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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)**



UPDATED ENVIRONMENTAL IMPACT ASSESMENT REPORT

**SRI TOI DAM SUBPROJECT
ZHOB RIVER BASIN**

July 2024

A Joint Venture of

**NEE
SAR** National Engineering Services Pakistan (Pvt) Limited Lahore (Lead F

RHC Rehman Habib Consultants (Pvt) Limited (JV Partner)

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

in association with

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ACRONYMS

AB	Acquiring Body
AP	Aggrieved Party
AN	Ammonium Nitrate
ADB	Asian Development Bank
AJK	Azad Jammu Kashmir
BEPA	Balochistan Environmental Protection Agency
BOD	Biochemical Oxygen Demands
BRSP	Balochistan Rural Support Program
BWRDP	Balochistan Water Resources Development Project
CAN	Calcium Ammonium Nitrate
CCR	Community Complaint Register
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
EA	Executing Agency
ESMMC	Environmental & Social Management Monitoring Cell
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPC	Environmental Protection Council
EPRCP	Environmental Planning and Resource Conservation Project
FAO	Food & Agriculture Organization
FOs	Farmer Organizations
FFS	Famer Field School
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
IA	Impact Assessment
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
MCM	Million Cubic Meter
MSDS	Material Safety Data Sheet
MM	Modified Mercalli
MSK	Medvedev–Sponheuer–Karnik scale
NCS	National Conservation Strategy
NGO	Non-Governmental Organization

NEC	NEC Consultants
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NOx	Oxides of Nitrogen
NTU	Nephelometric Turbidity Unit
NVP	Net Value Production
PEPA	Pakistan Environmental Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PIS	Perennial Irrigation Schemes
PMD	Pakistan Meteorological Department
PMF	Probable Maximum Flood
PPC	Pakistan Penal Code
PPEs	Personal Protection Equipment
PPP	Public Private Partnership
PIU	Project Implementation Unit
BID	Balochistan Irrigation Department
RB	Requiring Body
RCC	Reinforced Cement Concrete
REA	Rapid Environmental Assessment
SIEE	Summary Initial Environmental Examination
SMART	Self-Monitoring and Reporting Tools
SOx	Oxides of Sulfur
SPS	Safeguard Policies
TA	Technical Assistance
TCI	Techno Consult International
TDS	Total dissolved solids
TSS	Total Suspended Solids
VOCs	Volatile Organic Compounds
VECs	Valued Environmental Components
WHO	World Health Organization
WUA	Water User Association
WWF	Worldwide Fund for Nature

EXECUTIVE SUMMARY

A. INTRODUCTION

1. Balochistan Water Resources Development Sector Project consists of implementation of 11 sub-projects in two potential river basins namely Mula and Zhob in the Balochistan. Siri Toi Dam Project is major core project of Zhob River Basin. Environmental Impact Assessment (EIA) report of the sub-project was prepared by the TA-Consultants (2017) under the ADB PPTA-8800 (PAK). This Environmental Impact Assessment (EIA) report has been updated due to minor changes in the technical design of sub-project at detail design phase.

2. The Siri Toi Dam Project is located in Union Council Sambaza, Tehsil and District Zhob in Balochistan Province, approximately 62 km north-east of Zhob on Sri Toi River, the main tributary of Zhob River near Kili Gul Khan. The latitude and longitude of the scheme are 31° 35' 56.35" N, 69° 16' 8.86" E. The annual average availability of water is nearly 32.216Million Cubic Meter (MCM) with a catchment area of 962 sq.km.

3. The broader objective of Sri Toi Water Storage and Irrigation Project is aimed at:

- Increasing command area to 3948 hectares out of total cultivable command area,
- Sustained water supply to the present command area.

4. The Project is being funded by Asian Development Bank (ADB) with Balochistan Irrigation Department (BID) acting as the Executive Agency (EA).

Scope and Objectives of the EIA:

5. This report is the environmental impact assessment (EIA) for the Siri Toi Dam Project and complies with the environmental assessment guidelines and requirements of the Asian Development Bank Safeguard Policy Statement (SPS, 2009) and the Government of Pakistan. The EIA has been prepared to present the environmental assessment process of the project and ensure that the potential adverse environmental impacts are appropriately mitigated. The scope of work for the preparation of the EIA included, a detailed scoping exercise, study of the relevant baseline information, assessment of environmental impacts of the Project and its ancillary activities, assessment of the cumulative environmental impacts of the project, preparation of mitigation measures with an environmental management plan and an environmental monitoring plan.

B. Critical Facts

Policy Legal and Administrative Framework:

6. The Government of Pakistan has formulated and proclaimed a comprehensive policy and legal framework for environmental assessment and protection. The main provisions for environmental protection and pollution control in Pakistan are proclaimed in the Pakistan

Environmental Protection Act (PEPA), 1997, which empowers the Balochistan government to frame regulations for the protection of the environment under the Balochistan Environmental Protection Act, 2012.

7. PEPA provides the framework for protection and conservation of species, wildlife habitats and biodiversity, conservation of renewable resources, establishment of standards for the quality of ambient air, water and land, establishment of Environmental Tribunals, appointment of Environmental Magistrates, and Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) approval. This Act has a direct bearing on the proposed Sri Toi Dam Project as the project requires an Environmental Impacts Assessment (EIA).

8. Further, as Sri Toi Dam Project is located mainly in the District Zhob of Balochistan, it falls under the jurisdiction of the Balochistan Environmental Protection Agency which will be responsible for approval of the EIA of the project.

Project Categorization for Environmental Assessment:

9. As per the classification of ADB, Sri Toi Dam Project has been classified under Category A and requires an EIA. Pak-EPA regulations, formulated in 2000 for 'Review of IEE and EIA', categorize development projects under three schedules and Sri Toi Dam Project has been categorized as Schedule II which requires an EIA.

Comparison of Project Footprints of Feasibility Design with Detailed Design

10. Main components of the sub-project includes main dam, dyke, spillway, intake and outlet structures and network of main and distributary canals for irrigation supplies. Comparison of difference in feasibility design and design phase, is provided in below Table A.

Table A: Salient Features of Proposed Project

Feature Description	Detailed Design	Feasibility Design
Type of structure	Central Clay Core Earthfill Dam	Central Clay Core Earthfill Dam
Location	N 3496638.09, E 525794.05.96	N 3496638.09, E 25794.05.96
Dam Height (m)	72.00	66.00
Storage Capacity (MCM)	42.32	36.49
Catchment Area (sq.km)	961.00	961.00
Spillway Crest Length (m)	148.00	135.00
Spillway Type	Ogee ungated overflow	Ogee ungated overflow
Spillway Design Flood	PMF/10,000 years return	PMF/10,000 years return
Dyke/Saddle (No.)	1	1
Right Bank Main Canal and	29.00	

Feature Description	Detailed Design	Feasibility Design
Left Bank Main Canal and Intake Structure Height (m)	45.40	58.87
Steel outlet Pipe (m)	3	10.00, 20.00 & 30.00
Khushkaba Area (Ha)	34	1600
Design Command Area (Ha)	361	361
Watershed Development Area (Ha)	3,948	3,948
Average Annual Available Water (MCM)	3750	3750
	32.16	57.00

11. The footprints of the main dam, dyke and spillway are almost same in the detail design. Reservoir area is slightly reduced. The alignment of the main canals (both left and right) and their distributary canals are changed from the feasibility alignments. This change is attributed to the detail topographic survey of the command area. However, it does not impact the overall footprint of the project as changes in the canal alignments are confined in within the boundaries of command area demarked at the Feasibility Study level. An escape structure is provided at the start of the canals to spill the flow in case of emergency. Communication will improve as bridge culverts are provided on all the canals at the pedestrian tracks/ routes. Social structure are also provided such as washing pads for women, animal drinking structures and wuzu structures.

C. Description of the Environment

Physical Environment

12. **Topography:** High ridges surround the dam area which lies at the foot of Masa Khwal, a prominent rock outcrop about 305 m high in the middle of the valley. The terrain is generally flat in the dam area and it is for command area development. It is located in an environment of degraded rangelands. The average altitude of the Sri Toi command area is 1350 m above mean sea level.

13. **Geology:** In Sri Toi area, main rocks are covered in dam site area is mainly sedimentary in nature. The dam site is located in narrow gorge. The recent alluvium is present in the river bed and consists of rounded and sub-rounded gravels and boulders with some sand and fine particles. Abutments comprise of very steep slopes having 75 to 80 NW dip almost vertical in outcrop. The site having rock of Eocene, Oligocene and Miocene age prominent at that location.

14. **Soil:** The soil of the project area is alluvium material i.e. piedmont alluvium. The piedmont alluvium is nearly level to gently sloping. The top soil is dark brown, moist, silt loam to silty clay loam, slightly sticky, slightly plastic, friable, slightly hard, fine tubular pores, few scattered gravels, and has a clear smooth boundary.

15. **Seismicity:** The seismic zoning map of Pakistan, indicates that the project area lies in the zone 3. This zone is classified as Moderate Damage Risk Zone which is liable to Medvedev–Sponheuer–Karnik scale (MSK) VII and also 7.8 on Modified Mercalli (MM) scale. The Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence.

16. **Surface Water Resources:** Siri Toi River is the main surface water resource of the project area. It is flowing from south to north and empties into to Zhob River at the length of 130 km. Siri Toi River is like a shifting snake, twisting to find its easiest way down to Zhob River. Two main tributaries contributing and form a Siri Toi River are Tangi Manda & Chukhan Manda. The watershed of Siri Toi River from start to proposed dam axis is around 968 sq.km.

17. **Hydrology:** Annual average water availability from the watershed of Siri Toi Dam has been estimated as 37. 86MCM. By adding base flow volumes of 4.85MCM, total water availability becomes 41.72MCM.

18. **Climate:** The climate of the sub-project is semi-arid and lies in monsoonal belt. Mean annual rainfall varies between 250-400 mm per year. It receives most of its rainfall from July to September. The region observes cold winters and hot summers with temperatures soaring as high as 38 °C in summers. Approximately 40% of average rainfall in eastern and southern Balochistan occurs in the months of July and August (monsoon dominated environments). However, less than 10% of average rainfall occurs in monsoon.

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

Biological Environment

20. Sri Toi like the whole district geography is typical of a mountain eco-system represents a typical pastoral dependence and rain fed agriculture. The habitat of the project area and its surroundings are broadly categorized as Hills, Foothills, plains and stream beds. Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover, mainly comprising of shrubs and few tree species.

21. **Flora** includes Olive (*Olea ferrugenea*), Blue pine (*Pinus gerardiana*), Shina (*Pistacia khinjik*), Uzhgai (*Pistachia cabulica*), Gurgura (*Reptonia buxifolia*), Shang/ Wild Ash (*Fraxinus xanthoxyloides*), Wild almond (*Prunus eburnean*), etc. **Foothills:** Olive (*Olea ferrugenea*), Phulai (*Acacia modesta*), Sanatha (*Dodonea viscosa*), **Plains and Stream beds:** Commonly found in the entire district where *Tamarix* sp. and *Saccharum* sp. are commonly found.

22. **Fauna:** Baseline faunal survey was conducted and following fauna was reported. **Mammals:** Fox, wolf and Hyena, Cape hare, Indian grey wolf, red fox, Asiatic jackals, Indian Crested Porcupine, striped hyena, Jungle cat, afghan hedgehog, Caracal and Indian grey wolf. **Birds:** Chakoor, Seese partridges, eagles. **Reptiles** include Lizards, Afghan Tortoise, snake, Clif racer (*Coluber rhodoracus*) and Agama (*Agama spp.*) are available in everywhere.

23. **Protected area:** There are no notified protected areas present in the project vicinity. Approximately more than 200 km south of the project area is Tor Ghar Community Game Reserve in District Qila Saifullah game reserve.

Socioeconomic Environment

24. **Livelihood:** The population in the area is poor with subsistence of small business of livestock (ruminants), labourer and few in services. Few households earn from harvest of pine nuts (chalghoza) grown on the mountains far away from project area. Livestock is main sources of income of the locals. The communities in the sub-project area is composed mainly of Mandokhel tribe of Pashtoons. These communities are relatively remote and have very low income levels. Most of the households/families have migrated years ago to Zhob, Quetta and Karachi for their livelihoods.

25. **Demography:** The total households of the villages is 12,861. The average family size was found as 15. Traditional joint family system characterizes the social fabric of the area. Major castes are Arabzai clan of Mandokhail. Pushto 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. No issue of resettlement was observed.

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

27. **Water Rights:** Currently there is no irrigation over the Siri Toi River, in rare cases tube well irrigation was observed.

28. **Health & Hygiene:** No modern health facilities are available in the project area. There is a lady health assistant, who is attending delivery cases of the women. Basic health unit with insufficient health facilities is present. It was reported that water storage container were kept covered. There are no standard toilets and common pits are used. There is no sewerage system in the project area. Common health problems of the project area includes diarrhea, abdominal pain, malaria and skin diseases; most children are said to suffer from skin disease.

29. **Education:** The education level is very low. High schools are present in project area but students number is very low.

30. **Mode of Communication:** The site is approachable from Zhob–Wana road. At a distance of 45km from Zhob there is a FC check post and a blacktop road leads to Killi Hazrat Baba (10km) which is the single largest settlement in the proposed command area of the dam. Dam site is further six km away from the Killi Hazrat via shingle/ rugged road. The journey takes about 2.5 hours from Zhob.

31. **Archaeological and Historical Sites:** There is no sites of archaeological and historical importance in the sub-project corridor.

D. STAKEHOLDERS CONSULTATION

32. The consultations were carried out at feasibility stage with relevant federal, provincial, district level government departments, NGOs and community. Second round of consultations was done at detailed design stage. The purpose was to engage all the stakeholders and to know their concerns. During stakeholders' consultations, information regarding project main features and its benefits were shared. The stakeholders concerns on land acquisition, wildlife, water conflict and agriculture were acquired and addressed accordingly. A Grievance Redress Mechanism has been proposed to facilitate the concerns and grievances of affected persons during project implementation.

E. ENVIRONMENTAL IMPACTS & MITIGATIONS

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

- Employment opportunities to some locals for design phase surveys.
- An anticipated positive impact on socio-economic conditions during construction phase is the creation of limited-time employment opportunity for the local population. Since the project interventions will require substantial input from manual labor, even people with relatively lower levels of education or skills could get short term employment.
- A substantial land will be irrigated under the proposed scheme.
- Household income will increase substantially with irrigation improvement measures owing to availability of water for irrigation, crop yields, increase in the number of animals, and availability of other occupational opportunities.
- The Project will positively contribute in improving the carrying capacity of biological environment and overall improvement of the ecosystem.
- Availability of irrigation and agriculture would support livestock growth and in due course of time would enable farmers to diversify in areas of diary production.
- Water storage in the dam body will attract water birds especially those migrating from Siberia to warm area during winter. Depending upon the size of the water body, it serves the purpose of a wetland.
- Availability of water for cultivation of crops will support cropping during Rabi as well as Kharif season over the entire command area. During due course of time, availability of

water will support agriculture and other production system and will help in converging into an integrated system wherein all the components of the ecosystem will be producing at their optimal level including the human element.

- Positive change in the soil characteristics due to water availability on a continuous basis.
- Moreover, the cropping intensity will also increase to 120%.

F. SIGNIFICANT FINDINGS

34. **Potential Impacts and Mitigation** - In order to formulate practical safeguards environmental impacts were identified in the EIA process. A summary of the environmental impacts and mitigation measures which are discussed in detail in Chapter 7 of the EIA, are presented below.

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

- **Permanent Land Acquisition:** The project involves permanent acquisition of various categories of land. This impact would be of moderate significance. **Mitigation:** This impact can be mitigated by ensuring compliance of Land Acquisition Act, 1894, addressing community grievances on priority basis and timely compensation to affectees. Revised LARP preparation is on-going to mitigate impacts of land acquisition properly.
- **Soil Erosion:** Significant Excavation, backfilling and compaction works is expected for the project to negotiate level differences. This impact would be of moderate significance. **Mitigation:** Provision of erosion control measures, no construction works during heavy monsoon rains, material borrowing and disposal plan, photographic record during various project phases etc. will ensure the impact significance is reduced to low significance.
- **Soil Contamination:** Soil may be contaminated as a result of fuel/oils/chemicals spillage and leakage, and inappropriate disposal. The waste would be generated from site clearance, excavation, concrete batching, concrete conveyance and construction of substructures and superstructures. This impact would be of moderate significance. **Mitigation:** Provision of waste management plan, avoidance of vehicular traffic on unpaved roads, use of impervious sheathing beneath construction machinery and equipment will result in impact being reduced to low significance.
Air Quality: Air quality may deteriorate due to transportation of construction and excavated material to and from the site in diesel fueled trucks that would cause the production of combustion gases (CO, CO₂, NO_x, SO_x). Considerable amount of dust would be generated from slope cutting activity and also from other activities such as site clearance, excavation and transportation of excavated and construction material and concrete batching. **Mitigation:** A mitigation regime containing 8 stipulations is proposed for mitigation of air quality deterioration.
Noise and Vibration: The major sources of noise pollution during construction activities would be during slope cutting, excavation, loading, transportation, loading/unloading of materials and operation of construction equipment etc. The vibrators used for concreting

also produce noise and vibration. Increased noise and vibration levels during construction activities can be a source of nuisance for locals and a source of disturbance to wildlife.

Mitigation: At most of the construction sites, there are no major sensitive receptors except for some native reptiles that may inhabit the proposed sites will be temporarily affected by noise. Enhanced noise levels could be prevented and mitigated by careful planning of machinery operations, use of low noise equipment and scheduling of operations only during the daytime in order to reduce these levels.

Water availability: Surface water of Sri Toi river is being used for drinking and household consumption purpose in the project area villages. Labor influx will stress water consumption temporarily. **Mitigation:** Contractor should not extract water for drinking or construction purposes water near villages. There is substantial perennial base flow in the river bed. Ground water therefore can be tapped by excavating shallow pits or through pumping at the Dam site by ensuring that it will not affect water availability to local communities.

Waste Management: The waste would be generated from site clearance, excavation, concrete batching, concrete conveyance and construction of substructures and superstructures. This impact would be of moderate significance. **Mitigation:** A series of mitigation measures has been recommended in Chapter 7 to minimise the impact of dust emission.

Social Issues: The construction activity would involve people of labor class frequenting the area for the entire length of construction period. The surrounding residential area is inhabited by people who associate very closely with a certain set of cultural values. The area being a part of a rural setup, it is quite uncommon for residents to experience and easily adjust to the presence of outsiders in their areas for any length of time. The significance of the impact is considered to be moderate. **Mitigation:** It is imperative to engage local work force as much as possible, and also develop and implement a strong community communication and participation plan; It is highly recommended that the project proponent includes some CSR measures specifically for the tail-end population.

Health & Safety: Various activities during the construction phase of the Project could have health & safety impacts on workers and the people living in the nearby vicinity. The use of heavy machinery and vehicle is expected during the excavation and transportation activities. The safety of workers is of prime concern while dealing with such machineries and vehicles. **Mitigation:** By adopting the following measures the impact would be finally of low significance:

- Provisions of proper signboards and informing the local people about the activity
- Provision of Personal Protection Equipment (PPEs) to workers
- Adequate water supply and sanitation facilities will be provided in the labor camps
- First aid facility should be in place and an ambulance should be available at site for 24 hrs
- Prepare and implement SOP to manage COVID-19 risks

Breaching of Dam, Canal and Structures: Breach of dam, canal and irrigation structures is unlikely to occur. However, it will threaten system sustainability and following factors may

also fuel contribute to the this process: Improper operation of water control facilities; Reservoir sedimentation; Deterioration of free board due to cattle trespass and other factors; Tampering of outlets; Canal siltation etc. **Mitigation:** BID (Irrigation Department) to monitor the system regularly; Emergency response plan for Dam and canal breach shall be followed. Other mitigation measures are part of it in Chapter 7.

Traffic: The Sri Toi project will take approximately three years to complete and during this time there will be increased traffic within the project area as well as on the link roads and other approach routes of the project area. Blockage of access road due to construction activity could cause traffic congestion and will interrupt the construction works and movement of local people. **Mitigation:** A traffic management plan to be prepared and implemented by the contractor, inter alia, has been proposed as mitigation.

Stakeholder Consultation: Two rounds of public/stakeholder consultation was carried out during the preparation of the EIA. The consultations assisted in dissemination of project information among the project stakeholders and obtain their feedback with local knowledge on baseline, mitigation measures, and also perception of the PAPs regarding impact significance and their views on project interventions.

G. CUMULATIVE IMPACTS

36. The best definition of Cumulative Impact Assessment (CIA) is defined by The US Council on Environmental Quality as “the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” .

37. The purpose is to assess the impacts of Sri Toi Dam Project cumulatively with those of other proposed projects within AOI limits and this chapter has been prepared in accordance with TOR.

