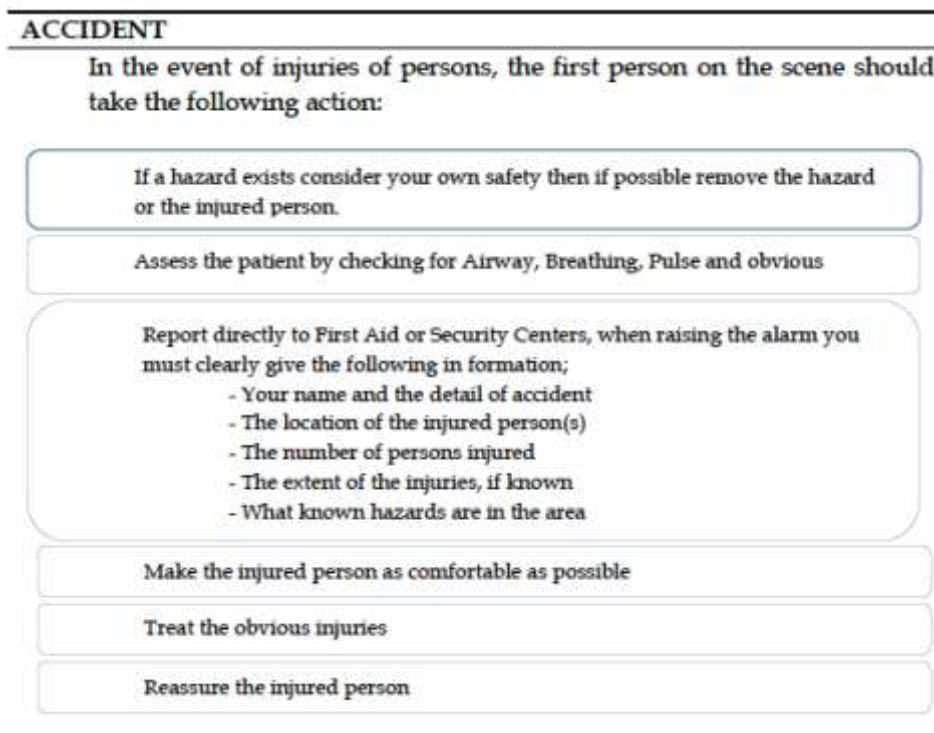


Figure 5.2 Emergency Procedure for Serious



COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoided politely, at all costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

First Aid Persons

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,

- Provide treatment to the victim(s) to the best of his/her ability.
- Ensure the safety of victims by ceasing any work activity in the area.
- Protect the injured from further danger and weather.
- Assist medical services personnel when they arrive.
- General Administration Team
- Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

Security Team

If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.