□ Identification of Current and Proposed Projects

38. CIA is a challenging task as its analysis builds upon information derived from direct and indirect impacts due to present and future interventions in a defined geographical area including the current and proposed project. Therefore, cumulative impacts on the projects are, in concept, related to (i) existing projects located within AOI of Sri Toi; and (ii) proposed developments planned within and nearby to AOI of Sri Toi. As a first step, an effort was made to identify the projects within the AOI through various sources such as district level departments, Government of Balochistan planned programs and information through locals. These projects will be considered along with Sri Toi Irrigation Project for direct and indirect effects as part of CIA. However, no planned projects were found within the AOI of Sri Toi Dam. Moreover, the following projects are planned under Balochistan Water Resources Development Project (BWRDP) Preparatory Technical Assistance by ADB:

- Ahmedzai Perennial and Floodwater Irrigation – Sub Project
- Killi Sardar Akhter Perennial Irrigation – Sub Project

39. Again, there will be no cumulative impact due to Sri Toi Irrigation Project and the above-mentioned projects as these are planned on different tributaries of Zhob River and are far away (70 – 100 kms) from the Sri Toi Project site.

H. ENVIRONMENTAL MANAGEMENT PLAN

40. 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.

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

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

42. 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.

K EMP Budget

43. The EMP budget for construction period of Project is PKRs. 15,900,000/annum which covers cost of laboratory analysis, supervision consultant, third party monitoring, and trainings. For operation and maintenance phase, the cost is estimated for initial three years of operation which is PKRs 1,300,000/annum covering costs of laboratory analysis, third party monitoring, trainings and community engagement.

I CONCLUSION

44. The report provides conclusion based on the impacts assessed and the mitigation measures suggested. The report recommends that EA (BID) on priority basis shall initiate the establishment of ESMCC within its existing institutional structure. It is also 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.

45. Local WUA and FOs need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures. A study to be conducted to prepare a Pest Management Plan in coordination with Agricultural Department. If there are any changes in Project layout during execution, or any other changes in project description then change should be carried out through Change Management Plan included in EMP of this EIA report.

46. The Project does not cause any critical environmental negative impact due to which the Project could be dropped; rather project will improve water availability, ground water quality, soil conditions and economy of the area due to increase in agricultural activities during its operational phase. Overall the Project can be declared as environmental friendly project if mitigation measures mentioned in EMP are implemented properly.

1 INTRODUCTION AND BACKGROUND

1.1 Overview of Sri Toi Water Storage Dam and Irrigation Project

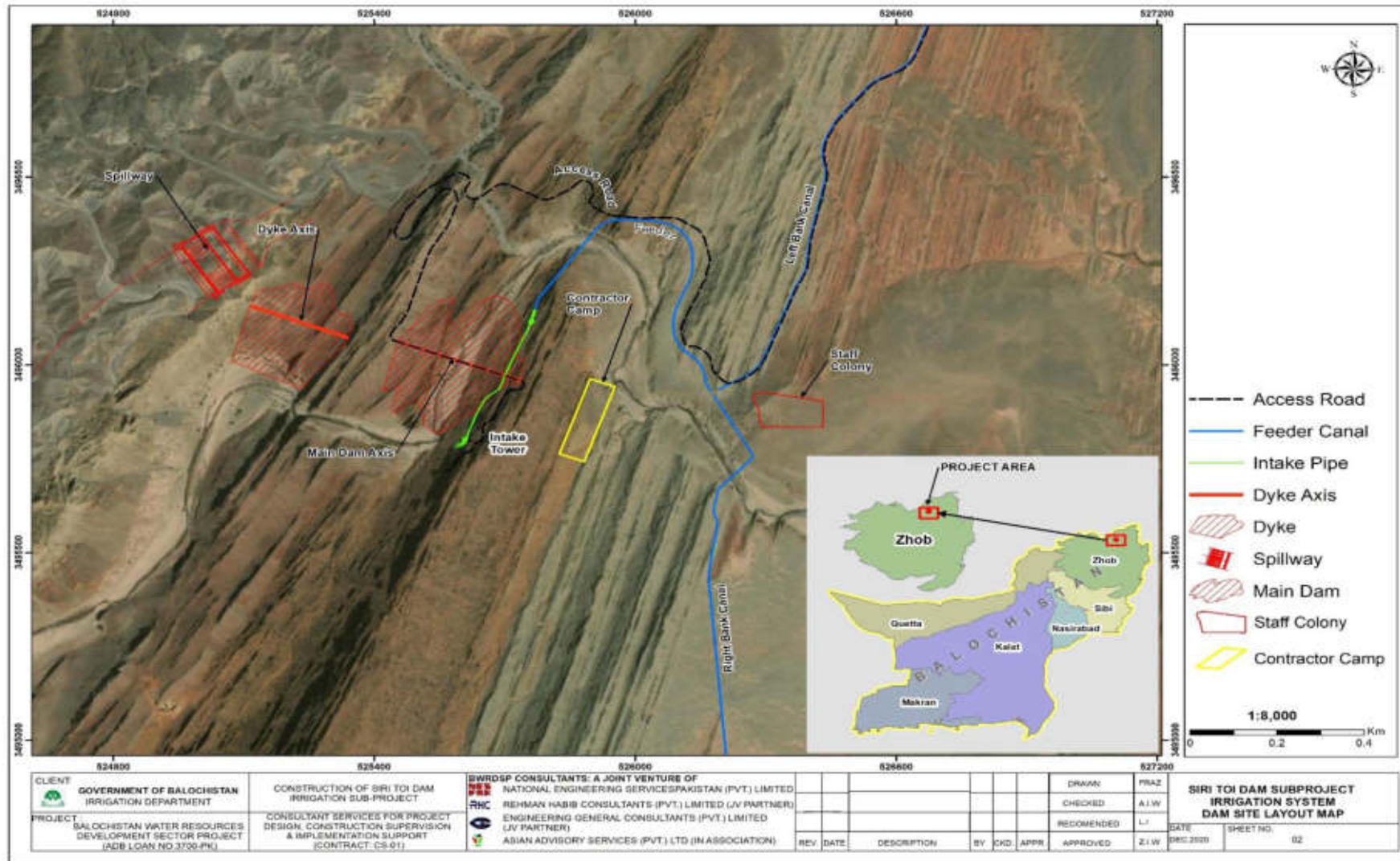
47. The subproject is located in Union Council Sambaza, Tehsil and District Zhub about 62 km north-west of Zhub. The latitude and longitude of the scheme are $69^{\circ}15'58.77''\text{E}$ & $31^{\circ}35'51.57''\text{N}$. The site is approachable from Zhub–Wana road. At a distance of 45 km from Zhub there is a FC check post and a blacktop road leads to Killi Hazrat Baba (10 km) which is the single largest settlement in the proposed command area of the dam. Dam site is further six km away from the Killi Hazrat via shingle/ rugged road. The journey takes about 2.5 hours from Zhub. The access route to the dam site and location of the project from the Zhub city is shown in **Figure 1**.

48. The main dam will be 72 m high Earth fill Dam about 304 m long extending across the Siri Toi River with Central Impervious Core. The dam will create a reservoir which at its normal conservation level of 1458 masl will have a gross storage capacity of 41.716 MCM (33,820 acre-ft. whereas, dam crest elevation will be 1465 masl. The Dyke has been proposed adjacent to the left abutment of Main dam. The Dyke will be 38 m high Earth fill Dam about 241 m long with Central Impervious Core. The present spillway design is based on a reservoir level of 1458 m amsl with surcharge depth of 4.0 m resulting a HFL of 1462.02 m amsl for design discharge corresponding to dam Elevation of 1465.0 m amsl. The spillway has been dimensioned to safely pass the design flood of 2524 cumecs (10,000 yrs return period) with full freeboard requirements without over topping of the dam. A front open intake tower designed with top level of 1465 for irrigation flows intake with an invert El. of 1427.0 m asl. Layout of the Main Dam, Dyke and Spillway is shown in **Figure 2**.

49. More than 28,243 m of main and distributary channels have been designed for CCA of 3948 ha. irrigation channel and about 50 km of secondary channel. Different types of Hydraulic structures are used in Siri Toi dam irrigation system to transmit and regulate flows effectively and efficiently. The hydraulic structures are generally categorized as regulation, conveyance and protection structures. The regulatory structures are cross regulators, head regulators and escape regulators. Conveyance structures include all inline canal structures such as aqueducts, syphon aqueducts, and canal siphons. The protection structures that externally protect the canal are called cross drainage structures and the structures that internally protect the canal from the excess canal water are called escape structures.

50. Bifurcator structure at downstream of the feeder channel has been designed as a free flow crest type head regulator with slide gate to divide the feeder channel into left and right bank canal. An escape regulator structure has been provided at the bifurcator in case of emergency situations to carry spill the water from the feeder canal to a nearby natural pond in emergency cases.

Figure 1: Layout of Main Dam, Dyke and Spilway



51. The contract for preparing EIA(feasibility level) of this assignment was signed between Asian Development Bank (ADB) and PPTA consultants JV hired the services of third party NEC Consultants (Private) Limited as per Terms of Reference to conduct EIA under its detailed supervision. Now this is updated version that EIA that is updated by BWRDSP consultants at detail design stage

52. Balochistan Irrigation Department, is the Executing Agency (EA) and implementing partner of the institutional component of the Project.

53. The detailed description of the project and its components is given in **Chapter-3** of this document.

1.2 Project Objective

54. The broader objective of Sri Toi Dam Subproject is aimed at:

- Increasing command area to 3,948 hectares out of total cultivable command area,
- Sustained water supply to the present command area.

1.3 Nature and Size of the Project

55. Salient features of Sri Toi Dam Subproject are following:

Table 1: Salient Features of the Project

No.	Subproject	Feature Description	Detailed Design	Feasibility Design
1	Sri Toi Water Storage Dam Irrigation	Central Core Earth Fill Dam height	72.00	66.00
		Reservoir Storage:		
		Gross Storage (MCM)	42.32	36.49
		Dead Storage (MCM)	6.71	6.49
		Live Storage (MCM)	35.61	30.00
		Spillway Type	Ogee	Ogee
		Length of irrigation network (km)	81.85	58.87

1.4 Necessity of the EIA

56. The apex Pakistani law governing the subject of environment is the Pakistan Environmental Protection Act – 1997 (PEPA-97). Under Section 12 of the Act, it is mandatory for the proponents of the projects¹ to execute the IEE and / or EIA (where warranted), and get

¹ The Act defines a Project as: “Any activity, plan, scheme, proposal or understanding involving any change in the environment and includes:

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

the approval from federal agency (i.e. Pak-EPA). This function has been delegated under Section 26 to provincial EPAs.

57. After the 18th amendment to the constitution of Pakistan, environment became a provincial subject, and the environmental law governing the Sri Toi Dam subproject is now the Balochistan Environmental Protection Act 2012. This act also provides for IEE or EIA (as the case maybe) for projects under its clause 15.

58. 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". Due to cumulative nature of the proposed project, an EIA is being conducted.

59. According to the Asian Development Bank Policy, all loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) and requires the completion of the environmental categorization form. REA has been conducted and attached as **Annexure 1**.

60. Accordingly, a proposed project is classified as 'Category A' if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EIA for Category A project examines the project's potential impacts, evaluates all possible alternatives (including the "without project" situation), and recommends measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. For Category 'A' project, the borrower is responsible for preparing a report and normally an Environmental Impact Assessment (EIA) report would suffice this purpose.

61. Based on the above requirements of national and provincial regulations, as well as the ADB policy, an Environmental Impact Assessment of the proposed project is being carried out.

1.5 Objectives of the EIA

62. The overall objective of EIA study is to study the interaction of project components among each other & the environment and to assess anticipated environmental impacts in order to propose necessary mitigation measures against adverse impacts. To achieve this objective, an assessment of the existing environmental status of the project site is a prerequisite and, therefore, included in this study by collecting and reviewing the baseline data of various environmental attributes.

63. This EIA is being prepared to ensure adequate environmental and social management during development and implementation of **Sri Toi Dam Subproject**. It will 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. The EIA will, therefore, comply with the Pakistani EIA procedures for meeting the environmental and social management requirements, as outlined in EIA Guidelines. The EIA will also comply with the ADB Safeguard Policies SPS – 2009 for environmental management of projects.

1.5.1 More Specific Objectives of this EIA Report

- Meet the statutory requirements set forth by the Pakistan Environmental Protection Act (PEPA) 1997 and the Balochistan Environmental Protection Act 2012.
- Comply with ADB policies and safeguards for environmental and social management of projects
- Facilitate proponents and financiers of the project in ensuring environmental and social acceptability of the project
- 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 socio-economic environment of the project area.
- Help the project proponents to incorporate necessary measures for legally compliant and socially acceptable environmental performance of their project.
- Identify significant environmental impacts (both positive and negative) during all stages of the project implementation and propose mitigation measures for negative impacts.

64. The scope of the assignment is derived from the PEPA guidelines. As per scope of work reflected in the PEPA guidelines, the EIA report will consist of the sections as described in section 1.9 of this report.

1.6 The Consultants

65. As mentioned before, PPTA Consultants hired NEC Consultants, as an independent third party, for conducting the EIA at feasibility stage. Now this is updated version of feasibility level EIA that is updated by BWRDSP consultants at detail design stage

66. The Core Team deputed for the successful completion of the assignment belongs to different subject areas. The consulting team comprises the following members:

Dr. Akhtar Iqbal	Environmental Specialist
Mr. Rana Abdur Rehman	Resettlement Expert
Mr. Hashim Farooq	Social Organiser
& Mr. Haseeb	

67. The third-party activities for preparation of EIA at Feasibility stage were undertaken under the detailed supervision of Mr. Kashif Masud – Environmental Specialist of Techno-Consult International.

1.7 Study Approach and Methodology

1.7.1 Updating the EIA

68. The updating of the EIA for BWRDSP has been carried out in accordance with the requirements of local laws (PEPA 1997 (amended 2012), Pak-EPA' s IEE/EIA Regulations 2000) and ADB' s SPS 2009 and Environmental Safeguards: A Good Practice Sourcebook Draft Working Document, December 2012. The objective of the updated EIA Report is to identify the impacts of project related activities on the physical, ecological and socio-economic components of the project environment and develop effective and appropriate mitigation measures.

69. The EIA study has been updated at detailed design stage on the basis of following considerations:

- Necessary changes in the alignment of the main canals (both left and right) and their distributary canals. This change is attributed to the detail topographic survey of the command area. However, it does not impact the overall footprint of the project as changes in the canal alignments are confined in within the boundaries of command area demarked at the Feasibility Study level.
- Further investigation and assessment of environmental and social impacts from the project to be done by keeping in mind the sequence as Avoidance → Minimization → Rehabilitation/Restoration → Offset/Mitigation.

70. The major findings of the previous EIA study have been reviewed and studied in detail. The prime focus of this updated EIA was on major areas of concern as identified during canal route optimization, detailed design and those highlighted in previous EIA findings.

71. The major impacts identified in the previous EIA were related to land acquisition. Keeping in view the updated alignment of main canals, Comparison map of feasibility and detail design were prepared to identify changes.

72. The Consultants have adopted following methodology for updating the EIA:

1.8 Approach and Methodology

73. Consultant reviewed the available data and previous EIA report of project prepared at the feasibility stage. The baseline conditions and potential environmental impacts identified in the previous EIA report have been updated as a pre-requisite for the development of an updated EMP. The tasks to update EIA were carried out in pre-defined stages that are desk study and review of all the available data, acquisition of updated design information, updating baseline conditions and impact assessment, proposing mitigation measures and updating the EMP.

1.8.1 Review/ Update as per Project Design

74. This task included review of design changes in project components and features i.e. changes in alignment and other allied structures. The EIA prepared during the feasibility stage was reviewed and updated in the context of project description in accordance with ADB SPS and guidelines.

75. The alignment of the main canals (both left and right) and their distributary canals are changed from the feasibility alignments. This change is attributed to the detail topographic survey of the command area. However, it does not impact the overall footprint of the project as changes in the canal alignments are confined in within the boundaries of command area demarked at the Feasibility Study level. All the design changes in the project features have been updated and incorporated in the project Description i.e. Chapter 3 and subsequent sections of the updated EIA report.

1.8.2 Route Optimization for Main Canal and Distributaries

76. Optimization of route alignment of the irrigation channel is the most cost effective method of reducing the environmental and social impacts of the canal and other distributaries. The identification and optimization of the route was the most critical phase of the present study. The objective of route optimization was to obtain first-hand overview of the project environmental and social setting and to conduct an initial analysis of the physical, biological and social constraints posed within the proposed canal route.

77. The following environmental criteria were used in addition to technical and design considerations for the proposed canal alignment.

- Avoid towns/populated areas;
- Avoid cultural, religious and historical buildings;
- Maintain minimum disturbance to the natural habitat and vegetation; and
- Maintain appropriate distance from the sensitive receptors (500 m).

78. Following the above mentioned criteria, route optimization was carried out jointly by the design and environmental teams of BWRDSP Consultants.

1.8.3 Delineation of Area of Influence

79. As per the ADB' s SPS, 2009, impacts and risks have been analyzed within project AOI. The AOI of the project encompasses primary project site(s) and related facilities that the borrower/client (including its contractors) develops or controls, such as main canals, distributaries, access roads, borrow pits, disposal areas and construction camps. AOI does not include potential impacts that might occur without the project or independently of the project.

80. Environmental impacts and risks will also be analyzed for all relevant stages of the project cycle, including pre-construction, construction and operation.

81. AOI include the actual RoW of project as well as the surrounding area where positive and adverse impacts may be foreseen due to the implementation of the proposed project. Accordingly, for the purpose of the Sri Toi Project EIA, the AOI has been divided into several specific sub-areas, based on the fact that not all sub AOIs need to be studied. The following are the main parts of the AOI:

- **Construction Site:** including dam, dykes, spillway, reservoir and canal, additional structures and immediate surroundings (construction camps, quarries, borrow and disposal areas, etc.);
- **Affected Structures:** The structure that may be physically affected due to project construction;
- **Project Foot Print Area:** this is the area directly related to Dam, Dykes, Spillways, Reservoir and Canal Right of Way (ROW), Canal, Outlets, command area etc; and

82. Resettlement in the form of physical dislocation of people or their homes is not envisioned for this project. The project site has been used as grazing fields for many decades and has been in the protective custody of the Arabzai clan. Some land owners have demanded that this land should be properly distributed to individuals of the tribe. Land distribution among the tribe members at individual basis of ownership has been done. The project proponent will need to acquire land from these private land owners for the said Project. Land acquisition and resettlement survey of the project area has been completed in December 2020. As per information received from the the revenue patwari Zhob, the revenue data has been completed and will be handed over to the Project Director shortly. The data will be examined and cross checked with the help of design engineer to make sure that the same land is being acquired for the project. After that, the data will be formatted in form of Section-4 to be submitted to the Project Director and onward submission to the DC for formally notification of Section-4. After that the field books and jamabandi will be prepared to identify the DPs and also for section-5.

83.

1.8.4 Data collection and Survey in the AOI

84. During updating EIA report, following secondary data relevant to BWRDSP was collected and reviewed

- Pre-Feasibility Report - Zhob River Basin
- Feasibility Report - Siri Toi Dam

85. A team of environmental and social carried out the environmental and social survey in the AOI to familiarize themselves with the local conditions and the environmental settings. During the survey, the information regarding the topography, soils, rock, surface water, groundwater, flora and fauna, forested areas, social settings and villages/towns in project AOI was observed and collected.

86. As already discussed in Summary, area of Influence is same as that of Feasibility stage. No variation in baseline conditions were noted except LARP related has to be done

again, as due to change of canals alignment, land ownership has changed. So additional social consultation are being to fulfill LARP requirement of ADB and assess all impacts of re-alignments.

1.8.5 Analysis of Alternatives

87. It is mandatory requirement for preparing EIA report that the proposed project is compared with other alternative arrangements that could have been developed to meet the objectives for which the proposed project has been planned.

88. In order to meet the desired objectives of the project, five project design alternatives were analysed for the assessment of alignment, technological and design options considering technical, environmental, social and financial aspects. Moreover, no go alternative was also considered with reference to the effect on the command area and associated benefits such as project area development, employment opportunities and socio-economic activities. As per the alternative analysis carried out for the sub-projects, Option 3 was approved by the PD BWRDSP for the Final design.

1.8.6 Major Significant Impacts

89. Based on the initial impression formed after preliminary data review and the reconnaissance, following issues seemed to be pertinent for the proposed project:

- Issues pertaining to land acquisition are most pressing as the land need to be distributed among the Arabzai clan before the same is acquired for the project.
- Social and environmental issues due to construction activity (involvement of external labor force may face resistance, security concerns)
- Environmental issues related to biodiversity, especially in terms of flyway for migratory birds that migrate during winter from Siberia to Pakistan for wintering and return to their areas of origin during February/March every year.
- Environmental flows to (HDF delay action dam maroofzai (42R 549288.42mE 3509252.52mN)) to Gomal Zam Dam (42S 583195.95mE 3551738.40mN) which is a wetland and a wildlife sanctuary
- Impact on soil erosion is anticipated during project construction stage as huge amount of earth work will be involved.
- Siltation will be a major impact for the Sri Toi Dam that will reduce the pondage capacity of the dam and its delivery system.
- Water quality is primarily intended for use as agriculture. Water for drinking will continue to be extracted from ground as presently being done.

1.8.7 Stakeholder Consultation

90. Due to the extensive nature of the proposed project, it is imperative to take all the stakeholders on board, and gather information about their concerns and perceptions at an

early stage of the project cycle. The consulting team conducted internal meetings to identify and list all important stakeholders.

91. The primary stakeholder of the project is the community at large. People of the area have already been consulted once during the development of socio-economic profile document. Second level of public consultation was carried out during the detailed design stage in September and December 2020. Gender consultation was done in September 2021 in the project area.