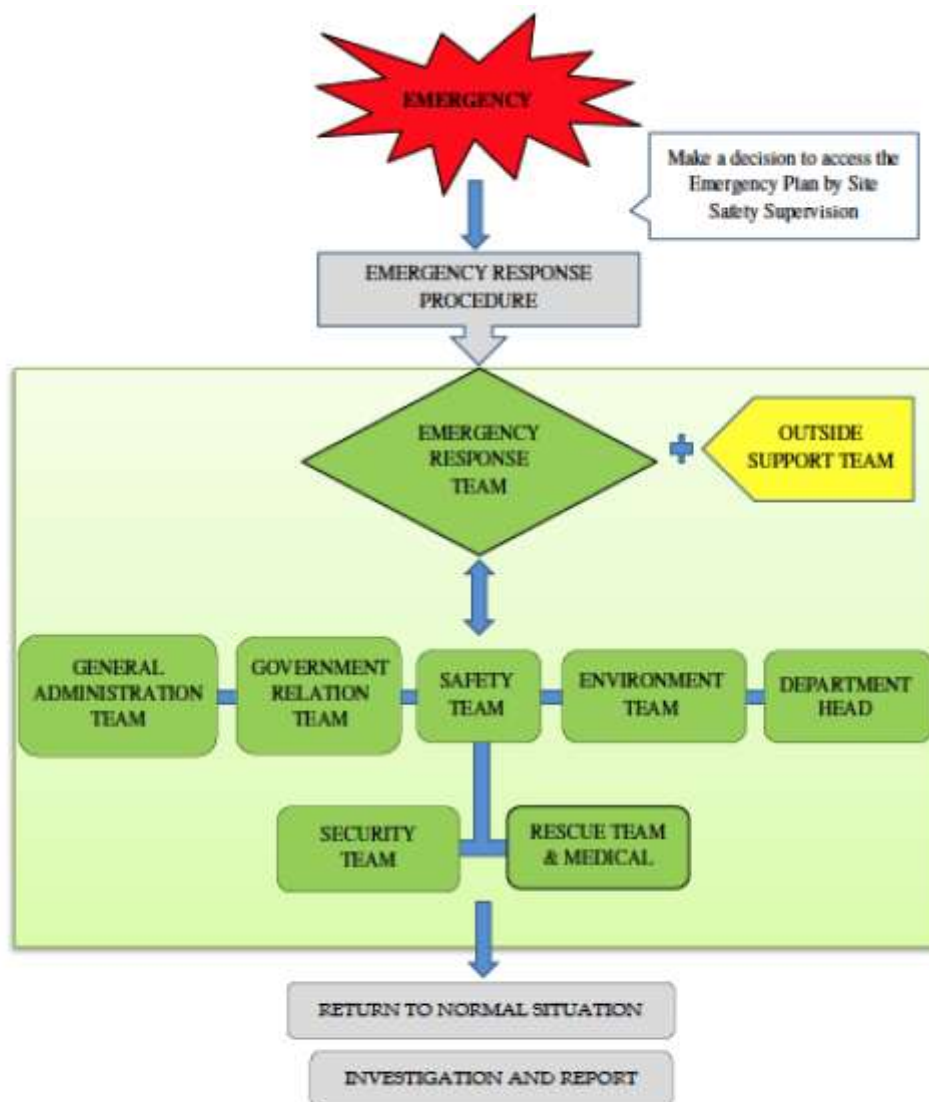
Prevent access to the site of unauthorized personnel (press, etc.).

Emergency Coordinator

The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.

The Emergency Coordinator shall ensure next-of-kin are properly notified, as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation

The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event. Below Flowchart provides sample Emergency Response Procedure(ERP) at site. Contractor has his site-specific ERP accordingly. The objective of an Emergency Response Procedure (ERP) is to ensure swift, coordinated, and safe responses to emergencies, minimizing harm and optimizing resource allocation.



Note: Name of contact person and call number from Owner/ Contractor to be determined.

Incident/Accident Reporting Checklist is provided below whose objective is to ensure comprehensive, standardized reporting of incidents/accidents to facilitate analysis, compliance, and continuous improvement in safety protocols.

Details of the actual Job Being done at the time:		
Details of Accident / Incident / What actually happened?		
Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)		
UNSAFE CONDITIONS	UNSAFE ACTS	
1 <input type="checkbox"/> Inadequately Guarded	1 <input type="checkbox"/> Operating Without Authority / Training	
2 <input type="checkbox"/> Unguarded	2 <input type="checkbox"/> Operating at Unsafe Speed	
3 <input type="checkbox"/> Defective Tools, Equipment, or Substance	3 <input type="checkbox"/> Marking SHE Device Inoperative	
4 <input type="checkbox"/> Unsafe Design or Construction	4 <input type="checkbox"/> Using Unsafe Equipment or Equipment Unsafely	
5 <input type="checkbox"/> Hazardous Arrangement	5 <input type="checkbox"/> Unsafe Loading, Placing, Mixing	
6 <input type="checkbox"/> Unsafe Illumination	6 <input type="checkbox"/> Taking Unsafe Position	
7 <input type="checkbox"/> Unsafe Ventilation	7 <input type="checkbox"/> Working on Moving or Dangerous Equipment	
8 <input type="checkbox"/> Unsafe Clothing	8 <input type="checkbox"/> Distraction, Teasing, Horse Play	
9 <input type="checkbox"/> Insufficient Instruction	9 <input type="checkbox"/> Failure to use Personal Protective Devices	
10 <input type="checkbox"/> Lack of system of work	10 <input type="checkbox"/> Lack of effective instruction or supervision	
Why was the unsafe act committed? _____	Why did the unsafe condition exist? _____	
Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)		
UNSAFE ACT	UNSAFE CONDITION	If Supervisor can't handle, then recommend to
<input type="checkbox"/> Stop the Behaviour	<input type="checkbox"/> Remove	<input type="checkbox"/> Site Engineer, or
<input type="checkbox"/> Study the job	<input type="checkbox"/> Guard	<input type="checkbox"/> Site Manager, or
<input type="checkbox"/> Instruct (tell-show-try-check)	<input type="checkbox"/> Warn	<input type="checkbox"/> Project Manager, or
<input type="checkbox"/> Follow Up	<input type="checkbox"/> Supervisory Training	<input type="checkbox"/> Safety Committee
<input type="checkbox"/> Enforce		
Detail below any immediate remedial actions that have been taken:		
Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	Responsible	Completion Date

Annexure 6:Archaeological ‘Chance Find’ procedure

Background

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this ‘Archaeological Chance Find Procedure’ are to promote preservation of archaeological data while minimizing disruption of construction scheduling/ It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Potential Impacts to Archaeological Sites

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

Archaeological ‘Chance Find’ Procedure

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following ‘chance-find’ principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

- (i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.
- (ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.
- (iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.
- (iv) Work will not re-commence in this location until agreement has been reached

between DoA and proponent as to any required mitigation measures, which may include excavation and recovery of the item.

(v) A precautionary approach will be adopted in the application of these procedures.

Detailed Procedural Steps

If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part as for a public purpose.

Annexure 7: Dust Management Plan

General

The purpose of this plan is to describe the measures that the project shall take to ensure that the risk of emissions from dust generated by site operations during construction are minimized and that best practice measures are implemented.

Dust emissions from construction can cause ill health effects to Contractor staff along with nuisance and annoyance to members of the local community. Dust will be controlled through:

Elimination

Reduction/Minimisation

Control

This dust management plan shall be implemented based on the measures already provided in the Environmental Management Plan (EMP) relating to controlling dust emissions.

Methodology

The following methodology will be undertaken for each project section:

Step 1 – Identify the dust generating activities

Construction activities that are likely to produce dust will be identified. The activities that will be taken into account are:

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Roads, surfaces and public highways

Static and mobile combustion plant emissions

Tarmac laying, bitumen surfacing and coating

Materials Handling, Storage, Spillage and Disposal

Storage of material

Stockpiles

Spillages

Storage of Waste

Site Preparation and Restoration after Completion

Earthworks, excavation and digging

Storage of spoil and topsoil

Demolition

Construction and Fabrication Processes

Step 2 – Identify the Receptors

The receptors have already been identified. The nature and location of the sensitive receptors will be taken into account when implementing control measures.

Step 3 – Implement Best Practice Measures to Control

Based on the nature of the activity producing the dust, the likelihood of dust being produced and the possible consequence of dust based on the sensitive receptors, the most effective control measure will be identified and implemented.

Step 4 – Monitor effectiveness of control

Construction Supervision Staff (CSC) will have the responsibility to ensure that dust control measures are being implemented and are effective.

Step 5 – Record and report result of monitoring

All inspections, audits and results of monitoring will be recorded and kept as part of the site filing system.

Method Statements and Risk Assessments

The Contractor’s Risk Assessments and Method Statements will be required to be approved by the CSC prior to commencing work and will be required to contain environmental aspects of the task, including dust control measures where required.

Where dust has been identified within the risk assessment as a significant issue, the method statement will be required to cover the following:

Methods and materials that will be used to ensure that dust generation is minimized.

The use of pre-fabricated materials where possible.

Optimum site layout:

Dust generating activities to be conducted away from sensitive receptors

Supply of water for damping down.

Good housekeeping and management

All employees will be briefed on the Risk Assessment and Method Statement before starting work.

Training

All Contractor staff will be required to attend training seminars as already mentioned in the EMP document. A site-specific induction will also be required before being allowed to work on site. These will include site-specific sensitive receptors and details regarding dust control measures to be taken.

Toolbox talks on air pollution and minimizing dust emissions will be provided on a regular basis to Contractor staff.

Identification of Dust Generating Sources and Control Methods Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Dust Source	Dust Control Methods
Major haul roads and traffic routes	Haul roads will be dampened down via a mobile bowser, as required.
Public Roads	Road sweeper will be used to clean public roads as required.
Site traffic management	Site traffic will be restricted to constructed access roads as far as possible. Site speed limit will be set at 10 mph as this will minimize the production of dust.