92. Following secondary stakeholders of the project were also consulted during detail design phase:

- Balochistan Irrigation Department
- Revenue Department, Zhob Division
- Agriculture Department
- Forest Department, Balochistan

93. All these entities were contacted with brief project introduction for meetings and soliciting feedbacks on the proposed project. The collected information has been documented as a separate chapter 06 in this EIA report.

1.8.8 Impact Evaluation

□ Impact Prediction and Assessment

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

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

96. Environmental impact studies represent a blend of technical information and analysis along with value judgments. To assess an environmental threat posed by an aspect, the principal factors to be considered are:

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

97. A qualitative risk assessment methodology has been adopted for this project, comprising the Likelihood and Consequence values detailed in **Table 2** and **Table 3**.

Table 2: Qualitative Likelihood Values

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

Table 3: Qualitative Consequence Values

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

98. On the basis of a likelihood and consequence matrix (**Table 4**), each hazard may be categorised into broad 'risk categories' and the required management approach for each risk category can be defined.

Table 4: Risk Matrix – Risk Categories and Management Response

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

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

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

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

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

❑ Cumulative Impacts

100. EIA of Sri Toi project requires a cumulative assessment of the proposed project. According to the 1997 CEQ handbook on the consideration of cumulative effects (CEQ, 1997) states that “the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time.”

101. Considering above, EIA will also look into the potential impacts from existing and future planned developments and reasonably located within a geographical scope where potential environmental and social interactions could act to create any significant impact. Cumulative impacts analysis will be done under five steps:

- Identification of Valued Environmental Components (VECs)
- Baseline of VECs.
- Assessment of VECs.
- Assess significance of impacts and
- Management of impacts.

❑ Impact Mitigation, Management and Monitoring Plan

102. Mitigation measures include:

- Avoiding the impact altogether by not taking a certain action or parts of an action;

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- Compensating for the impact by replacing or providing substitute resources or environments.

103. Mitigation measures would be developed for the elimination of identified and potential problems which may affect the environment. Recommendation for design, construction and operation phases would be separately presented in this plan. This plan will be prepared with the aim to monitor the efficiency of recommended mitigation measures. Residual impact significance will also be provided after implementation of mitigation measures.

Table 5: Environmental Management Plan - Activity based

Activity	Mitigation Measures(s)	Monitoring Indicator (s)	Monitoring and Reporting Frequency	Party (ies) Responsible
All activities in EIA that received a “negative determination with conditions”.	If mitigation measures are well specified in the EIA, quote directly from EIA	Specify indicators to (1) determine if mitigation is in place and (2) successful.	For example: “Monitor weekly and report in quarterly reports. If XXXX occurs, immediately inform activity manager”.	If appropriate, separately specify the parties responsible for mitigation, for monitoring and for reporting.

1.9 Organization of Report

104. This report contains a total of eight chapters. Besides **Chapter 1**, which contains introduction and background of the report, other chapters are described as under:

- **Chapter 2** – “Policy, Legal and Administrative Framework” elucidates the current legal framework which is applicable on the proposed project in context of environment and sustainable development;
- **Chapter 3** – “Description of Project” furnishes an overall description of the Project, including its background and key components for design, construction and O&M phases;
- **Chapter 4** – “Project Need and Alternatives” provides details on alternatives considered for the proposed interventions, location and design;
- **Chapter 5** – “Baseline Conditions” comprises a detailed documentation of the existing (baseline) conditions of the Project Area, with respect to its physical, ecological and socio-economic environment;

- **Chapter 6** – “Stakeholder Consultation” provides details of consultative sessions with the local community as well as with other stakeholders including local politicians, local government officials, policy makers and NGOs for their opinions and suggestions on the Project;
- **Chapter 7** – “Potential Environmental Impacts & Mitigations” documents the likely impacts of the Project on the physical, ecological and socio-economic environment during the construction and operation phases and lays down the proposed measures to mitigate the adverse impacts of the Project; and
- **Chapter 8** – “Environmental Management Plan” provides the proposals on mechanism to be adopted for the implementation and monitoring of the environmental measures.
- **Chapter 9** – “Conclusions and Recommendations” conclusions of the environmental impact assessment study and recommendations to be adopted.

2 LEGISLATION, GUIDELINES AND REGULATORY FRAMEWORK

2.1 General

116. 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.

2.2 Background

117. The Government of Pakistan realized the importance of environmental preservation way back in the early 1980's. Until the 1980's development policies were formulated irrespective of environmental considerations. A variety of environment-related acts and ordinances existed, but the Pakistan Environmental Protection Ordinance 1983 (PEPO) was the first effort to deal with environmental concerns systematically. The ordinance created a legal basis for comprehensive environmental policy making, the establishment and enforcement of standards, environmental impact assessments and the inclusion of environmental considerations in development policies². In 1984, the promulgation of this ordinance was followed by the establishment of the Pak-EPA, the primary government institution dealing with environmental issues. The PEPO 1983 was replaced with a new Act of Parliament in 1997 i.e. PEPA Act 1997.

118. The UN International Summit on Environment was held in 1992 in Rio de Janeiro, to highlight the importance of environment protection and to promote sustainable development. Pakistan also became a signatory of this summit, after which the Government of Pakistan developed a National Conservation Strategy (NCS), approved in March 1992. It was decided that all reports regarding strategies, policies and program for sustainable development will be drawn up on the basis of the NCS³. Another major environmental policy initiative formulated in 1999 was Environmental Planning and Resource Conservation Project (EPRCP)⁴.

119. The enactment of PEPA 1997 took up the key issues of PEPO and in addition provided for a considerable strengthening of institutions at the national and provincial level for the formulation, execution and enforcement of environmental policies and conferred broad-based enforcement powers to the EPA⁵. NEQS for municipal and liquid industrial effluent, industrial gaseous emissions and motor vehicle exhaust and noise, were issued by Pakistan EPA in 1994.

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

³ *"A model process to develop a National Agenda"*: Pakistan National Conservation Strategy; pg.1.

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

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

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

2.2.1 Applicable ADB & National Environmental Policies / Laws

121. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. ADB's safeguard policy (2009) framework consists of three OPs 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 (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) AP are informed and consulted during project preparation and implementation.

122. The applicability of above policies considering the Project interventions and its responses are given in the **Table 6** below:

Table 6: Applicable Policies Related to Proposed Project

S. No.	Safeguard Policies	Key Requirements	Remarks
1.	Environment	Projects and subprojects need EIA 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.	No Resettlement is envisioned. Land distribution among the tribe members at individual basis of ownership has been done.

S. No.	Safeguard Policies	Key Requirements	Remarks
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. The projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate gender and intergenerationally inclusive.	There are no groups of people in the project area who could be categorized as indigenous people; therefore, this policy does not apply to the proposed project.

123. Besides the ADB policies, there are various legal provisions at the national or provincial level related to the design, construction and operation of the proposed project. This stems from a multitude of environmental laws, regulations, and / or policies or executive orders related to the physical-chemical, biological, cultural, and socioeconomic environments. Some of the statutes to be referred in the EIA are the following:

- 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.

2.3 National Policy on the Environment

124. 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.

125. 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

126. 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.

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

128. "For the irrigation water, the strategy is clear that evolving Water Resource Management System and Institutional Framework will be central to sustainable water use in the province. The theme is pillared on undertaking river basin wide management of water with greater focus on the flood irrigation Sailaba and creating water storages on all strategic locations in the river basins and handling the Sailaba irrigation and dams command area in an integrated manner. Under the Strategy, GoB will support establishment of Drip Irrigation Manufacturing Plants in the province under PPP mode for providing either front- end or back-end subsidy to get a system introduced with full institutional support. There is emphasis that water supply and sanitation require a dedicated attention and given the massive gap, it is planned to undertake integrated water supply and sanitation system in partnership with the local communities especially women through a community infrastructure program for a minimum of 5000 settlements ".

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

129. 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.

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

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

132. The project site has been used at grazing fields for many decades and has been in the protective custody of the Arabzai clan. This land is now a barren land due to absence of water. Resettlement in the form of physical dislocation of people or their homes is not envisioned for this project. Land acquisition and resettlement survey of the project area has been completed in December 2020. As per information received from the the revenue patwari Zhob, the revenue data has been completed and will be handed over to the Project Director shortly. The data will be examined and cross checked with the help of design engineer to make sure that the same land is being acquired for the project. After that, the data will be formatted in form of Section-4 to be submitted to the Project Director and onward submission to the DC for formally notification of Section-4. After that the field books and jamabandi will be prepared to identify the DPs and also for section-5. After that, the project proponent will acquire land from private land owners for the said Project.

2.6 Environmental Legislations

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

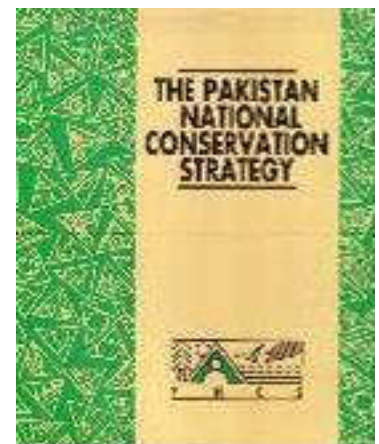
2.6.1 National Regulations

134. 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

135. 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

136. The NCS specifies the basic guidelines for an integrated effort aimed at protecting the environment and the natural resources of the country. This broad framework provides a comprehensive point of reference for all agencies, departments, private sector companies, financial institutions, and donor agencies for undertaking systematic efforts to bring about an effective change for sustainable development⁶.

2.6.2 National Environmental Quality Standards (2010)

137. The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000 including standards for liquid effluent and gaseous emissions. The standards for ambient air, drinking water quality and noise levels were published on November, 2010 and standards for motor vehicle exhaust, diesel vehicle, and petrol vehicles published in August, 2009. The relevant NEQS are provided in **Annexure-2** and the contractor shall be bound to comply with these.

2.6.3 Pakistan Environmental Protection Act, 1997

138. The PEPA 1997 is the apex environmental law of the country. Under section 12 of the Act, it is mandatory for the proponents of the projects⁷ to execute the IEE and / or EIA (where warranted), and get the approval from provincial EPA. A copy of PEPA 1997 is attached as **Annexure 3** of this report.

139. 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.



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

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

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

- 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.

2.6.4 Balochistan Environmental Protection Act, 2012

140. After the 18th Constitutional amendments the subject of environment vide Notification No.4-9/2011-Min dated 29th June, 2011 stand devolved to the provinces with effect from 1st July, 2011. Even after the deletion of the subject of environment from the concurrent list, the Pakistan Environmental Protection Act 1997 remained intact as per Article 270-AA, Sub Article (6). However, there is provision that the province, through an appropriate legislature / competent authority, may alter, repeal and amend the laws related to the subject.

141. 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.

142. In terms of requirements of EIA / IEE, the provincial Act contains, in its section 15, similar provisions as given in the PEPA section 12. The PEPA has entrusted the authority of review and to approve environmental assessments to the provincial EPA. The proposed project falls under the jurisdiction of the Balochistan Environmental Protection Agency (BEPA). This EIA report will need to be submitted to EPA (B) for grant of environmental NOC.

143. 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.

2.6.5 Pakistan EPA Review of IEE and EIA Regulations, 2000

144. 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.

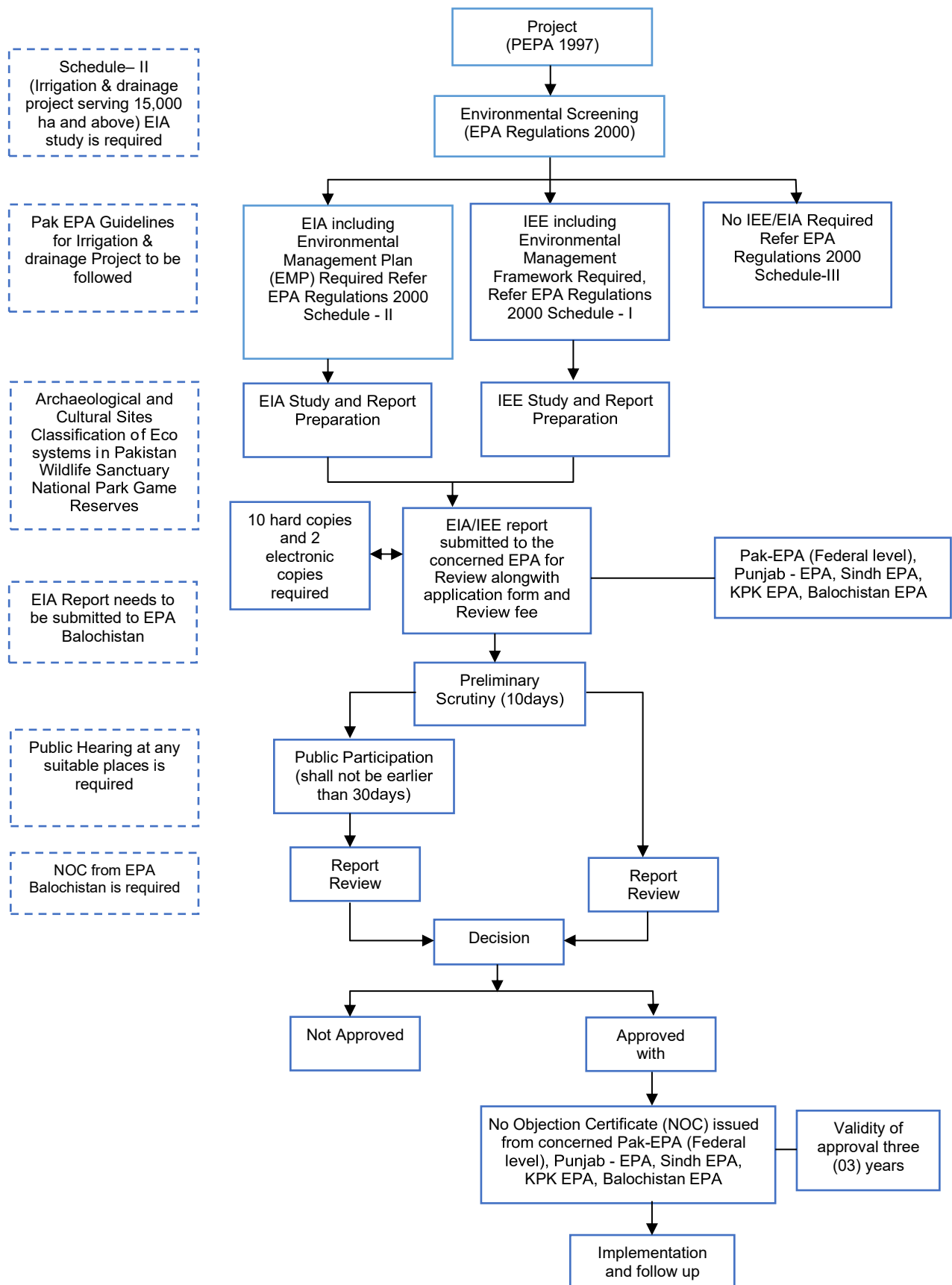
145. The Review of IEE and EIA Regulations 2000, prepared by Pak-EPA under the powers conferred upon it by PEPA-97, categorizes projects for IEE and EIA, respectively⁸. The proposed interventions under Sri-Toi Water Storage Dam and Irrigation Project are likely to fall under the Category B as defined in Schedule – I of Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000, attached as **Annexure 3**. According to these guidelines, the proposed project would require an EIA to be conducted.

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

- a. A project is categorized as requiring an IEE or EIA using the two schedules attached to the regulations i.e. Schedule I and II attached as (Annexure – 7) at the end of this report.
- b. An EIA or IEE is conducted as required and following the Pak-EPA guidelines.
- c. The EIA or IEE is submitted to the concerned EPA: provincial EPAs if the project is located in the provinces or Pak-EPA if it is located in the Federal administered area.
- d. A non-refundable review fee, depending on the cost of the project and the type of the report, is submitted along with the document as per the rates shown in Schedule III.
- e. The submittal is also accompanied by an application in the format prescribed in Schedule IV of the regulations.
- f. The EPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report, (i) confirming completeness, or (ii) asking for additional information, if needed, or (iii) returning the report requiring additional studies, if necessary.
- g. The EPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, for the issue of confirmation of completeness.
- h. When the EPA accord their approval subject to certain conditions:
 - i. Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
 - j. Before commencing operation of the project, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
 - k. An environmental management plan (EMP) is to be submitted with a request for obtaining confirmation of compliance.
 - l. The EPA is required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
 - m. The EIA 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.

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

Figure 2: Procedure for Submitting the EIA Report



Note:

1. EPA = Environmental Protection

2.6.7 The Forest Act, 1927

147. The Forest Act, 1927 was largely based on previous Indian Forest Acts implemented under the British. The first and most famous was the Indian Forest Act of 1878. Both the 1878 act and the 1927 one sought to consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on timber and other forest produce. It also defines the procedure to be followed for declaring an area to be a Reserved Forest, a Protected Forest or a Village Forest.

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

2.6.8 The Antiquities Act, 1975

149. 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.

2.6.9 Pakistan Penal Code 1860

150. 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.

2.6.10 The Balochistan Wildlife Protection (Amendment) Ordinance, 2001

151. 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.

2.6.11 Balochistan Goats (Restriction) Ordinance 1959

152. 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.

2.6.12 Balochistan Ground Water Rights Administration Ordinance 1978

153. 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.

2.6.13 The Canal and Drainage Act, 1873

154. 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.

2.6.14 Explosive Substance (Amendment) Act 2016

155. This act replaces Explosive Substance Act 1908 and regulates the use of explosive substances in the province of Balochistan.

2.6.15 Government of Pakistan Guidance on Managing COVID-19 Risks

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

2.7 Institutional Setup for Environmental Management

157. 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)

158. After devolution of the subject environment to provincial level under 18th amendment, these two organizations are primarily responsible for administering the provisions of the Balochistan Environmental Protection Act 2012. The EPC oversees the functioning of the BEPA. Its members include the representatives of the government, industry, non-governmental organizations and the private sector. The EPA is required to ensure compliance with the 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. One of the functions of the provincial EPA is 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

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

160. The Environmental Impact Assessment study in hand is fully committed to the requirements determined in the “ADB Safeguard Policy Statement”. The environmental works carried out by NEC on behalf of project proponents have been essentially guided by these rules as enunciated in the “Outline of an Environmental Impact Assessment Report”.

161. In the light of significance attached by ADB to various environmental impacts, Project is Category A, wherein an Environmental Impact Assessment is required.

162. Main reasons behind assigning category A is due to the size of Sri Toi Dam and its associated irrigation canals which would require a significant quantity of material movement to and from the project site. Another reason behind the Category A is a risk of breaching of the dam because of natural hazards.

2.8.2 ADB’s Accountability Mechanism Policy 2012

163. The objectives of the Accountability Mechanism are providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or

is likely to cause, them direct and material harm. The Accountability Mechanism is a “last resort” mechanism.

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

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

165. 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.

166. 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.

167. ADB has published a MEMO on Health and Safety related requirements regarding Covid-19, that is provided as Annexure 4.

2.9 World Health Organization (WHO) Guidelines to protect against COVID-19 in ALL workplaces

168. World Health Organization (WHO)⁹ has recommended measures to prevent transmission of COVID-19 that apply to all workplaces and all people at the workplace that includes frequent hand-washing or disinfection with alcohol based hand sanitizer, respiratory hygiene such as covering coughs, physical distancing of at least 1 metre or more according to the national recommendations, wearing of masks where distancing is not possible, regular environmental cleaning and disinfection, and limiting unnecessary travel. Clear policies and messages, training, and education for staff and managers to increase awareness of COVID-19 are essential. The management of people with COVID-19 or their contacts is also critical e.g. requiring workers who are unwell or who develop symptoms to stay at home, self isolate and contact a medical professional or the local COVID-19 information line for advice on testing and referral.

2.10 Comparison of International and Local Environmental Legislations

⁹ <https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-health-and-safety-in-the-workplace>

169. 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.

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

171. Similar to the standards for air quality, the comparison of noise standards provided in Table 8 clearly shows that NEQS for noise are more stringent in comparison to the WHO/IFC standards. The only exception is the daytime noise level standard for Industrial areas where the WHO/IFC standard is more stringent (70 dB (A)) in comparison to NEQS (75 dB (A)) and so for this particular parameter, the WHO/IFC standard will be used.

172. 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.

173. Similar to the standards for air and Noise quality, the comparison of Water quality standards provided in Table 9 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 zinc, residual chlorine, Phenolic compounds (as Phenols) mg/l, Poly-nuclear aromatic hydrocarbons (as PAHs) g/l. WHO for Lead and Zn are more stringent comparatively.