Dust Source	Dust Control Methods
Road Cleaning	A mechanical road sweeper will be readily available and used.
Handling, Storage, Stockpiling and Spillage of Dusty materials	
Material handling operations	The number of times a material will have to be handled will be kept to a minimum to prevent double handling and ensure dusty materials are not handled unnecessarily.
Transport of fine dusty materials and aggregates.	Closed tankers will be used or sheeted vehicles.
Vehicle loading/unloading materials on to vehicles and conveyors.	Dusty materials will be dampened down Drop heights will be kept to a minimum and enclosed where possible.
Storage of Materials	
Bulk cement, bentonite etc.	Bentonite will be delivered in tankers and stored in dedicated enclosed areas. Bulk cement will be transported through tractor trollies or trailers.
Fine dry materials	These will be protected from the weather and by storing in appropriate containers and indoors, where necessary.
Storage location	Material will be stored in dedicated lay-down areas.
Storage of Stockpiles	
Stockpile location	Stockpiles will be placed so as to minimize double handling and facilitate the site restoration.
Building stockpiles	Stockpiles, tips and mounds will not be stored at an angle greater than an angle of repose of the material.
Small and temporary stockpiles	Where possible, stockpiles will be placed under sheeting. Dusty material will be damped down. Wind barriers (protective fences) of a similar height to the stockpiles will be erected, if required.
Large and long-term stockpiles	Long-term stockpiles will be vegetated and stabilized as soon as possible. Stock piles will be dampened down until stabilized, where necessary. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Waste Material from Construction	
Disposal method	A dedicated lay-down area will be available for waste. Waste will not be allowed to build up and will be disposed off at the designated locations as per EMP.
Site Preparation and Restoration	
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
Construction and Fabrication Process	
Crushing of material for reuse, transportation and disposal	Authorization will be obtained from PMU and ADB before using any mobile plant on site for activities such as crushing and screening. Any crushing or screening activities will be located away from sensitive receptors.
Cutting, grinding, drilling, sawing,	These activities will be avoided wherever possible.

Dust Source	Dust Control Methods
trimming, planning, sanding	Equipment and techniques that minimize dust will be implemented. Water will be used to minimize dust.
Cutting roadways, pavements, blocks	Water sprinkling to be used.
Angle grinders and disk cutters	Best practice measures will be used such as dust extraction

Monitoring Arrangements

Monitoring will be conducted at sensitive receptor locations in the project area as provided in the EMP. Furthermore, at locations where PM levels are exceeding applicable guidelines, additional stringent measures will be implemented at the respective location(s) in the project area to ensure dust levels are controlled as far as possible.

Annexure 8: Site Specific EMP (SSEMP) Guide & Template for Guidance to Contractor

Guide for Development of SSEMP

- Step 1: Define Boundaries
- Step 2: Identify Sensitive Receptors
- Step 3: Specify construction activities
- Step 4: Conduct Risk Assessment
- Step 5: Assign Environment Management measures
- Step 6: Prepare Site Plans
- Step 7: Prepare Environment Work Plans (if required)
- Step 8: Monitoring

Step 1: The project area needs to be clearly defined.

Step 2: The mapping of sensitive receptors has already been conducted and needs to be presented clearly in a map.

Step 3: The tentative construction activities to be conducted are as follows:

- Site Surveying and Vegetation (Trees and plants) Clearance
- Establishment of Work Camp, Batching and Asphalt plant and access roads
- Dismantling of Asphalt and existing structures including Utilities
- Preparation of ground for Asphaltting
- Asphaltting
- Landscaping

Step 4: The Risk Assessment matrix template is provided in the table below.

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

Risk = Likelihood × Consequence

Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventative measures are not applied	3
Unlikely	May occur once or twice during the activity if preventative measures are not applied	2
Rare	Unlikely to occur during the project	1

Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding community e.g. extreme loss of soil and water resources and quality from stormwater runoff extreme pollution of soil and water resources including major contamination from hazardous materials widespread effects on ecosystems with deaths of fauna/flora widespread community impacts resulting in illness, injury or inconvenience loss or destruction of archaeological or historical sites Occurrence will almost certainly result in the work being halted and a significant fine.	5
Major	The action will cause major adverse damage on the environment or surrounding communities' e.g.	3

	major loss of soil and water resources and quality from stormwater runoff major pollution of soil and water resources including contamination from hazardous materials significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna significant annoyance or nuisance to communities major damage to or movement required to archaeological or historical sites Occurrence may result in work being halted and a fine	
Moderate	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	2
Minor	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	1

Risk Score Table

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
Certain		25	15	10	5
Likely		15	9	6	3
Unlikely		10	6	4	2
Rare		5	3	2	1

Risk: Significant: 15-25

Medium: 6-10

Low 1-5

Any Medium to Significant risk requires an environmental management measure to manage the potential environmental risk. Judgement will be required concerning the application of an environmental management measure to mitigate low risk situations.

The higher the risk the more intensive the required mitigation measure will need to be; e.g., where site sedimentation is deemed to be low risk, then silt fences may be needed but as the risk increases, then sediment traps may be required. The selection of the appropriate mitigation measure will require judgement based on the level of risk and the specific site parameters.

Step 5: The Environmental Management measures are to be extracted from the IEE study for the project and should be added in the last column of the table below.

No.	Construction Activity	Hazards to Consider	Likelihood that the site or sensitive receptors will be affected?	Consequence of the site or sensitive receptors being affected?	Risk Score (Consequence x likelihood)	Environmental Management Measures
i	Site Surveying & vegetation clearance	Damage to vegetation beyond project footprint				These can be taken from the EMP provided in the IEE report (If Risk Score is 6 or more)
		Erosion of exposed areas and sediment				
		Loss of topsoil				
		Dust generation				
		Noise				
ii	Establishment of Work Camp, Batching plant etc.	Soil deposited onto roads from tires				
		Stock Pile erosion				
		Noise & Vibration				
		Traffic congestion				
		Fuel spills				
iii	Dismantling of Asphalt and existing structures including Utilities	Noise and vibration				
		Dust generation				
		Community safety				

		Worker safety				
		Traffic Congestion				
iv	Preparation of Sub-Base	Noise and vibration				
		Dust generation				
		Traffic Congestion				
vi	Landscaping	Dust generation				
		Sediment runoff				
		Failure of vegetation to take root				

Step 6: The Site plans are a critical part of the SSEMP and will need to be prepared, otherwise the ADB will consider the document as incomplete.

The site plan will need to provide the following:

Indication of North and scale

Existing and planned supporting infrastructure (e.g., access roads, water supplies and electricity supplies)

Location of planned work

Contours

Drainage systems

Locations of sensitive receptors

Step 7 (if required)²: The completed SSEMP provides details of all the environmental management requirements for all stages of the construction process. For individual work teams who are responsible for only a small part of the overall construction works it can be confusing as to what is required for their particular work component. For example, the work team responsible for stripping soil for the construction areas are not going to be interested in the requirements for pouring concrete for footings and foundations. However, it is essential that the soil stripping team knows exactly what to clear and what to leave, as well as where to put stockpiles of soil for later use.

In situations where different work activities are required at different times or at different locations, environmental work plans can be prepared. These are similar to the work method statements that are often produced for major construction projects.

Step 8: A detailed monitoring plan will be provided along with frequency and responsibilities to ensure all key environmental parameters are monitored to ensure compliance with both national and ADB requirements.

Template for SSEMP

Introduction

Project Overview

Scope of SSEMP

Objectives of SSEMP

Map of Sensitive Receptors

Construction Activities

Risk Assessment

Risk Assessment Matrix & Mitigation Measures

Site Plan(s)

Environmental Monitoring Plan

Instrumental Monitoring of Environmental Parameters by Contractor as per EMP

In-house monitoring

Third Party environmental monitoring

² ADB, Safeguards Unit for Central & West Asia Department, Environmental Management for Construction Handbook.

Visual monitoring of Environmental Parameters by Contractor as per EMP
Responsibilities
Organizational Responsibilities and Communication
Responsibility of EA
Responsibility of Construction Supervision Consultant (CSC)
Responsibility of Contractor
Responsibility of EPA

Annexure 9: Accident and Incident Investigation Procedure

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

HS.T.02 INCIDENT / NEAR MISS REPORT

Title of Project:		
Location:		Date:

Objective(s)

To implement immediate and effective process in order to provide immediate treatment against any fatality, Injuries, Casualty.