Table 7: Comparison of International and Local Air Quality Standards

Pollutants	USEPA		WHO/IFC		NEQS	
	Avg.Time	Standard	Avg.Time	Standard	Avg.Time	Standard
SO ₂	3 hrs	0.5 ppm	24 hr	125 µg/m ³ (IT-1*)	Annual Mean	80 µg/m ³
	1 hr	75 ppb	10 min	500 µg/m ³	24 hr	120 µg/m ³
CO	8 hrs	9 ppm (11mg/m ³)	-	-	8 hrs	5 mg/m ³
	1 hr	35 ppm (43 mg/m ³)			1 hr	10 mg/m ³
NO ₂	Annual Mean	100 µg/m ³ (53 ppb)	1 yr	40 µg/m ³	Annual Mean	40 µg/m ³

Pollutants	USEPA		WHO/IFC		NEQS	
	Avg.Time	Standard	Avg.Time	Standard	Avg.Time	Standard
	1 hr	(100 ppb)	1 hr	200 µg/m ³	24 hrs	80 µg/m ³
O ₃	8 hrs	0.07 ppm (148 40 µg/m ³)	8 hrs	100 µg/m ³	1 hr	130 µg/m ³
PM ₁₀	24 hrs	150 µg/m ³	1 yr	70 µg/m ³ (IT-1*)	Annual Mean	120 µg/m ³
			24 hr	150 µg/m ³ (IT-1*)	24 hrs	150 µg/m ³
PM ₂₅	Annual Mean	15 µg/m ³	1 yr	35 µg/m ³	Annual Average (IT-1*)	15 µg/m ³
	24 hrs	35 µg/m ³	24 hr	75 µg/m ³	24 hrs (IT-1*)	35 µg/m ³
					1 hr	15 µg/m ³

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

Table 8: Comparison of International and Local Noise Standards

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

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

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

Properties/Parameters	Standard values	WHO standards	Remarks
Biological			
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards

Properties/Parameters	Standard values	WHO standards	Remarks
Treated water distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤15TCU	≤15TCU	
Taste	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Odour	Non objectionable/ Acceptable	Non objectionable/ Acceptable	
Turbidity	<5NTU	<5NTU	
Total hardness as CaCO ₃	<500mg/l	---	
TDS	<1000	<1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	mg/Litre	mg/Litre	
Aluminum (Al) mg/l	≤0.2	0.2	
Antimony (Sb)	≤0.005 (P)	0.02	
Arsenic (As)	≤0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl ⁻)	<250	250	
Chromium (Cr)	≤0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	mg/l	mg/l	
Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing countries
Fluoride (F)*	≤1.5	1.5	
Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤0.5	0.5	
Mercury (Hg)	≤0.001	0.001	
Nickel (Ni)	≤0.02	0.02	

Properties/Parameters	Standard values	WHO standards	Remarks
Nitrate (NO ₃)*	≤50	50	
Nitrite (NO ₂)*	≤3 (P)	3	
Selenium (Se)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source		
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries
Organic			
Pesticides mg/l			PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted. **
Phenolic compounds (as Phenols) mg/l		0.002	
Poly-nuclear aromatic hydrocarbons (as PAHs) g/l		0.01 (By GC/MS methods)	
Alpha Emitters bq/L or pCi			
	0.1	0.1	
Beta emitters			
	1	1	

175. National Environmental Quality Standards for vehicular emissions and wastewater are given in Table 10 and 11 respectively.

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

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

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

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

S.No.	Parameter Standards	Value
1.	Temperature	40 ^o C
2.	pH value (acidity/basicity)	6-

		10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20°C	80mg/ L
4.	Chemical Oxygen Demand (COD)	150 mg/L
5.	Total Suspended Solids	150 mg/L
6.	Total Dissolved Solids	3500 mg/L
7.	Oil and Grease	10 mg/L
8.	Phenolic compounds (as phenol)	0.1 mg/L
9.	Chloride(asCl ⁻)	1000mg/L
10.	Fluoride (as F ⁻)	20mg/ L
11.	Cyanide (asCN ⁻)	2mg/L
12.	An-ionic detergents ⁽²⁾ (as MBAS) ⁽⁵⁾	20mg/ L
13.	Sulphate(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.

Irrigation Water Quality Standards (FAO)

176. There are no national level Irrigation water quality standards in Pakistan. The US Regional Salinity Laboratory and Food and Agriculture Organization (FAO) have given the quality of irrigation water as shown in Table 12.

Table 12: FAO Irrigation Water Quality Standard

Water Quality Classification	Salinity Hazard		SAR (meq/L)	RSC (meq/L)
	EC at 25 °C (Micromhos/cm)	TDS (mg/L)		
Excellent	<250	<160	Upto 10	<1.25
Good	250-750	160-500	10-18	1.25-2.5
Medium	750-2250	500-1500	18-26	>2.5
Bad	2250-4000	1500-2500	>26	-
Very Bad	>4000	>2500	>26	-

3 DESCRIPTION OF PROJECT

3.1 Introduction

177. This chapter provides details of Sri Toi Dam Subproject including location and footprints, salient features and land requirements, project components, construction and operation stage interventions and project implementation schedule & cost. Sri Toi Dam Subproject is an Asian Development Bank funded project, aimed to improve the agricultural productivity of rain fed agriculture area on the tributary of Zhob River.

161. The Sri Toi dam site is located in the Union Council of Mir Sambaza, tehsil and district Zhob, about 62 km north-east of Zhob on Sri Toi river, the main tributary of Zhob river near Kili Gul Khan. The latitude and longitude of the sub-project are 31° 35' 52" North, 69° 15' 58" East and the mean altitude of the command area is 1350 m above mean sea level. The location of the proposed dam, shown on the Location Map.

3.2 Objective of the Project

162. The main objective of this project is supply of irrigation water to the project area. Most of the area can be considered as poor, subsistence farming is the economic mainstay, so the project will have a major impact on the welfare of local people. Agriculture and livestock are main sources of income of local people. The community of the sub-project area is composed mainly of Mando-Khel tribe of Pashtoons. However, the sub-project will have a, significant impact on a relatively remote community with a very low level of income. There are significant markets within reach and the area has potential for wheat and vegetables which are able to offer good rates in the market.

3.3 Location and Footprint

3.3.1 Location

163. The Sri Toi Dm site is located in the Union Council of Sambaza, tehsil and district Zhob, about 62 km north-east of Zhob on Sri Toi river, the main tributary of Zhob river near Kili Gul Khan. The latitude and longitude of the sub-project are 31° 35' 52" North, 69° 15' 58" East and the mean altitude of the command area is 1350 m above mean sea level. The location of the proposed dam and other interventions is shown as **Figure 3**.

164. Access from Zhob to the dam site is via Zhob-Wana road. Initially in the direction of north-east for a distance of 42 Km then turning to Samabza road in south-east direction up to Kili Hazrat Sahab by a link metaled road by travelling 10-kms, followed by katcha shingle/gravel track for a distance of another 10 Km up to the dam site. The journey takes about 2.25 hours from Zhob town.

3.3.2 Footprint

165. The canal traverses a plain comprising flat and mountainous terrain. Comparison of Feasibility and detail design of Layout Plan of Sri Toi Dam and its other Interventions are shown in **Figure 4 - 7** respectively.

Figure 3: Location Map of Project Area

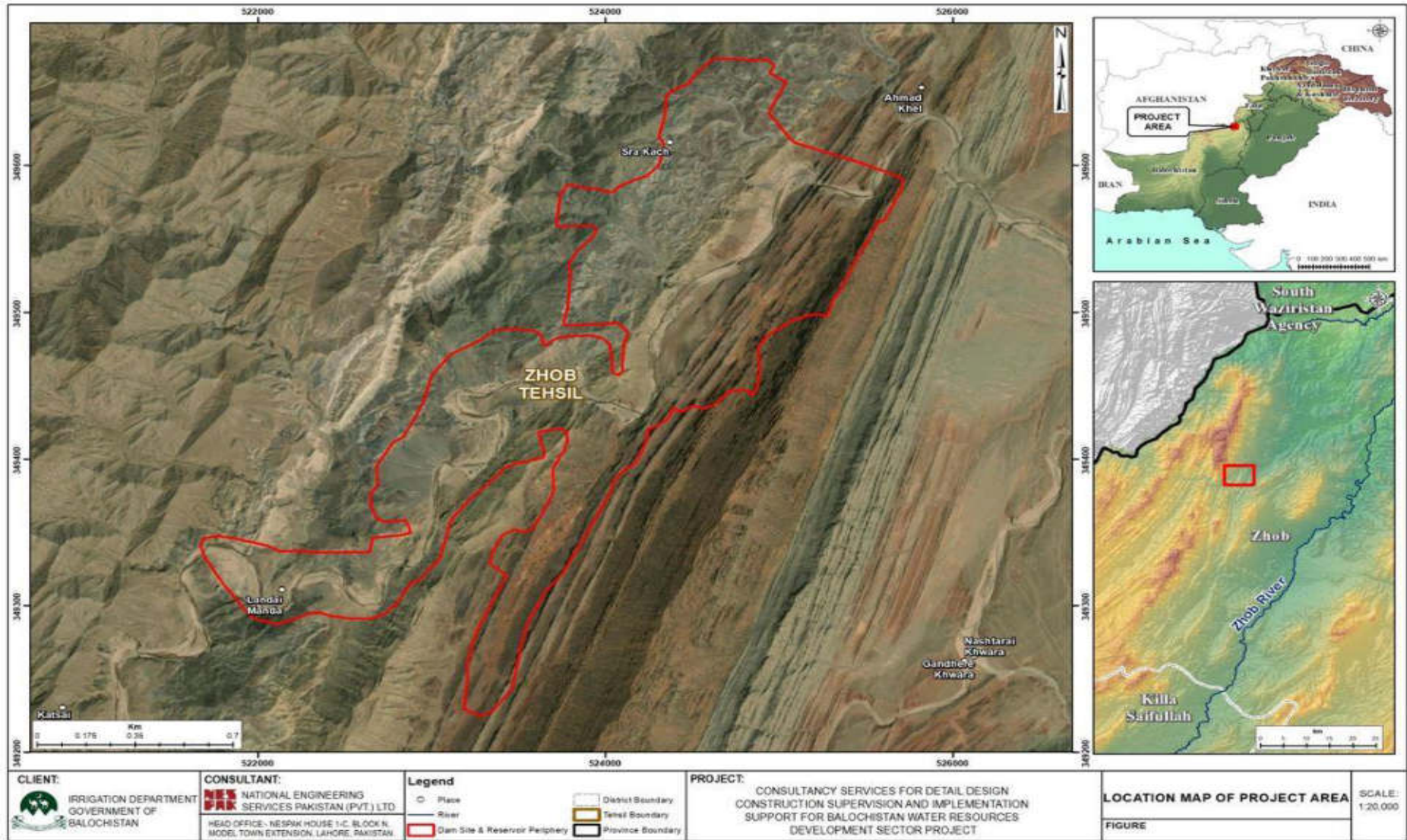


Figure 4: Layout Plan Model of Proposed Dam (Feasibility Stage)

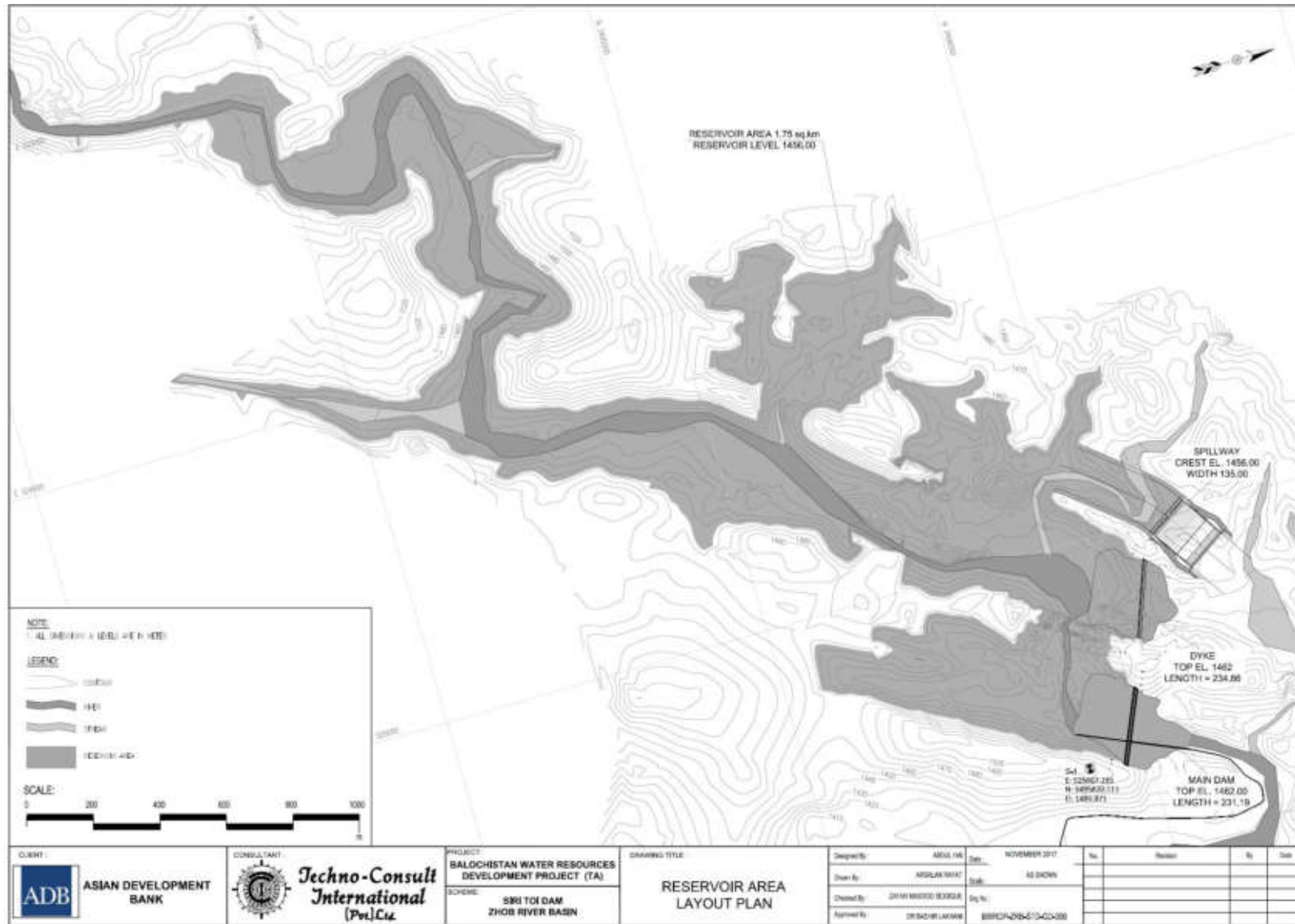


Figure 5: Layout Plan Model of Proposed Dam(Detail Design)

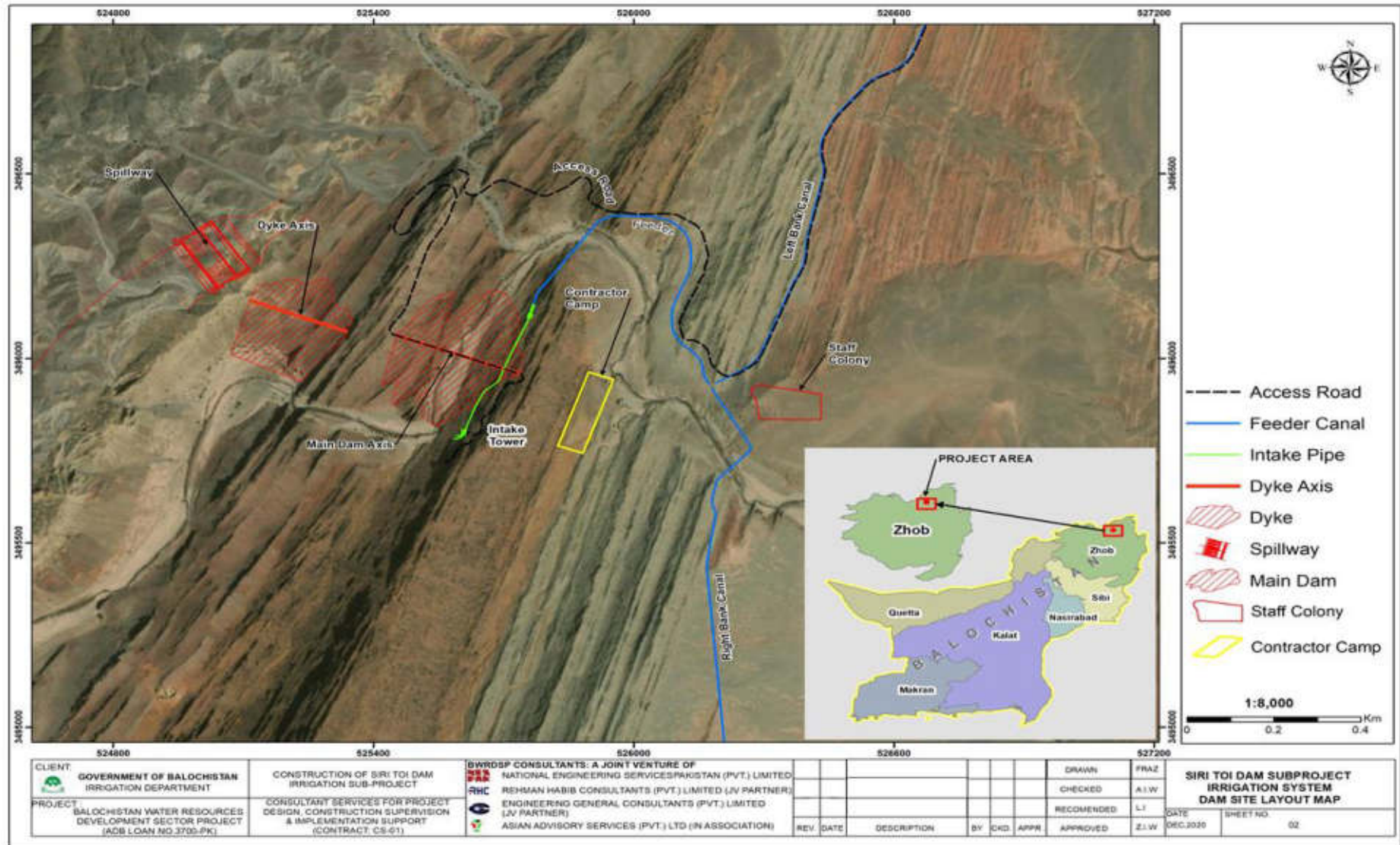


Figure 6: Layout Plan of Proposed Project Interventions (Feasibility Stage)