SECTION A: TO BE COMPLETED BY PERSON INVOLVED (OR BY SUPERVISOR OR HEALTH AND SAFETY REPRESENTATIVE IF WORKER IS INCAPACITATED) AND BY THEIR SUPERVISOR

Details of the person involved in the incident/near miss

Employee #: Site Address Work phone:

Name: Father Name:

Position: Date of birth: Male Female

Please select one: Member Client Member Sub Contractor Visitor/Other

Details of the: Incident Near miss Medical

Date: Time: A.M /P.M

City: Location:

Was the incident/near miss reported to your supervisor, immediately: Yes No

Part of the body injured

Head	Trunk	Internal	Arm	Hand	Leg	Foot eye
<input type="checkbox"/> neck	<input type="checkbox"/> heart	<input type="checkbox"/> left	<input type="checkbox"/> left	<input type="checkbox"/> left	<input type="checkbox"/> left	<input type="checkbox"/> ear
<input type="checkbox"/> hip	<input type="checkbox"/> lungs	<input type="checkbox"/> right	<input type="checkbox"/> right	<input type="checkbox"/> right	<input type="checkbox"/> right	<input type="checkbox"/> great toe
<input type="checkbox"/> nose	<input type="checkbox"/> chest	<input type="checkbox"/> systemic	<input type="checkbox"/> shoulder	<input type="checkbox"/> thumb	<input type="checkbox"/> knee	<input type="checkbox"/> other toes
<input type="checkbox"/> mouth	<input type="checkbox"/> stomach		<input type="checkbox"/> upper arm	<input type="checkbox"/> fingers	<input type="checkbox"/> lower leg	
<input type="checkbox"/> teeth	<input type="checkbox"/> groin		<input type="checkbox"/> elbow	<input type="checkbox"/> palm	<input type="checkbox"/> ankle	
<input type="checkbox"/> face	<input type="checkbox"/> back		<input type="checkbox"/> forearm		<input type="checkbox"/> thigh	
<input type="checkbox"/> skull	<input type="checkbox"/> multiple		<input type="checkbox"/> wrist		<input type="checkbox"/> upper leg	<input type="checkbox"/> psychosocial

Nature of injury

<input type="checkbox"/> abrasion	<input type="checkbox"/> puncture	<input type="checkbox"/> heart attack	<input type="checkbox"/> sprain	<input type="checkbox"/> burn	<input type="checkbox"/> traumatic shock
<input type="checkbox"/> bruise	<input type="checkbox"/> laceration	<input type="checkbox"/> hearing loss	<input type="checkbox"/> strain	<input type="checkbox"/> scald	<input type="checkbox"/> electric shock
<input type="checkbox"/> fracture	<input type="checkbox"/> amputation	<input type="checkbox"/> foreign body	<input type="checkbox"/> hernia	<input type="checkbox"/> rash	<input type="checkbox"/> psychosocial
<input type="checkbox"/> concussion	<input type="checkbox"/> bite	<input type="checkbox"/> minor cuts		<input type="checkbox"/> allergy	<input type="checkbox"/> chemical

aggravation of previous injury or medical condition (please describe):

Type of incident which caused injury

<input type="checkbox"/> striking against	<input type="checkbox"/> stumbling	<input type="checkbox"/> lifting	<input type="checkbox"/> pushing	<input type="checkbox"/> ingestion
<input type="checkbox"/> struck by	<input type="checkbox"/> slipping	<input type="checkbox"/> bending	<input type="checkbox"/> pulling	<input type="checkbox"/> absorption
<input type="checkbox"/> caught in/on	<input type="checkbox"/> tripping	<input type="checkbox"/> twisting	<input type="checkbox"/> jumping	<input type="checkbox"/> inhalation
<input type="checkbox"/> stepping on	<input type="checkbox"/> falling	<input type="checkbox"/> stress	<input type="checkbox"/> vehicle	<input type="checkbox"/> needlestick
<input type="checkbox"/> other (please describe):				

Annexure 10: Traffic Management Plan

Need for Plan

The construction of the Landfill will take over 24 months and, in this period, huge vehicular movement carrying large amount of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

The plan

The Objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. It is intended to compliment and work alongside relevant ESMMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

Contractor, at the time of the execution of the project will prepare a comprehensive TMP in coordination with local traffic police department, PMU, emergency services and local administrative department. The PMU and CSC will review and approve contractors TMP. The contractor’s TMP shall include following mitigation measures during its preparation:

Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project construction.

Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.

Spoil dumpsites located close to Project site to minimize journey distance and limit movements to site access roads.

Concrete mixing plant located at Project site limiting traffic movements associated with concrete delivery to site access roads

Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site

Provision of bus/minibus services for personnel living in nearby settlements

Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.

Schedule deliveries and road movements to avoid peak periods

Road maintenance fund to leave a useful asset for communities after the construction phase.

Driver training for HGV drivers and refresher course every six months for Project drivers

Speed restrictions for project traffic travelling through communities (to be agreed with Traffic Management Authority)

Run a safety campaign to improve the people's knowledge of the traffic hazard on their roads, public information and other activities to address the issues.

Run a pedestrian awareness programme

Temporary signage

The traffic management plan is provided below.

Other Recommendations

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the project site would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

Public Access Routes

The use of public road for site access may be restricted in terms of:

Vehicle size, width and type of load

Time limits

Parking

Pedestrian conflicts

Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

Site Workers Traffic

Site personnel should not be permitted to park vehicles near the site boundary; this will lead to disruption in material deliveries. Designated parking area with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

Site Rules

Access to and from the site must be only via the specified entrance.

On leaving the site, vehicles must be directed to follow the directions given.

Drivers must adhere to the site speed limits.

All material deliveries to site must keep allocated time limits.

No material or rubbish should be left in the loading-unloading area.

Develop a map for alternate routes showing material delivery services.
Assign designated personnel on site to receive deliveries and to direct the vehicles.
Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.
Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the project.

Contractor's Obligation

The traffic management plan of the Contractor should be safe enough and widening of access roads and construction of the detours must be completed before start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. While widening the access roads, the safe movement of the vehicles, people, animals and wildlife must be ensured. It will be sole responsibility of Contractor. The roads widening should be designed on the basis of the traffic survey, summarized and estimated site traffic. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, PMU, emergency services and Traffic Police, and also publish weekly programme in local newspapers.

Annexure 11: Solid Waste Management Framework

INTRODUCTION

Construction contractors may use this framework as guiding document for preparation of site-specific solid waste management plan. The purpose of this Framework Solid Waste Management Plan is to ensure that wastes arising from the proposed construction works are managed, reused, recovered or disposed of by a method that ensures the provisions of the BEPA rules and ADB SPS, 2009. It also ensures that the optimum levels of waste reduction, re-use and recycling are achieved.

Waste management priorities for project are based following waste management hierarchy.

Prevent material wastage

Minimise the quantity of waste

Reuse of site materials

Recycling of waste

Energy recovery

Disposal

WASTE MANAGEMENT AT Balochistan Project sites

National Level

Waste management of the project will be carried as per national rules including:

Solid Waste Management Policy, 2000

Requirements of Balochistan Environmental Protection Act

Draft Guidelines on Solid Waste Management, 2005.

Section 11 of PEPA, 1997 prohibits discharge of waste in amount that violates the NEQS.

Draft Hazardous Substances rule of 1999

Section 132 of Cantonment Act, 1942

Provision Contains in the Local Government Ordinance, 2001

Regional Level

Asian Development Bank (ADB) SPS, 2009

IFC guidelines for Solid Waste Management

Best practices of waste management on construction sites

Details of the wastes to be produced

During construction/civil works, potential sources of waste will include spoils generated during excavation, concrete and construction waste, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills. It is the responsibility of all personnel on site including Contractors, Sub-Contractors and their Employees to ensure compliance with this Waste Management Plan.

Main Waste Categories

Contractors are required to develop inventory of main waste categories that will be generated during construction phase of the project. Anticipated main waste categories include construction debris, concrete waste, scrap wood, bricks, concrete, asphalt, plumbing fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents.

Anticipated Hazardous Waste Arising

Fuels stored on site that will be used during the construction phase are classed as hazardous. There will be fuel stored on site for machinery and construction vehicles. All fuel tanks and draw off points will be banded. If the fuel is correctly contained and banded, it is not expected that there will be any fuel wastage at the site. Other sources of hazardous waste include used paints, used oil/lubricants, electrical waste and chemicals. Project contractors are required to develop SOPs for handling, storage and disposal of hazardous waste arising from the project.

ESTIMATED WASTE GENERATION

Construction Waste Generation

Project contractors are required to develop and maintain waste inventory clearly showing the type, amount and location of waste generated from different activities at the site. Waste record keeping is key to successful implementation of waste management plan.

Proposed Waste Management Options

Waste will be segregated on site. Contractor will ensure that sufficient number of waste drums are placed at site with appropriate color coding. All recyclable waste will be handed over to recycling contractor. The appointed waste contractor will collect and transfer the recyclable wastes as receptacles are filled. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility. Project contractors will identify both recycling and non-recycling contractor working in the project area. Contractors through bidding documents will be bound to hire such waste contractors for efficient waste management at project sites.

A successful Waste Management Plan is largely dependent on how readily it can be changed in to normal site operations by the person responsible. It is recognized that the plan should not be obstructive to site operations and the construction program by placing the responsibility of construction waste management with the Manager, all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible. An Environmental Representative from each Works Sub-Contractor will also be nominated responsible for all waste management in their own operations. In this way, it is possible to identify where the greatest material wastage occurs, with a view to implementing better management.

The site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan. The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in this framework for solid waste management are performed on an on-going basis.

Tracking and documentation procedures for off-site waste

The site construction Manager will maintain a copy of all waste collection permits. If waste (soil & stone) is being accepted on-site, a waste docket must be issued to the collector. If the waste is being transported to another site, a copy of the waste permit for that site must be provided to the manager. Record of waste collection docket, a receipt from the final destination of the material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

Disposal Waste

Contractors are required to develop SOP for disposal of recyclable, non-recyclable and hazardous waste generated at site. Food waste will be disposed at food waste pit which will be fenced. Recycling waste will be handed over to recycling waste contractor. Hazardous waste will be disposed through incineration facility available in close proximity of the project area. Workers on the site will be encouraged to recycle as much municipal waste as possible i.e., cardboard, plastic, metals and glass. Prior to removal, the municipal waste will be examined to determine if recyclable materials have been placed in other containers. If this is the case, effort will be made to determine the cause of the waste not being segregated correctly.

ESTIMATED COST OF WASTE MANAGEMENT

Contractors are required to estimate and budget cost for waste management through BOQ items. Such waste management cost should include cost of waste drums, cost of waste handling crew, cost of waste transportation, cost of EPA approved waste contractor services and associated incineration costs if any. By reusing materials on site, there will be reduction in transport and disposal costs for a waste contractor taking the material away.

TRAINING PROVISIONS FOR WASTE MANAGER AND SITE CREW

A waste manager will be appointed or designated by construction contractors to ensure commitment, operational efficiency and accountability during the project execution.

Site Manager Training and Responsibility

The waste manager will be given responsibility and authority to select a waste team if required i.e., members of the site crew that will aid him in the organization, operation and recording the waste management system implemented on-site. The waste manager will have overall responsibility to oversee record and provide feedback to the CSC on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors where necessary and to co-ordinate with suppliers, service providers and sub-contractors to prioritize waste prevention and salvage. The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on-site. He will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and know how to implement this Framework for Solid Waste Management.

Site Crew Waste Management Training

Training of the site crew is the responsibility of the waste manager and as such, a waste training program should be organized. A basic awareness course will be held for all crew to outline the construction waste management plan and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g., general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

RECORD KEEPING

Records will be kept for each waste material which leaves the site, either for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site. The waste manager or delegate will record the following:

Waste taken off-site for reuse

Waste taken off-site for recovery

Waste taken off-site for recycling

Waste taken off-site for disposal

Waste (soil & stone) accepted on-site for recovery

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

OUTLINE WASTE AUDIT PROCEDURE

Contractors are required to develop SOP for waste auditing at the construction sites. Such SOP should reflect frequency and types of waste audits, audit criteria and way forward to close non-compliances.

Responsibility for Waste Audit

The appointed waste manager will be responsible for conducting a waste audit at the site during project execution.

Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site, as well as waste accepted, should be undertaken. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed. Upon completion of the construction phase a final

report will be prepared summarizing the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

CONSULTATION WITH RELEVANT BODIES

Local Authority

Project contractors are required to maintain close coordination with focal government departments/agencies to ensure that all available waste reduction, re-use and recycling opportunities are identified and utilized.