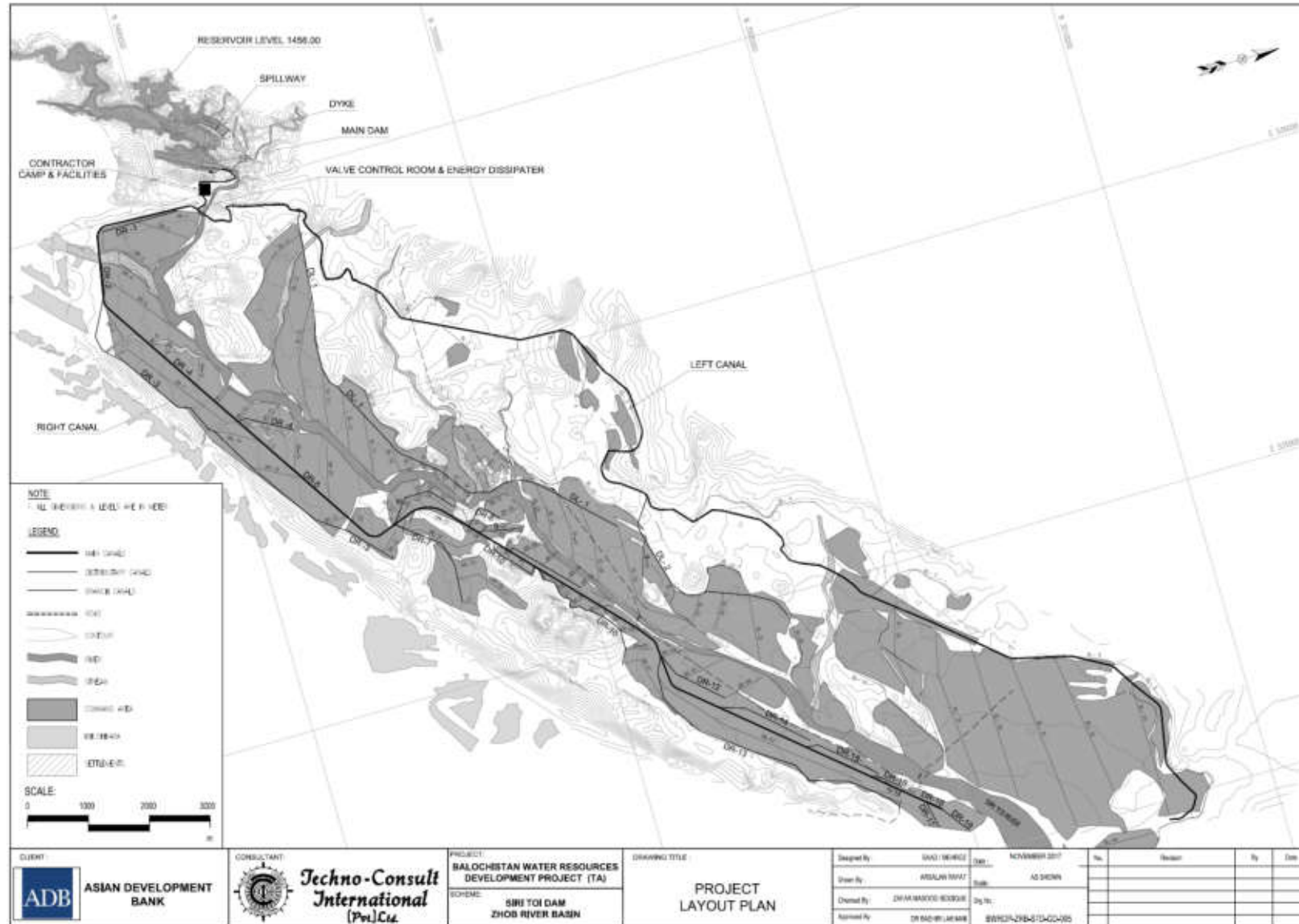
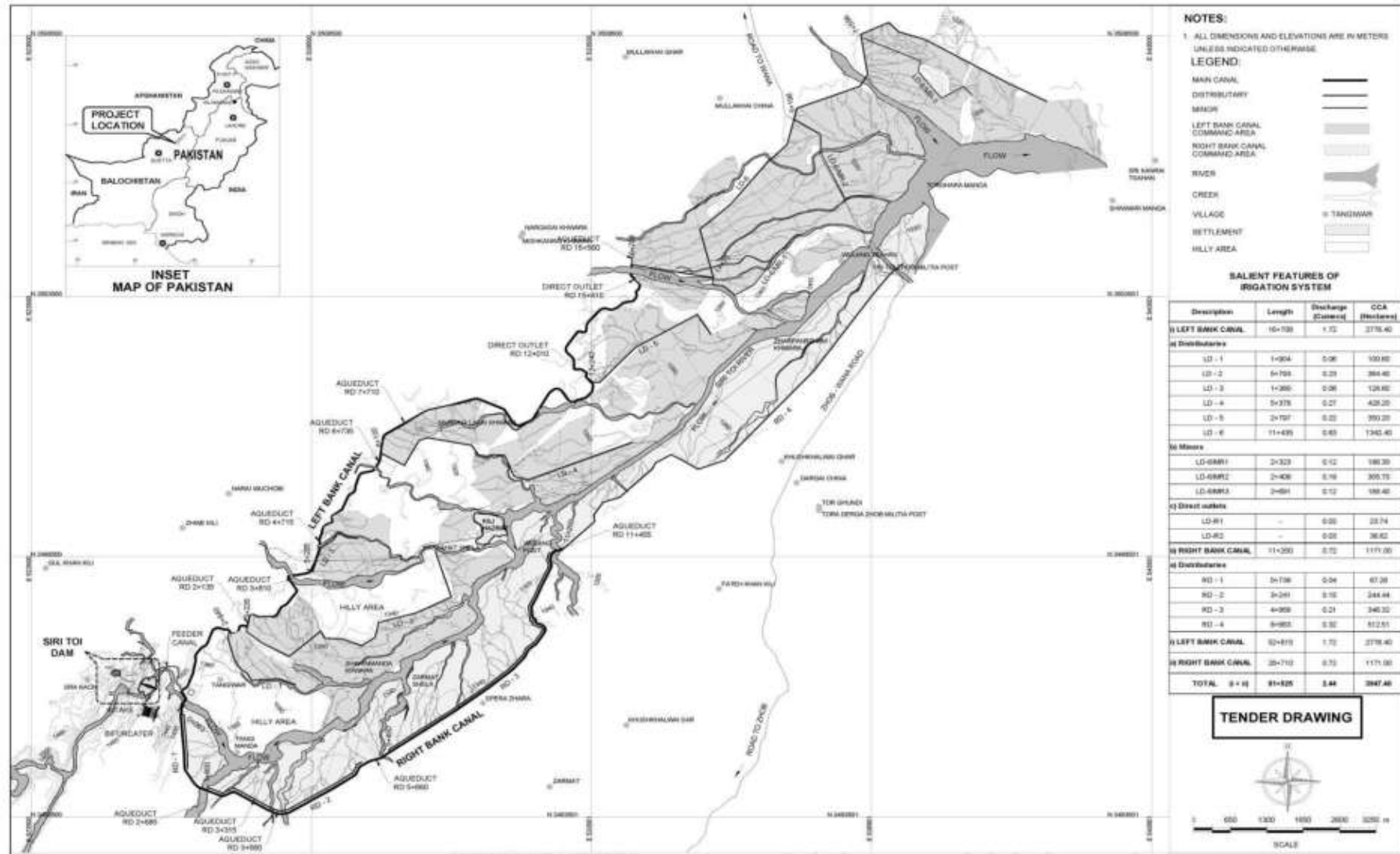


Figure 7: Layout Plan of Proposed Project Interventions(Detail Design Stage)



3.4 Salient Features and Land Requirements of the Project

3.4.1 Salient Features

166. Salient features of Sri Toi Dam Subproject are shown in below **Table 13**.

Table 13: Salient Features of Proposed Project

Feature Description	Detailed Design	Feasibility Design
Type of structure	Central Clay Core Earthfill Dam	Central Clay Core Earthfill Dam
Location	N 3496638.09, E 525794.05.96	N 3496638.09, E 25794.05.96
Dam Height (m)	72.00	66.00
Storage Capacity (MCM)	42.32	36.49
Catchment Area (sq.km)	961.00	961.00
Spillway Crest Length (m)	148.00	135.00
Spillway Type	Ogee ungated overflow	Ogee ungated overflow
Spillway Design Flood	PMF/10,000 years return	PMF/10,000 years return
Dyke/Saddle (No.)	1	1
Right Bank Main Canal and	29.00	58.87
Left Bank Main Canal and	45.40	
Intake Structure Height (m)	3	10.00, 20.00 & 30.00
Steel outlet Pipe (m)	34	1600
Khushkaba Area (Ha)	361	361
Design Command Area (Ha)	3,948	3,948
Watershed Development Area (Ha)	3750	3750
Average Annual Available Water (MCM)	32.16	57.00

3.4.2 Land Acquisition

167. Section 4 has notified by Revenue department, Zhob Division on 13-7-2021. Updated LARP is under preparation and expected to be completed in November 2021. LARP has been approved by ADB and uploaded on website in January 2022.

3.5 Components of the Project

168. The following works are proposed under Sri Toi dam sub-project:

- A 287m long and 67m high earth fill dam with clay core on Sri Toi river.
- A 235m long and 32m high earth fill dyke with clay core on side ridge to plug the reservoir.
- A spillway in a length of 148 m on the left abutment of the dyke.
- A total length of 345m steel pipeline from intake structure of the dam up to start of the command area followed by irrigation main canal, left, right canals of a total length of 74km for the design command area

- Necessary cross drainage works including aqueducts, super-passages, RCC-pipe crossings, and other minor hydraulic structures

169. The salient features of the Sri Toi dam are presented in **Table 13** above. Typical section of the proposed project components is given as **Annexure 9**.

170. **Selection of dam axis:** The dam axis has been selected after reviewing the general topography of the area through site visits and analysis of satellite based imagery and terrain. The selected dam axis has good rock on abutments and the foundation geology.

171. **Reservoir characteristics:** The reservoir Area-Elevation-Capacity curve has been developed. Terrain of the area is very steep and narrow and the storage volume at lower elevation is quite insignificant. This necessitates the design of a dam with a height of 67 m in order to store 30 MCM, required to fulfil the needs of the design command area. The river downstream of the dam location opens to vast flat lands about 1.5 kms downstream of the proposed dam, where sporadic human settlements exist.

172. **Spillway design discharge:** The spillway design flood is estimated for 10,000yrs return period and checked for Probable Maximum Flood (PMF) for Sri Toi river. Flood discharges for 10, 25 and 50 years return period has been computed for diversion arrangements during construction.

173. **Spillway location:** The proposed spillway is located towards the left abutment of the dyke. The spillway width is 148m, at which it will safely pass 10,000 year design flood with 4-5 m head. The spillway has a USBR Type-II stilling basin which is adequately sized to dissipate the erosive energy. An earthen channel from the stilling basin will convey the flood water back to the river and away from the dam.

3.5.1 Command Area

174. Construction of the proposed dam will cover the command area up to 3,948ha, beside of sustained water supply to the present command area being cultivation seasonal basis by growing vegetables and grains. The proposed reservoir would recharge the subsurface flow of karezes, shallow wells and tubewells, protect the agriculture land and human settlements from devastation of floods during flood seasons and develop grazing zones for livestock. The stored water will support drinking, agriculture purpose and other domestic uses.

3.5.2 Earthwork

175. Huge amount of earth work will be done, whose approximate total quantities have been given in below table

Description	Detail Design	
	Excavation (Cu. m)	Fill (Cu.m)
Main Dam	133,039	1,586,334
DYKE	84,645	672,066
Spillway	1,420,245	87,066

176. Total estimated cost of recommended plan is Rs **8,782.644** Million. Detail of which is given in the following **Table 14**.

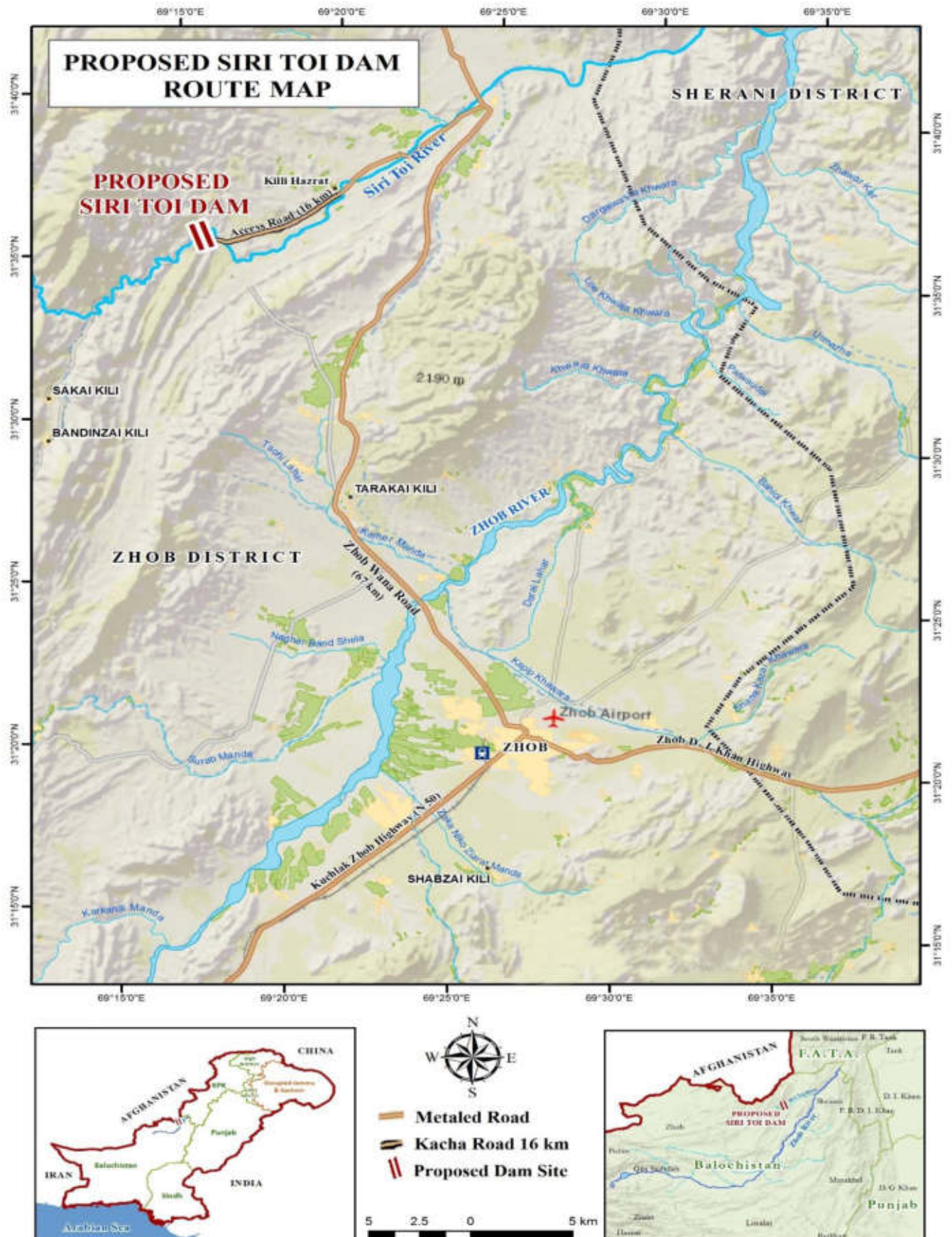
Table 14: Initial cost estimate for Sri Toi Water Storage Dam Irrigation Sub-project

Bill No.	Description	Amount (Rs. Million)
A	Civil Works	
1	Main Dam	2082.592
2	Dyke	976.366
3	Slope Protection	465.028
4	Curtain and Consolidation Grouting	316.228
5	Spillway	6311.020
6	Intake Structure and Irrigation Conduit	162.468
7	Feeder Channel	87.662
8	Irrigation system and related structures	1,761.237
9	Access Roads	1131.423
10	Diversion works, care and handling of water	30.000
11	Instrumentation	34.726
12	Project Colony	20.991
13	General Items	86.440
	Sub Total-A	13,466.18
B	Mechanical Works	
14	Mechanical Works for Main Dam	373.950
15	Mechanical Works for Left Bank Canal System	67.936
16	Mechanical Works for Right Bank Canal System	39.484
17	Mechanical Works for Feeder Channel	44.259
	Sub Total-B	525.630
	Total (A+B)	13,919.81
C	Provisional Items	
18	Day Work	13.612
19	Specified Provisional Sums	466.470
20	Under Drainage Spillway	31.690
21	Physical Contingencies @ 1% of Sub Total -(A+B)	139.192
21	Balochistan Sales Tax @ 6%	835.152
	Total Cost	14,966.16

3.6 Access to Site

177. The site is approachable from Zhob–Wana road. At a distance of 45km from Zhob there is a FC check post and a blacktop road leads to Killi Hazrat Baba (10km) which is the single largest settlement in the proposed command area of the dam. Dam site is further six km away from the Killi Hazrat via shingle/ rugged road. The journey takes about 2.5 hours from Zhob. The access route to the dam site and location of the project from the Zhob city. **Figure 8** shows the access road to project site.

Figure 8: Access Road to the Project Site



3.7 Enhanced Scope of Work and Infrastructure Upgrades Appropriation Request (ICB-01/01) for the Siri Toi Dam Subproject

178. The Appropriation Request (ICB-01/01) delineates essential modifications and additional tasks essential for the Siri Toi Dam Subproject within the Zhob River Basin, part of the Balochistan Water Resources Development Sector Project (BWRDSP). These alterations encompass revisions in the downstream (D/S) slope design of the main dam embankment, reinforcement of slope protection for both the dam and dyke, and enhancements to the spillway structure. A significant aspect of the revised scope of work primarily involves expanded excavation necessitated by geological considerations, alongside modifications in concrete specifications. The footprints of the main dam, dyke and spillway are almost same in the detail design. Key activities encompass excavation, compaction, stone work, pitching, and concrete tasks.

179. Additionally changing the design of the Access Road from shingle gravel to a metalled road and providing an additional Link Road to the outlet structure, along with the rehabilitation of the existing Killi Hazart Road and surfacing of the Road along LBC Service Road, involves major activities including excavation and compaction, infrastructure installation, and pavement construction. Additional roads construction will not impact overall footprint of the project as these will be constructed within already acquired RoW.

3.8 Construction Stage Interventions

3.8.1 Earth Works and Concrete

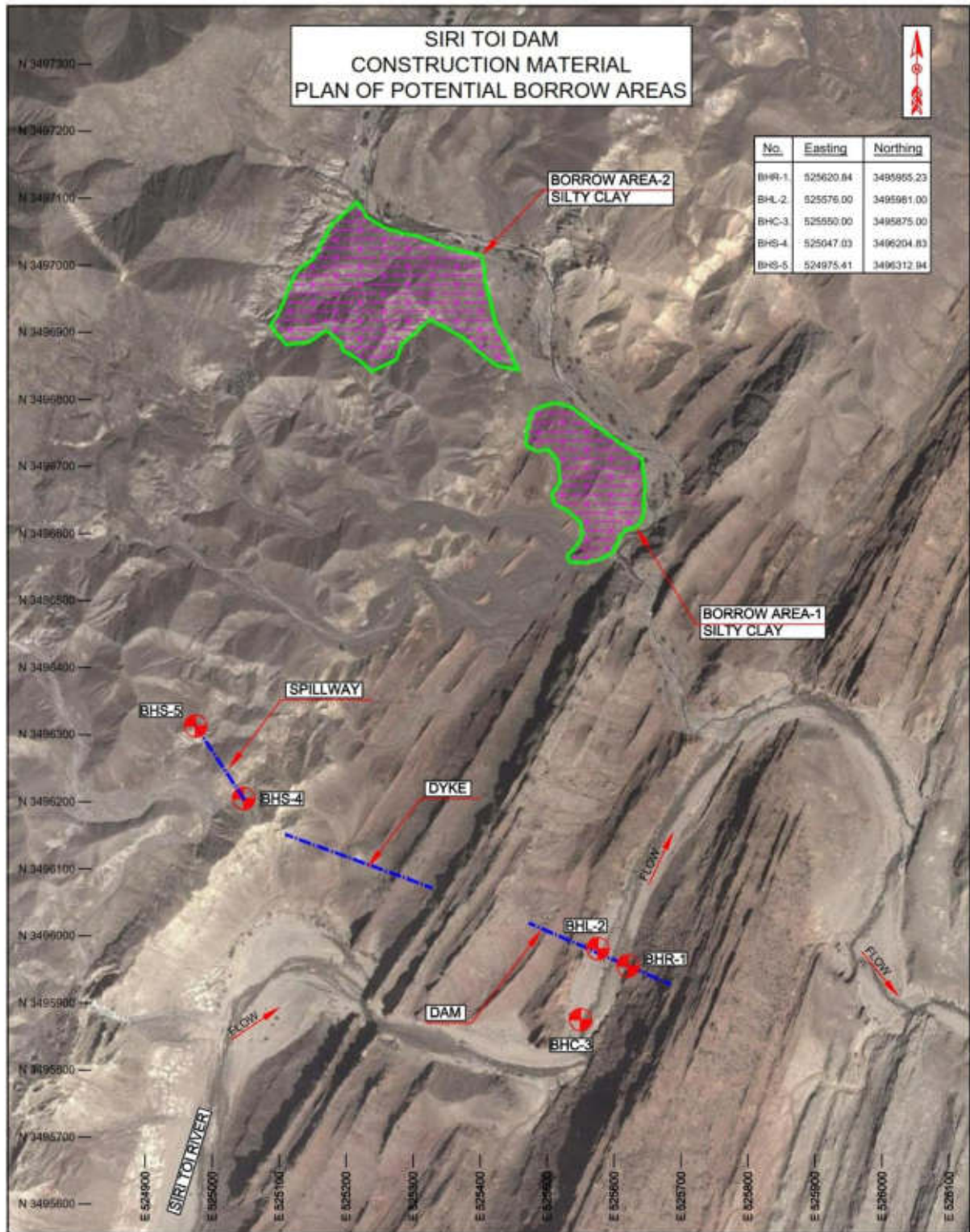
180. Huge amount of earth works (Excavation and compaction) and concrete will be done. The approximate total earth work quantities revised as per Appropriation Request (ICB-01/01) are shown in **Table 15**.

Table 15: Total Earth Work Quantities

Description	Excavation(Cu.m)	Compaction(Cu.m)	Concrete(Cu.m)
Main Dam	142151.516	1800205.306	287.6
DYKE	80227.54	818506.49	199.5004202
Slope Protection	204242.77	186307.535	
Spillway	1899787.753	85406.133	116229.1622
Access Road	561339.791	405435.89	16
Drainage System	1093.083	759.49	

181. After the execution of geotechnical investigation two burrow pit locations are identified which is shown below as **Figure 9**.

Figure 9: Burrow Pit Locations



3.8.2 Construction Camps, Storage Area and other Allied Utilities

182. Construction camp office has been finalized by the design team and given as **Annexure 10**. However, recommendations and specifications for selection of those areas and need of allied utilities which include; main site installations, labor camps, excavation stock piles, work yards, staff camps, transfer areas, dumping areas, quarry areas, solid waste disposal, wastewater management, Water Supply in Construction Facilities and Camps, Supply and Handling of Electricity and Fuel etc. is given in the EMP of this EIA report. The existing source of drinking water for the nearby villages is karaiz. The same will be used for drinking at campsite. However, any additional water to be used during construction would need special arrangements. **Table 16** below shows the estimated labor force and resource usage by contractor:

Table 16: Estimated Labor Force and Resource Usage by Contractor

#	Description	Unit	Quantity
Construction Works at Sri Toi Storage Dam Irrigation Sub-Project			
1	Labor force deployed for a period of 36 months	No.	850
2	Water requirement for construction works for a period of 48 months	m ³	35,000
3	Water requirement for labor force for a period of 48 months	m ³	108,000
4	Wastewater generated from campsite for a period of 36 months	m ³	86,400
5	Following machine will be utilized at site: 1. Concrete Batching Plant 2. Concrete Pump Mobile 3. Concrete Static Pump 4. Transit Mixture 5. Loader 6. Excavator (Type) 7. Excavator (Chain) 8. Dumper 9. Mobile Crain 10. Truck Crain 11. Tractor 12. Tractor Trolley 13. Electric Vibrator (Petrol) 14. Steel Cutting Machine 15. Steel Bending Machine 16. Water Bowser 17. Fuel Pump 18. Power Generator	No.	Various depending upon contractor progress

#	Description	Unit	Quantity
	19. Welding Plant (Diesel) 20. Dewatering Pump (Diesel)		
6	Cement	bags	950,000
7	Sand	Cum	85,000
8	Crush	Cum	150,000
9.	Steel	tons	3500

Source: Design Report

3.9 Comparison of Project Footprints of Feasibility Design with Detailed Design

Feasibility Study

183. Main components of the sub-project proposed in the Feasibility Study (2018) include main dam, dyke, spillway, intake and outlet structures and network of main and distributary canals for irrigation supplies. Salient features of the subproject proposed in the feasibility study include i) Main Dam, 66 m high from river bed and about 231m wide ii) dyke varies in height from 20 to 35 m and total length of 234 m iii) more than 40 km of main irrigation channel and about 115 km of secondary channel iv) 1.6 Km long outlet steel conduits; v) 135 m wide ogee spillway and; vi) more than 130 structures including fall and Aqueducts. Total project cost is estimate as Rs.5,445 Million (USD 45.50 million).

184. It has been estimated in the Feasibility Study that 3026 hectare-meter of water will be available annually for developing agriculture in the command area of 4,027ha on the both Right and Left banks of the Siri Toi River. Killi Hazrat Baba is the largest settlement in the proposed command area of the dam.

Detailed Design

185. Main components of the sub-project proposed in the Detailed Design (2021) include main dam, dyke, spillway, intake tower and outlet structures and network of main and distributary canals for irrigation supplies. Salient features of the subproject proposed in the detailed design include i) Main Dam, 67 m high from river bed and about 287m wide ii) dyke of maximum height of 27m and a length of 235 m iii) more than 27km of main irrigation channel and about 48 km of secondary channel iv) 36m high front open intake tower with 345m long outlet steel conduits; v) 148 m wide ogee spillway and; vi) more than 270 structures including fall and Aqueducts. Total project cost is estimate as Rs.9,000 Million (USD 56 million). It has been estimated that 32.16MCM water will be available annually for agriculture in the command area of 3,948ha on the both Right and Left banks of the Siri Toi River. More than 12km access road is provided and quarters for the operation staff will be constructed.

Comparison

186. The footprints of the main dam, dyke and spillway are almost same in the detail design. Reservoir area is slightly reduced. The alignment of the main canals (both left and right) and

their distributary canals are changed from the feasibility alignments(**Figure 6-7**). This change is attributed to the detail topographic survey of the command area. However, it does not impact the overall footprint of the project as changes in the canal alignments are confined in within the boundaries of command area demarked at the Feasibility Study level. An escape structure is provided at the start of the canals to spill the flow in case of emergency. Communication will improve as bridge culverts are provided on all the canals at the pedestrian tracks/ routes. Social structure are also provided such as washing pads for women, animal drinking structures and wuzu structures.

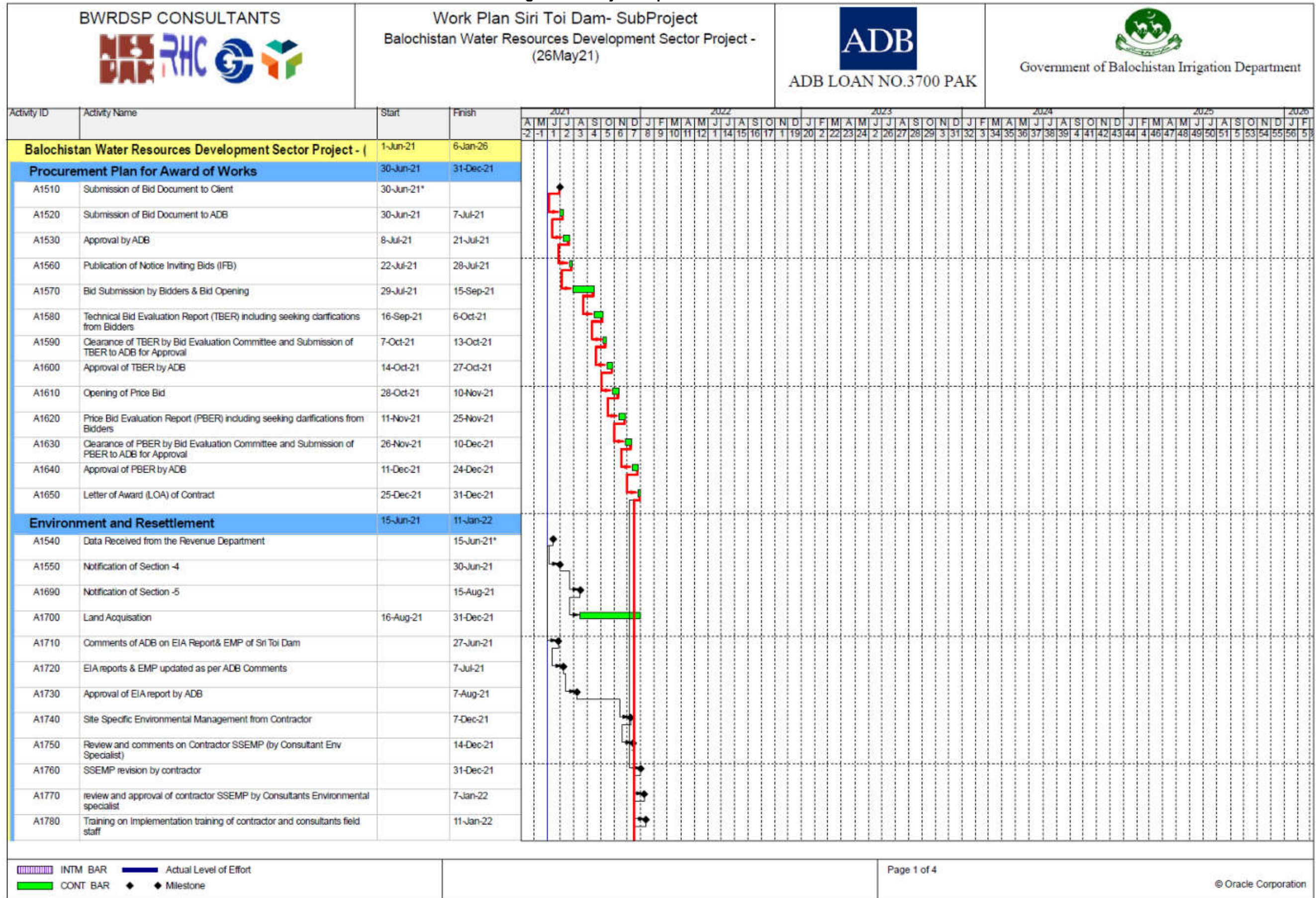
3.10 Project Time Frame

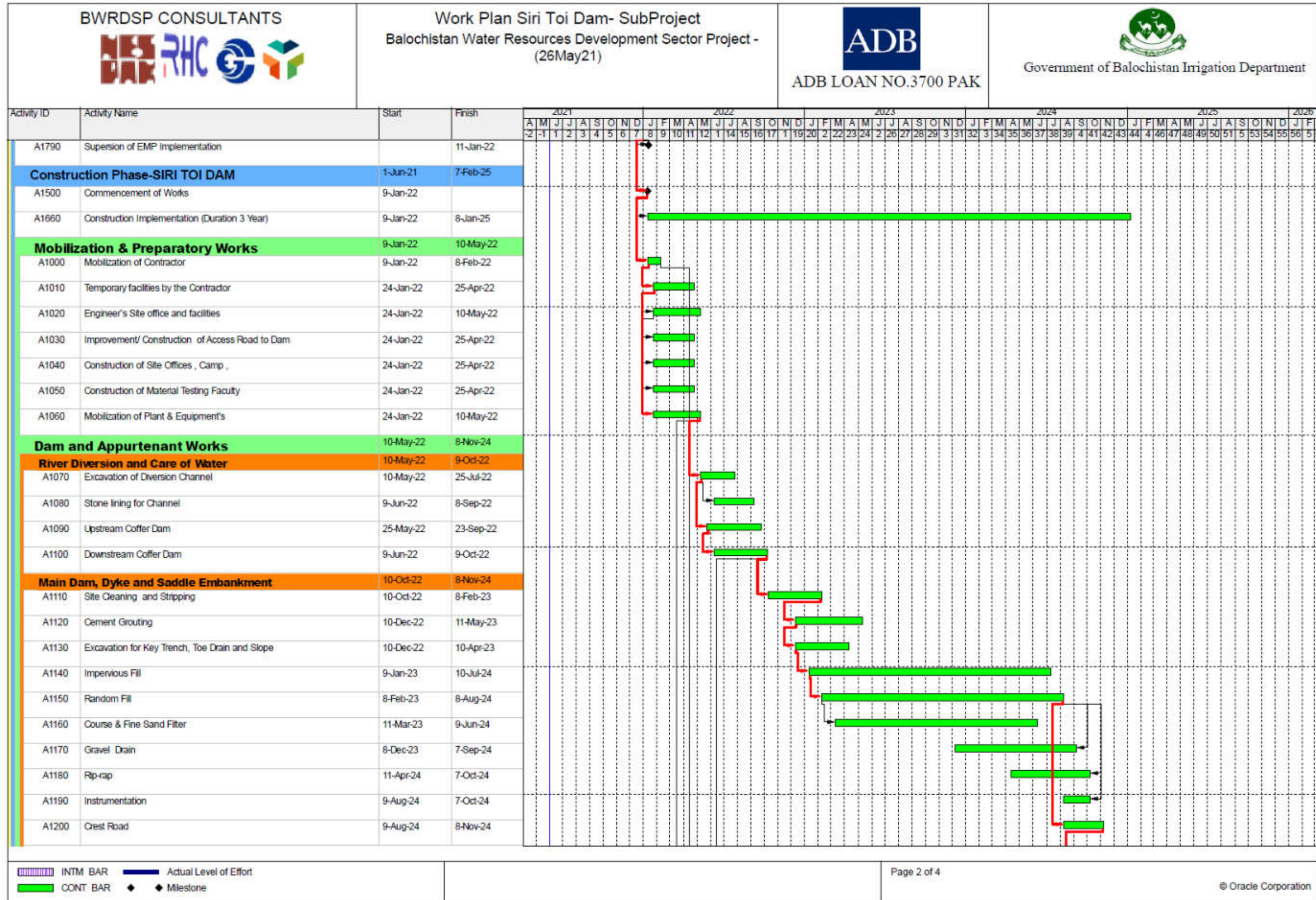
187. The major components of the implementation schedule are as follows:

- Land Acquisition;
- Additional Survey and Investigations;
- Preparation of Detailed Design and Tender Documents;
- Prequalification of Contractors and Invitation of Tenders, Evaluation and Award;
- Construction of Camps; and
- Construction of Irrigation Canal System

188. Project implementation schedule is provided as **Figure 10**. The construction activity of the proposed Sri Toi Irrigation Project will start from April , 2022 with the anticipated date of completion as April 2026.

Figure 10: Project Implementation Schedule





3.11 Project Cost

189. Infrastructure cost of Sri Toi Dam with all other interventions is PKR. 8,782.644 million. Since, the feasibility of Sri Toi Dam is in progress, the quantities of earth work and cost may subject to change till the finalization of geotechnical investigations. The project was awarded to M/S Noor-ul-Haq & Brothers at a contractor bid cost of 4,781,166.45 USD. During the construction stage, a variation order (ICB-01/01) amounting to PKR. 5,857.25 million has been submitted to ADB for approval.

4 PROJECT NEED AND ALTERNATIVES

198. This chapter intends to present the justification and feasibility of the selected sub project scheme intends to present the different alternatives considered by the team design for the particular SriToi Dam and irrigation system.

4.1 No Project Alternative

199. The Project Area can be considered as poor from an economic perspective. Subsistence farming is the economic mainstay. In case the proposed project is not implemented, the socio-economic conditions will not change as such. With the increasing population and scarcity of resources, residents are forced to abandon their homes in search of livelihood and grazing grounds for their cattle stock.

200. From the environmental perspective, the project site comprising of dam pondage area as well as irrigation channel and proposed land for irrigation are arid in nature having little or no rain and too dry to support vegetation. Water availability is scarce in area hence the proposed project will contribute positively to the project area.

4.2 Moving from Feasibility Study to Detailed Design

201. The Consultants¹⁰ have reviewed the Feasibility Study¹¹ of the Siri Toi Dam subproject and prepared a Concept Design Report in April 2020. A three members Panel of Expert (PoE) was hired by the PMO through ADB to overview the design of Siri Toi Dam prepared by the Consultants. The Concept Design has been shared with PoE for review and after incorporating PoE comments, detailed design of the Siri Toi dam is prepared based on the fresh topographic survey, detailed geotechnical and geological investigations and studies.

202. A zoned earthfill dam with clay core is proposed. Draft design report of the Siri Toi Dam subproject has been submitted by the Consultants to the PMO on 2 January 2021 and relevant sections of this draft design report were shared with ADB Dam Safety Panel of Experts (POE).

203. The project cost based on the finalized design was higher as compared to the Feasibility Study. PD-BWRDSP therefore, convened a meeting on 10 February 2021 at Quetta to discuss the Draft Design Report of Siri Toi Dam Subproject. The review panel comprised the officials from the Project Management Office (PMO), Irrigation Department and the Feasibility Study Consultant. Design aspects of different components of the Siri Toi Dam subproject were discussed with the objective of cost optimization. Minutes of the meeting were issued by the PD-BWRDSP vide letter no. PD/BWRDSP/ 2021/ 115 dated 22 February 2021.

¹⁰ The Design and Construction Supervision Consultants (BWRDSP Cosultants- comprising a JV of led by M/S NESPAK with RHC and EGC in association with AAS) was recruited and mobilized in August 2019 under the ADB Loan 3700-PAK (2019)

¹¹ Feasibility Study was prepared by the TA-Consultants (2018) under the ADB PPTA-8800 (PAK)

204. Follow up meetings were held by the DPD ZRB with BWRDSP Consultants on 27 February 2021 at Lahore and then by the PD with MD–NESPAK on 3 March 2021 and following alternate options for design and cost optimization for Siri Toi Dam subproject have been agreed to proceed further;

- Place spillway at Feasibility Study location and check its adequacy, cost and associated risks and reduction in storage
- Optimized design of existing spillway as given in the draft design report by reducing its width, gabion protection, tail channel excavation etc. with associated risks and reduction in storage capacity
- Quick review of Dam Embankment design for various components for optimization
- Reduction in dam height with associated reduction storage, quantities/ cost etc.
- Reduce project colony to three sub-engineers' quarters
- Type of access road from asphalt to shingle
- Market based rate analysis instead of following BCSR 2018
- Review of unit rate analysis for all items with respect to input, haulage and royalty/lease costs in a bid for cost optimization.

4.3 Alternate Project Option

205. Following alternate project options were structured for design optimization from the cost reduction point of view with the guidance from the Client.

Option-1: Spillway located on the right abutment with reduced width and with optimized design parameters of the Main Dam (72m high), Dyke and Saddle.

Option-2: Spillway located at Feasibility location with reduced width and with optimized design parameters of the Main Dam (72m high) and Dyke

Option-3: Main Dam and Dyke height reduced by 5m (67m high Main Dam) and with Spillway at Feasibility and location with reduced width.

Option-4: Main dam and Dyke height reduced by 10m (62m High Dam) and with Spillway at Feasibility and location with reduced width.

Option-5: Main dam and Dyke (72m High Dam) and with Spillway at Right abutment of the Main Dam.

206. Various Alternative Project Designs analysed to harness the water resources potential of the area which are summarized below in **Table 17**.

Table 17: Cost of development of sub-projects in Zhob river basin sub-projects

Option	Detail	Cost (PKR Million)	Comm. Area (ha)	Spillway Width (m)	Spillway Crest El. (m)	Dam Height (m)	Project Life (years)	Storage Capacity (MCM)
1	Dam Height 72m with Spillway width 140m	12,110	3,948	140	1456.5	72	32	39.30
2	Dam Height 72m with Spillway at Left Abutment	10,615	3,948	148	1456.0	72	31	38.37
3	Dam Height 67m with Spillway at Left	9,784	3,948	148	1451.0	67	23	30.00
4	Dam Height 62m with Spillway at Left	9,327	3,027	148	1446.0	62	19	23.00
5	Dam Height 72m with Spillway on Right	14,991	3,948	180	1458.0	72	34	42.13

207. Working paper on design alternative was submitted to the Client on 9 March 2021 for selection and approval of the option by the Client. PD BWRDSP approved Option 3 and directed the Consultant to submit the final design report for this option.

4.4 Justification of Dam Location at Sri Toi

208. The perennial flow in the Siri Toi river is limited and varies throughout the year. The flood flow is abundant in the river but the farmers are financially unable to divert it through conventional methods on sustainable basis. Moreover, flood flow is available for a very short time and might not occur at a suitable time or according to a familiar routine (unreliable). Intermittently the flood water of the Siri Toi River overtops the banks and is the cheapest source of irrigation for the Khushkaba land. Erratic availability of flood flow in Siri Toi river dictates the construction of a large dam for storage of flood flows.

209. Selection of dam axis: The dam axis has been selected after reviewing the general topography of the area through site visits and analysis of satellite-based imagery and terrain. The selected dam axis has sound rock on both abutments. The foundation geology is confirmed through geotechnical investigation. At the proposed axis, a dam with considerable

storage would be constructed. The dam crest length is nearly 231 m with two additional dykes. This option was selected because of its adequate storage capacity of 36.5 MCM and overall project economics.

210. The residents of Sri Toi are mainly depending on agriculture and livestock. They rely on traditional irrigation techniques like sailaba and khushkaba. The supply of water is not assured in these systems. The construction will provide perennial water to the command area. The perennial supply of water will enable the farmers to grow not only seasonal crops but also fruits which are suitable to regional climatic conditions.

4.5 Justification with respect to Environment

211. An **embankment dam** is created by the placement and compaction of a complex semi-plastic mound of various compositions of soil, sand, clay, or rock. It has a semi-pervious waterproof natural covering for its surface and a dense, impervious core. This makes such a dam impervious to surface or seepage erosion.¹²

212. **Earthen Dam or Earth-filled dam** is a type of Embankment dam that is made of compacted earth. Most have a central section of an impermeable material to stop water from seeping through the dam. Such dams are a good choice at sites with wide valleys and can be built on hard rock or softer soils. The geotechnical investigation for dam foundation at the site will confirm the availability of hard rock as foundation and hence the structural stability of the infrastructure. Preliminary Stability Analysis of the Dam has been Checked.

213. Since the tributary is ephemeral in nature i.e. lasting for a short period after rains, the proposed project aims to elongate time frame and in due course the water storage dam would support ecology in longer time span. The construction of dam will change land use of the project site. Presently the project site is a barren land with low to no vegetation, shrubs or non-migratory ecology species. The terrain is laid with large sized boulders to fine silt. The provision of pondage area will store water and ensure water is available for irrigation purposes to the adjacent villages for a longer period of time in a year. The unlined irrigation canals would recharge ground water.

214. Since this tributary is ephemeral in nature, there will not be any fragmentation / compartmentalization of environment up-stream or down-stream of the tributary.

¹² "Dam Basics". PBS. <http://www.pbs.org/wgbh/buildingbig/dam/basics.html#emb>

4.6 Justification of Design as Earthen Dam

4.6.1 Technical Considerations

215. Principal aspects that are considered for identification of dam type which best suit the site conditions included as follow;

- Valley shape.
- Geological and geotechnical conditions of the site.
- Depth to bedrock in the valley section.
- Availability of construction materials at economically close distance.
- Local experience of construction and maintenance of the dam type.

4.6.2 Dam Types Considered at the Feasibility Stage

216. During the Feasibility Studies various dam types were considered i.e Concrete gravity dam, Earth Core Rockfill Dam, Concrete Face Rockfill Dam and Central Core Earthfill Dam. By considering the conditions and quality of bedrock at abutments and dam foundation, thickness of alluvium, availability of rockfill from required excavations and availability of embankment materials, a Central Clay core earth fill dam was proposed in the deepest valley section with a spillway arrangement to cater for the peak flood flows.

4.6.3 Dam Types Considered at the Detail Design Stage

General

217. The first step for the selection of dam type at any site is to evaluate if it is technically possible to construct the dam type being considered at the selected site. The selected dam type should be the one which results the most economical project. Other factors such as environmental considerations, local construction practices, construction period, ease of operation and maintenance etc. may also play some role, although most of these are reflected in cost/ economic viability.

Dam Types Considered

218. The dam types considered for evaluation included (a) Central Core Earthfill Dam, (b) Concrete Face Rock Fill Dam (CFRD) or Earthcore Rockfill Dam (ECRD) and (c) Concrete Gravity Dam (CGD).

Evaluation of Technical Viability

219. Technical viability of dam depends upon various factors including topography, geology and geotechnical conditions prevailing at the selected dam site, seismicity and availability of construction materials. A brief discussion on each aspect along with suitability of dam types is given below:

Abutment Morphology

220. Both abutments of Main Dam have moderate and almost same morphology. The slope angle of left abutment and right abutment from nullah bed is about 120 degrees and 150 degrees respectively. The overall ratio between dam height and valley width is about 1.4:1. This morphology is favorable for constructing Earth fill dam, CFRD/ECRD.

Geology of Project Area

221. Main rocks are covered in dam site area is mainly sedimentary in nature. The recent alluvium is present in the river bed and consists of rounded and sub-rounded gravels and boulders with some sand and fine particles. Abutments comprise of very steep slopes having 75o to 82o NW dip almost vertical in outcrop. The site having rock of Eocene, Oligocene and Miocene age prominent at that location.

222. The left abutment contains Multana, Nisai and Parh group having lithology Sandstone/ Conglomerate Interceded with Red Colored Mudstone/Siltstone. Having generally anticline fold axis with steep to gentle slope from Multana formation to Parh Group with dipping generally in NW direction with amount of dip varies as 65o to 80o.

223. The right abutment mainly contains Multana Formation having lithology sandstone, shale and conglomerate with the dipping angle almost vertical having joints and minor sedimentary structures.

224. Overall geological condition at site is moderately to highly weathered, weak to very weak and with poor RQD values. Therefore, for concrete gravity dam, site conditions are not favorable and will be acceptable for constructing Earthfill embankment dam or CFRD/ECRD.

225. The geotechnical investigations, visual and expert evaluation indicate that the competency of bedrock is acceptable for constructing Earthfill embankment dam and CFRD/ECRD and not acceptable for CGD type.

Construction Material Availability

226. All major construction materials required for all dam types are available in the vicinity of the selected dam site, except good quality rockfill material.

Seismicity

227. The seismic study carried out for the project site revealed that seismic hazard is very high for the project area. Major fault in the area is Zhob fault which is at about 500m distance from the proposed left abutment of main dam. Additionally, there are also two minor faults in the project site. As per ICOLD, "In highly seismic areas if, it may not be possible to find any site without fault slip hazard: In such a case, concrete dams should be avoided and preference

be given to a conservatively designed embankment dam, designed with ample filter and transition zones, on both sides of a rather wide core, displaying ductile properties. There is a considerable confidence that such a structure can withstand, without failure, significant fault offsets.”

Construction and O& M Expertise

228. Only a few local contractors have experience of dam construction in the country and that experience is also limited to dams ranging in height up to 50 m or so. All the dams higher than this range have been constructed through international bidding. The present status of local expertise level for constructing dams up to 50 m height has been summarized as below:

229. Numerous earthen core and rock fill dams have recently been constructed in the country. Necessary expertise is available with local contractors for constructing this type of dam. Only three major concrete face rock fill dams have been constructed in the country. Maximum height of these dams is about 40 m. Requisite level of expertise is not achieved by the local contractors yet. There is only one large concrete gravity dam in the country, which was constructed by a foreign contractor. However, numerous small concrete gravity dams have been constructed in the country by local contractors. Local expertise for constructing such high dams is very limited.

230. All the constructed dams are being maintained either by Water and Power Development Authority (WAPDA) or by institutions controlled by Federation or Provinces. The organizational arrangements and expertise level for maintenance and operation vary greatly. The Irrigation Department Government of Balochistan has ample experience of construction of earthen dams. A tabular form study for selecting dam types is presented in Table 18.

Table 18: Technical Comparison of Dam Types

Relevant Aspect	Central Core	Concrete Face or Rock Fill Dam (CFRD/ECRD)	Concrete Gravity (CGD-RCC)
Abutment Morphology	Favorable	Favorable	Marginally
Width of Valley Section	Favorable	Favorable	Marginally
Engineering	Favorable	Favorable	Not Acceptable
Engineering	Favorable	Favorable	Not Acceptable
Depth to Bedrock in	Favorable	Favorable	Marginally
Construction Material	Available	Limited Availability	Available
Seismicity	Acceptable	Marginally Acceptable	Not Acceptable
Construction Experience	Available	Limited	Very Limited

Relevant Aspect	Central Core	Concrete Face or Rock Fill Dam (CFRD/ECRD)	Concrete Gravity (CGD-RCC)
Accessibility	Satisfactory	Satisfactory	Satisfactory
Suitability	Most Suitable	Suitable	Not Suitable
Technical Rating	First	Second	None

4.6.4 Conclusions on Dam Types

231. Central Core Earthfill type is considered most suitable to the site specific conditions and thus technically rated as the first choice. CFRD or ECRD type is not considered suitable due to poor quality of sandstone available at site as rockfill material. CGD – RCC is considered not suitable to the site specific conditions as foundation rock is soft with less bearing capacity for a gravity dam and thus technically not recommended

4.6.5 Spillway Layout Alternatives

232. The Consultants have carried out an analysis of six (6) alternative locations for placement of spillway based on topography, geology, foundation characteristics, spillway approach and tail conditions, safety and economy of the subproject. A spillway layout matrix was presented in Concept design note submitted to the Client and ADB Dam safety panel of experts in April 2020 to reach out to a conclusion for layout design of spillway as shown in **Table 19** below.

233. After POE review (June 2020) and in a meeting held in Consultant office on October 19, 2020, the Consultant were assigned to evaluate two alternate locations (1 and 2) out of six for further refinement and design:

- Ogee overflow spillway on feasibility location (Alternative 1)
- Gravity Spillway on Dyke location (Alternative 2)

234. However, when the detailed geotechnical investigations were carried out at dyke location (Alternative 2), it was found that bearing capacity of the foundation strata at this location is insufficient to sustain the load of a 30m high gravity spillway structure. A meeting was held with the PD BWRDSP and ADB PoE on 19 October 2020 to discuss the issue and it was concluded that spillway shall be located at the Feasibility location (Alternative 1). Final design of the spillway has been carried out for this alternate.

Table 19: Spillway Alternative Layout Matrix

Sr. No.	Spillway Alternate Locations ¹³	FOUNDATION	APPROACH	TAIL CHANNEL	SAFETY	COST
		<i>WEAK (1)</i> <i>MODERATE(2)</i> <i>GOOD(3)</i> <i>STRONG(4)</i>	<i>POOR(1)</i> <i>BETTER (2)</i> <i>GOOD(3) SMOOTH(4)</i>	<i>POOR(1)</i> <i>BETTER (2)</i> <i>GOOD(3) SMOOTH(4)</i>	<i>RISK (0)</i> <i>MILD RISK (1)</i> <i>SAFE (3)</i>	<i>HIGH (1)</i> <i>NORMAL(2)</i> <i>LOW(3)</i>
1	Spillway is located as per Feasibility Study Layout. Total Score (9)	Mud stone formation is present at spillway location. MODERATE (2)	Spillway approach to be cleared off from the hills for smooth entry of flood water to spillway. Spillway is also detached from the main reservoir body by a ridge on the right side. POOR(1)	A short tail channel shall be constructed to safely dispose off the flood water to downstream valley. GOOD(3)	Dam safety shall be at mild risk due to uncertain foundation characteristics and unfavourable spillway approach conditions. MILD RISK (1)	Earthwork cost would be high whereas cost of structure would be normal. NORMAL(2)
2	Spillway is placed at the location of Dyke. Total Score (13)	Beds of Sandstone and mudstone are present at spillway location as observed during the site visit and noted from the borehole log drilled during Feasibility Study (2018). MODERATE (2)	Smooth approach due to straight approach from river. The momentum of flow is aligned to the centreline of the Spillway on upstream. SMOOTH(4)	There exists a natural valley immediately downstream of the stilling basin to directly discharge the flood. GOOD(3)	Dam safety increased due to efficient spillway operation constructed on a stable foundation. SAFE (3)	Cost will increase due to concrete gravity structure. HIGH (1)
3	Spillway on the right bank of Main Nullah about 300m upstream of the Main dam.	Good quality rock observed during site visits and noted from the borehole log drilled on right abutment of Main	Hills/ridges exist on spillway approach to be cleared off for smooth entry of flood water to spillway. Flood flows in	There is a hilly ridge just downstream of the stilling basin causing direct obstruction to flow. POOR(1)	Risky due to poor approach and tail channel. RISK(0)	High cost of excavation in rock and providing crossing for the conveyance pipe,

¹³ Refer to Figures on the following pages for drawings of these layouts

Sr. No.	Spillway Alternate Locations ¹³	FOUNDATION	APPROACH	TAIL CHANNEL	SAFETY	COST
		<i>WEAK (1) MODERATE(2) GOOD(3) STRONG(4)</i>	<i>POOR(1) BETTER (2) GOOD(3) SMOOTH(4)</i>	<i>POOR(1) BETTER (2) GOOD(3) SMOOTH(4)</i>	<i>RISK (0) MILD RISK (1) SAFE (3)</i>	<i>HIGH (1) NORMAL(2) LOW(3)</i>
	Total Score (6)	dam during Feasibility Study (2018). GOOD (3)	approach may cause erosion on upstream face of the main dam. POOR(1)			contractors' camp relocation etc. HIGH(1).
4	Spillway adjusted in between Dam and Dyke Total Score (5)	Mud stone formation observed during site visit as well as as noted from the borehole drilled at the left abutment of Main Dam. MODERATE (2)	Poor approach conditions due to chances of parallel flow velocity and erosion at upstream face of the Dyke. POOR (1)	Poor condition at Tail Channel discharging flood waters close to the downstream toe of the main dam. POOR (1)	Close contact of the Main dam with spillway on mudstone rock formation. Downstream toe of the main dam would be prone to erosion due to Spillway discharge. RISK(0)	Cost will be increased due to foundation and abutment treatments for structural safety of dam and spillway. HIGH(1)
5	Spillway on right flank, Dam at narrow Gorge at u/s of FS dam location. Total Score (6)	Foundation conditions good as observed during site visit. GOOD(3)	Parallel flow conditions may cause erosion at upstream face of dyke. Dam u/s toe will be in front of dyke. POOR(1)	There is a hilly ridge just downstream of the stilling basin causing direct obstruction to flow. POOR(1)	Erosion at the downstream face of the dam due to spillway discharge and backwater levels in the tail channel. RISK(0)	Cost of Main dam would be lesser due to shorter dam body length but abutment treatment and excavation at tail channel would be costly. NORMAL(1)
6	Spillway on left of main Dam and Dyke moved d/s to narrow section of nullah. Total Score (7)	Compact mud stone formation observed during site visits and noted from the bore hole drilled on the left abutment of main dam. MODERATE (2)	Good approach conditions from the reservoir. GOOD (3)	Good Condition at Tail Channel directly discharging into the main nullah downstream of the main dam. GOOD (2)	Close contact of dam with spillway. Downstream toe of the main dam would be subject to erosion due to Spillway discharge. RISK(0)	Cost will be increased due to increased length and height of Saddle damd with foundation and abutment treatments. HIGH(0)

5 BASELINE CONDITION

5.1 Area of Influence

232. The basis for determining the areas covered under the Projects Area of Influence is the ADB Environmental Safeguards Good Practice Sourcebook (Dec 2012)¹⁴ which states:

233. "The area of influence may span:

- *Primary project site and ancillary facility sites that will be owned, developed, operated or managed by the borrower/client or its contractors. Examples of ancillary facilities include access roads, borrow pits, spoil disposal areas, pipelines, canals, tunnels, depots and construction camps.*
- *Associated facilities not funded by the project but whose existence and viability are entirely dependent on the project and whose services are essential to project operation.*
- *Areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken.*
- *Area and communities potentially affected by induced impacts from unplanned but predictable developments or activities caused by the project, which may occur later or at a different location. For example, a new road constructed through an intact forest provides access to a gas field. The road improves access to previously difficult to reach forest resources, resulting in illegal logging, local settlement and agricultural activities."*

234. Accordingly, for the purpose of the Sri Toi Project EIA, the AOI has been divided into several specific sub-areas. The following are the main parts of the AOI:

- **Construction Site:** including dam, dykes, spillway, reservoir and canal, additional structures and immediate surroundings (construction camps, quarries, borrow and disposal areas, etc.);
- **Affected Structures:** The structure that may be physically affected due to project construction;
- **Project Foot Print Area:** this is the area directly related to Dam, Dykes, Spillways, Reservoir and Canal Right of Way (ROW), Canal, Outlets, command area etc; and

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

¹⁴ These guidelines are broadly followed by IFC Performance Standard 1 criteria for establishing Area of Influence

5.2 Physical Environment

236. This section describes the physical environment of the proposed project area. The emphasis is given on geology, soil conditions, climate, water resources and quality, ambient air and noise quality and seismology of the project area.

5.2.1 Geography

237. Balochistan is situated in the southwest of Pakistan and covers an area of 347,190 square kilometres (134,050 sq mi). It is Pakistan's largest province by area, constituting 44% of Pakistan's total land mass. The province is bordered by Afghanistan to the north and north-west, Iran to the south-west, Punjab and Sindh, and Khyber Pakhtunkhwa and the Federally Administered Tribal Areas to the north-east. To the south lies the Arabian Sea. Balochistan is located on the south-eastern part of the Iranian plateau. It borders the geopolitical regions of the Middle East and Southwest Asia, Central Asia and South Asia. Balochistan lies at the mouth of the Strait of Hormuz and provides the shortest route from seaports to Central Asia. Its geographical location has placed the otherwise desolate region in the scope of competing global interests for all of recorded history.¹⁵

238. The terrain of project area is covered dominantly by linear Ridge-n-Trough structures in central and eastern part of the project area having North-East orientation which is primarily controlled by both stratigraphy and geologic structure. The stratigraphic imprints are manifested by the occurrence of alternate beds of relatively hard and erosion-resistant rocks with very soft and erodible strata that furnished the congenial environment for the development of Ridge-n-Trough topography. The principle geomorphic agency responsible for such morphology is the surface water flows, which resulted in differential erosion of the terrain.

239. The project area lies on the North-western part of the broader North-eastern oriented syncline. The syncline bounded by the major faults on North-western and South-eastern side. The North-western fault runs through the project area have further contact with the other major syncline. Hence the project is lying at boundary of two major synclines where anticline is absent due to their faulted contact. Keeping in view of the vicinity of project the North-western bounded fault of the broader syncline is evaluated further during the site specific geotectonic mapping.

240. Project specific geotectonic studies were conducted as a part of the detailed design studies for Siri Toi Dam Project. The studies conducted within the radius of 5Km from the Project site. Within the specified radius a number of faults associated with the major faults running through the project area were identified and plotted on the Geotectonic Map. Total No. of Twenty-two (22) faults associated with the major project specific north- eastern oriented

¹⁵ https://en.wikipedia.org/wiki/Balochistan,_Pakistan#Geography

fault were discovered. Out of these twenty-two faults, eight were minor faults and fourteen (14) were major faults. Four (04) major geological faults out of the twenty-two (22) mapped geological faults are running through the proposed spillway location. These faults drastically reduced the strength and stability characteristics of the rocks sited at the spillway location.

241. Keeping in view of the site geological observations regarding rock slopes at the dam site and results obtained from the Kinematic analysis it is interpreted that the zones of the rock slope having angles $>70^\circ$ are potentially unstable with respect to toppling failure. A large no. of rock fall deposits on the left and right abutment is the result of this rock slope instability. It is concluded that the cutting in these unstable areas require special attention with respect to the safe working environment. Any cutting in the slopes require proper design angle and rock support.

242. Grouting is the most important task for the dam site projects in order to reduce the permeability and lengthen the seepage path. Permeability and water pressure testing were conducted in the boreholes in order to assess the permeability of the subsurface strata below the dam foundations. This distribution of permeability values suggests an overall medium level of required grout injection, but underscores the need for a systematic and careful approach to the grouting to be certain that local, high permeability zones are properly treated, wherever they may occur.

243. Primarily curtain and consolidation grouting are recommended for controlling seepage below the dam foundations and any other potential seepage zones. Systematic and staggered double row of curtain grouting is recommended with 3m spacing and 30m depth of the holes on either side. Two rows of consolidation grouting on either side of the curtain are recommended with 3m spacing and 5m depth. Increase in depth and number of all the grout holes are recommended in the case of any high seepage areas or the areas of high grout intake.

244. Different construction material sources like coarse and fine aggregates, sources for impervious core, shell material and sources for rip rap were investigated for the Project. All the sources were studied by testpits execution, sampling and testing. After completing the whole procedure, it was concluded that all the main construction material sources are available in the vicinity of the project within the radius of 05 to 15km from the project site except material for coarse aggregate and impervious core material. The suitable material for these sources is sited at 32 and 55km respectively from the project site. Geological Map of Dam site and Reservoir area and locations of Construction material are provided as **Figure 11**, **Figure 12** and **Figure 13** respectively.

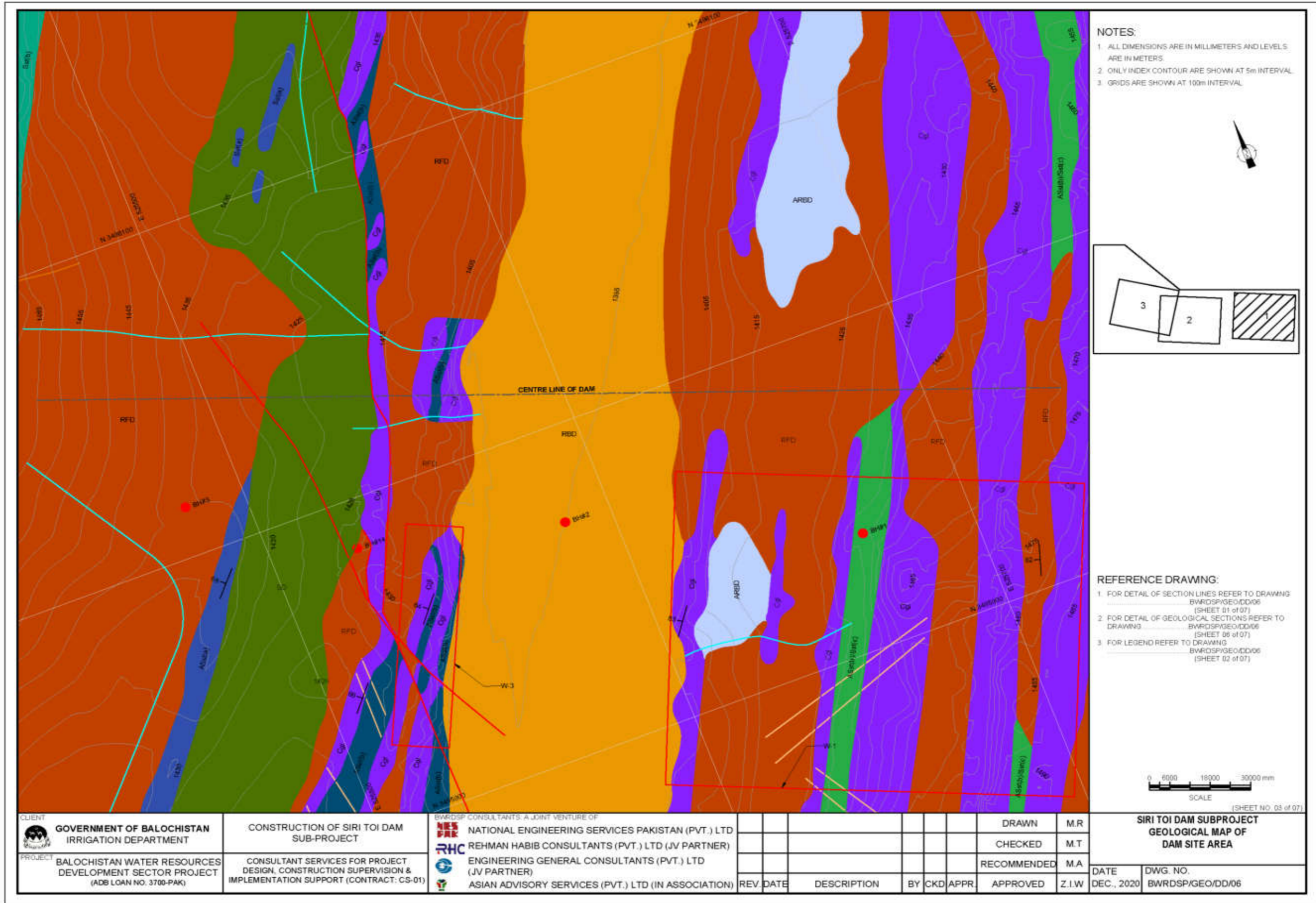


Figure 11: Geological Map of the Dam Site Area

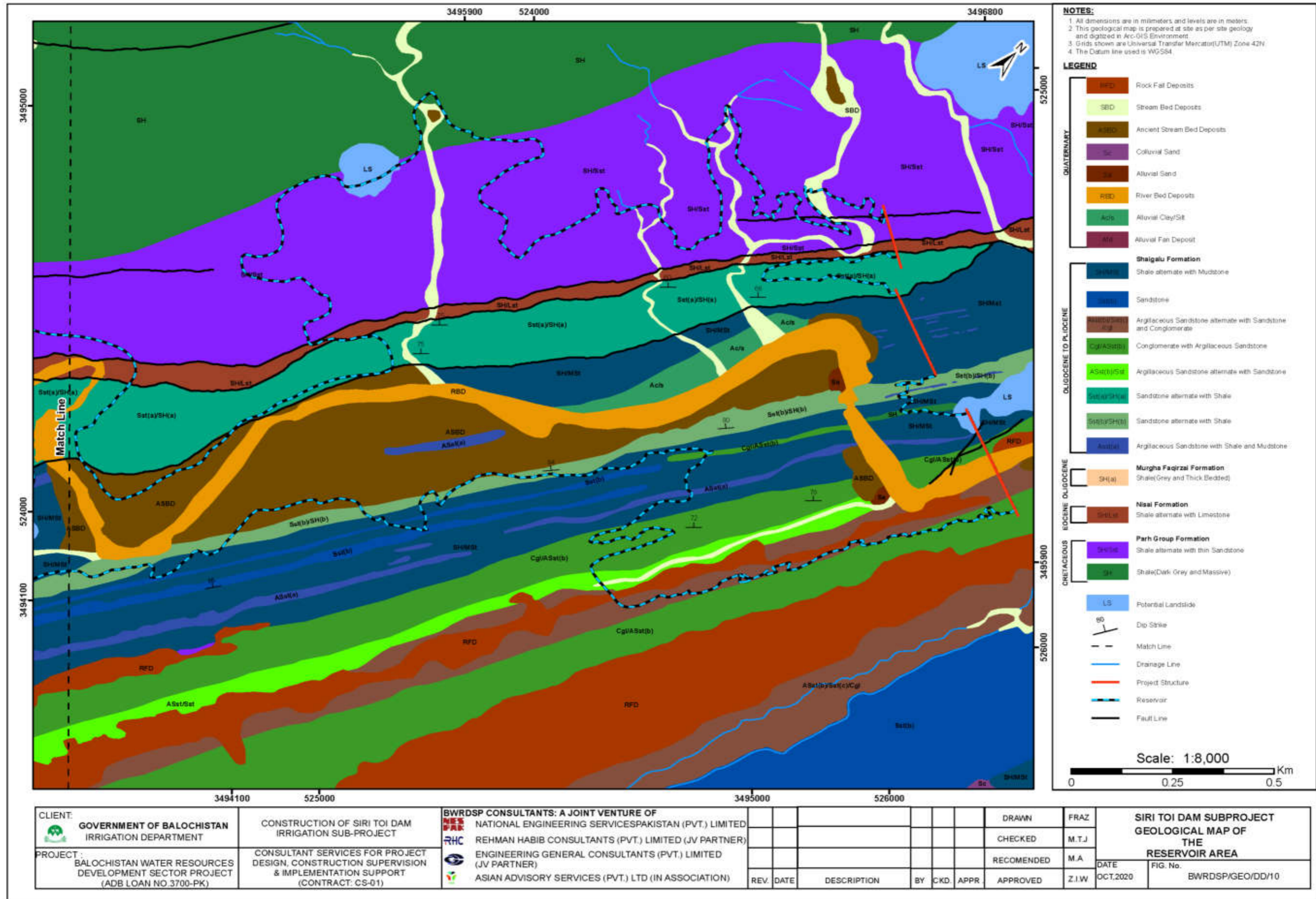


Figure 12: Geological Map of the Reservoir area

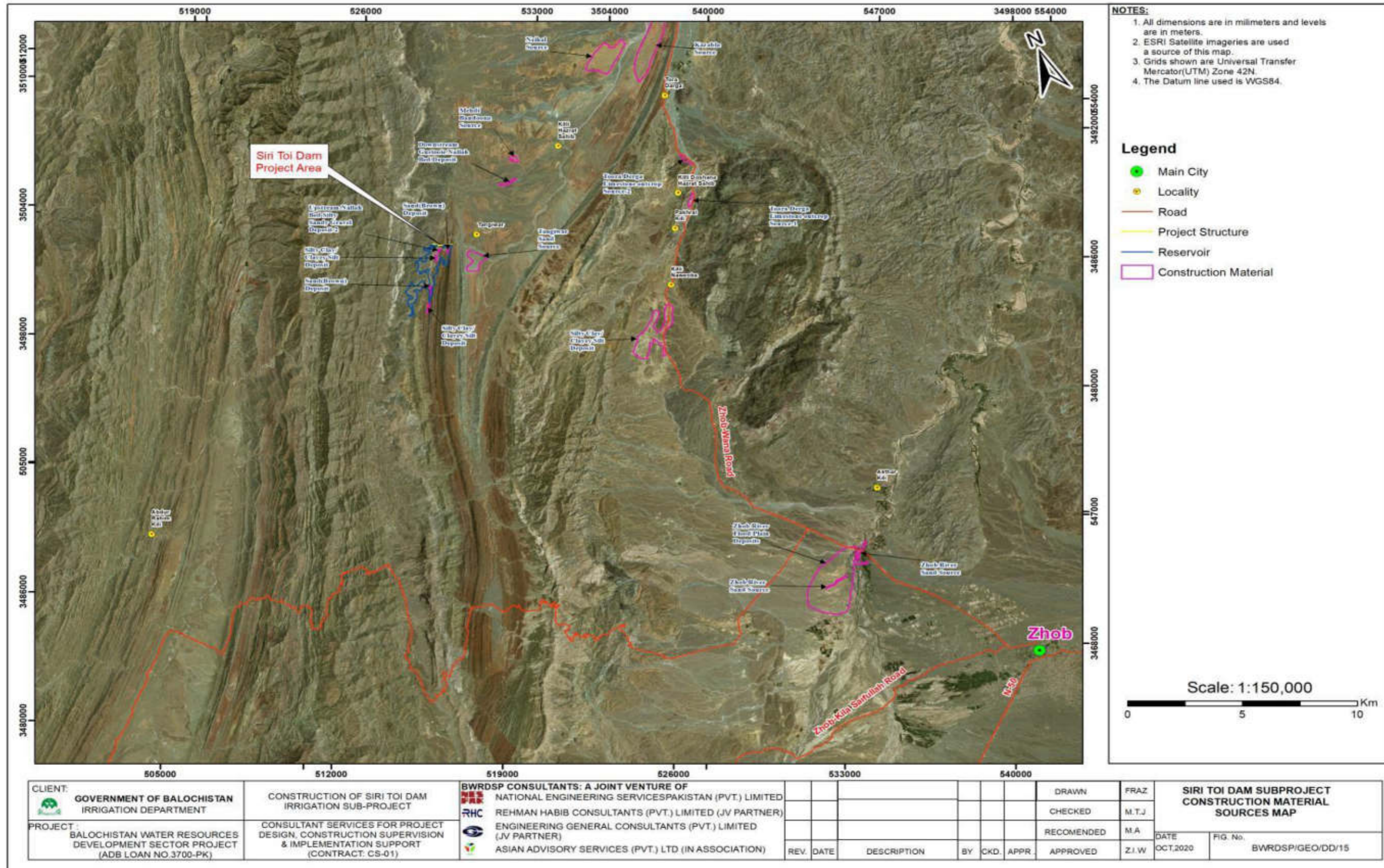


Figure 13: Map showing locations of Construction Material Sources for the Project Area

5.2.2 Topography

245. The Balochistan plateau is located in the south-west of Pakistan with altitudes mainly ranging from 600 – 3010 meters. This is an extensive area of 347,190 km² with a number of distinct natural topographical and drainage features.

246. The Kharan Desert is located in Northeast Balochistan. The desert is in the center of a large empty basin. Topographic map of Balochistan is shown in **Figure 14**.

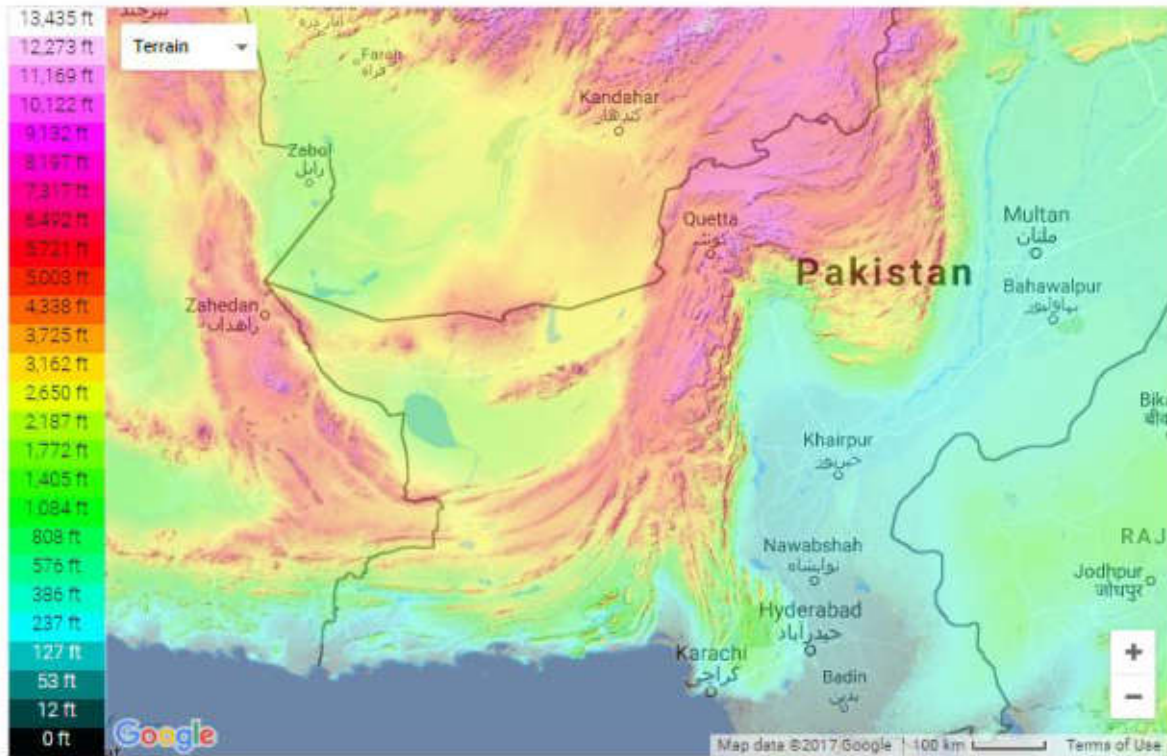
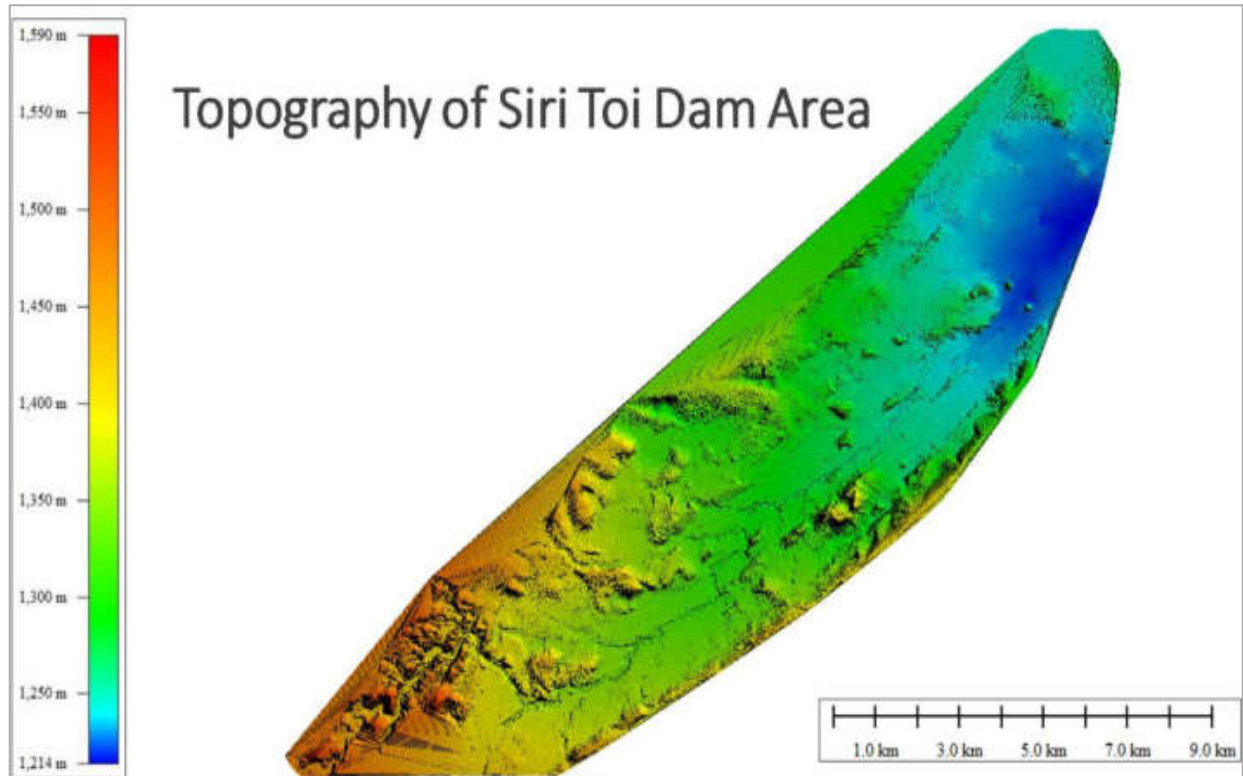


Figure 14 - Topographic Map of Balochistan

247. Sri Toi has several narrow and steep canyons along the main river alignment. Some distance downstream of the proposed dam axis the valley opens wide to a relatively flat area on both sides of the river banks having an average width of around 2-km. Several small and medium height mounds lie in this area that is excluded from the command area. In order to fulfill the irrigation requirement of 30 MCM for the design command area a 66 m high dam was required. Therefore, primarily a location where abutment hills exceeding 66 m was identified. A suitable dam location that would require minimum number of dykes for the reservoir rim was sought which was identified few kilometers upstream of the proposed command area. **Figure 15** below presents topographic profile of Sri Toi Dam area:

Figure 15 - Topographic Map of Sri Toi Dam Area



5.2.3 Hydrology

248. Annual average water availability from the watershed of Sri Toi Dam has been estimated as 27.46MCM using rainfall data of Zhob station (1971-2018). It results in a runoff factor 0.1013. By adding base flow volumes of 4.7MCM, total water availability becomes 32.16MCM.

249. Runoff factor of Gomal river at Kot Murtaza and Khajurikach using data periods (1960-2010) ranges from 0.10- 0.13. Runoff factor for Zhob river is also estimated 0.07 from stream flow records of Sharik Weir on Zhob River using data periods (1976-1985). Sri Toi dam catchment lies in 300-400 mm rainfall zone as per Pakistan Meteorological Department (PMD) mean rainfall map. The average annual rainfall of nearby rainfall station Zhob is also 297 mm. Rainfall frequency analysis gives 10,000-year and PMP rainfalls depths as 163.4mm and 290mm, respectively. Based on this, design floods have been updated as 2,524 m³/s for 10,000-year and 4,891 m³/s for PMP.

250. Catchment area map is shown below.

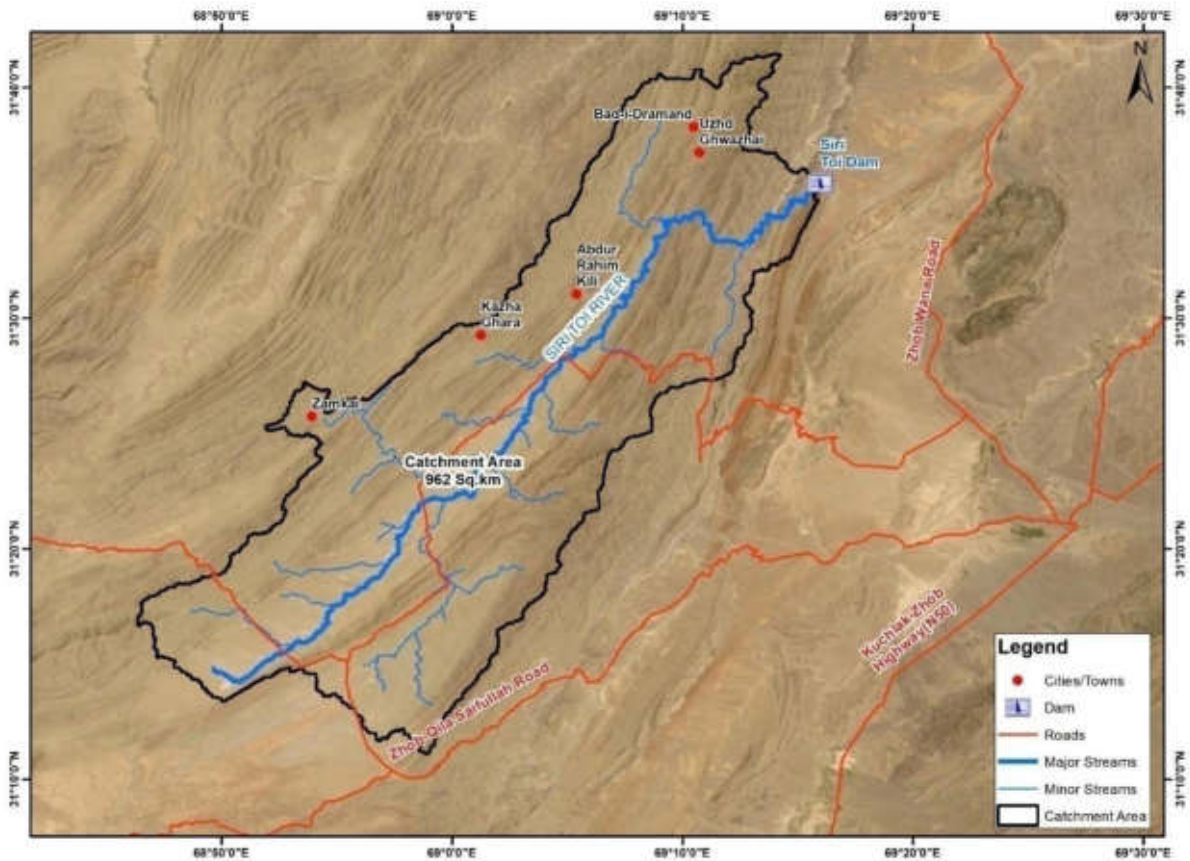


Figure 16: Catchment Area Map of Proposed Siri Toi Dam

□ Water Quality

251. Water quality in Balochistan is variable. Surface water is generally favorable to marginal in case of Hingol river with an average TDS and pH of 159 mg/L and 7.16 indicating good quality for agriculture and for drinking. Also, TDS and pH in Karkh river were 640 mg/L and 7.75 indicating good quality. The groundwater quality in northern parts is generally better than in the southern part of Balochistan. Water samples from tubewells of Quetta division are fit to marginally fit for irrigation (Source: Idris M, Vegetable Seed Farm, Sariab). Groundwater quality in coastal parts has marine influence. The Agricultural Farm at Pasni near the bank of Shadikaur river has no other orchard except salinity tolerant date-palm trees, this is due to saline water having estuarine effect. Groundwater in Balochistan has generally high concentration of fluoride, iron and nitrate in many districts (Source: Shima M, Pakistan Council of Research in water resources, Islamabad). In many cases the HCO_3^- contents are much higher than maximum permissible limit of 244 mg/L for crops, this is because the ions leach out and dissolve in groundwater during weathering of rocks.

252. Groundwater quality as assessed from tubewell water, dugwells and water pumps was generally within permissible limits. However, Sri Toi Manda (surface) and tubewell (ground) waters showed high salinity. Although, no vast soil salinity was observed except in local patches, land levelling is essential to manage root zone salinity. In unlevelled field salts accumulate on high spots. The ground water quality tested in during May 2017 is given in **Table 20**.

Table 20: Summary of Ground Water Quality

S. No.	Source of water	pH	Soluble salts		Cations	Anions		RSC (meq L ⁻¹)	SAR
			EC (dSm ⁻¹)	TSS (mg kg ⁻¹)	Ca + Mg (meq L ⁻¹)	CO ₃ (meq L ⁻¹)	HCO ₃ (meq L ⁻¹)		
1	Sri Toi tube well (ground water)	7.9	1.55	1085	6.3	BDL	4.80	1.5	1.69

BDL=Below Detection Level

253. Surface water stored in depressions during field visits during May 2017 was collected and tested in laboratory. **Table 21** presents result of surface water quality.

Table 21: Summary of Surface Water Quality (2017)

S. No.	Parameter	Units	Sampling Locations			NEQS	WHO
			Wall Site 1	Storage Area	Wall Side 2		
1	Turbidity	NTU	BDL	BDL	BDL	<5NTU	<5NTU
2	TSS	mg/L	BDL	BDL	BDL		
3	TDS	mg/L	2041	1971	1807	<1000	<1000
4	pH @25°C	-	8.15	8.15	8.30	6.5-8.5	6.5-8.5
5	Aluminum (Al)	mg/L	BDL	BDL	BDL	≤0.2	0.2
6	Antimony (Sb)	Mg/L	BDL	BDL	BDL	≤0.005	0.02
7	Arsenic (As)	mg/L	BDL	BDL	BDL	≤0.05	0.01
8	Barium (Ba)	mg/L	BDL	BDL	BDL	0.7	0.7
9	Boron (B)	mg/L	BDL	BDL	BDL	0.3	0.3
10	Cadmium (Cd)	mg/L	BDL	BDL	BDL	0.01	0.003
11	Chromium (Cr)	mg/L	BDL	BDL	BDL	≤0.05	0.05
12	Copper (Cu)	mg/L	BDL	BDL	BDL	2	2
13	Lead (Pb)	mg/L	BDL	BDL	BDL	≤0.05	0.01
14	Manganese (Mn)	mg/L	BDL	BDL	BDL	≤0.5	0.5
15	Nickel (Ni)	mg/L	BDL	BDL	BDL	≤0.02	0.02
16	Mercury (Hg)	mg/L	BDL	BDL	BDL	≤0.001	0.001
17	Selenium (Se)	mg/L	BDL	BDL	BDL	0.01	0.01
18	Zinc	mg/L	BDL	BDL	BDL	5.0	3
BDL = Below detection level							

5.2.4 Seismic Conditions

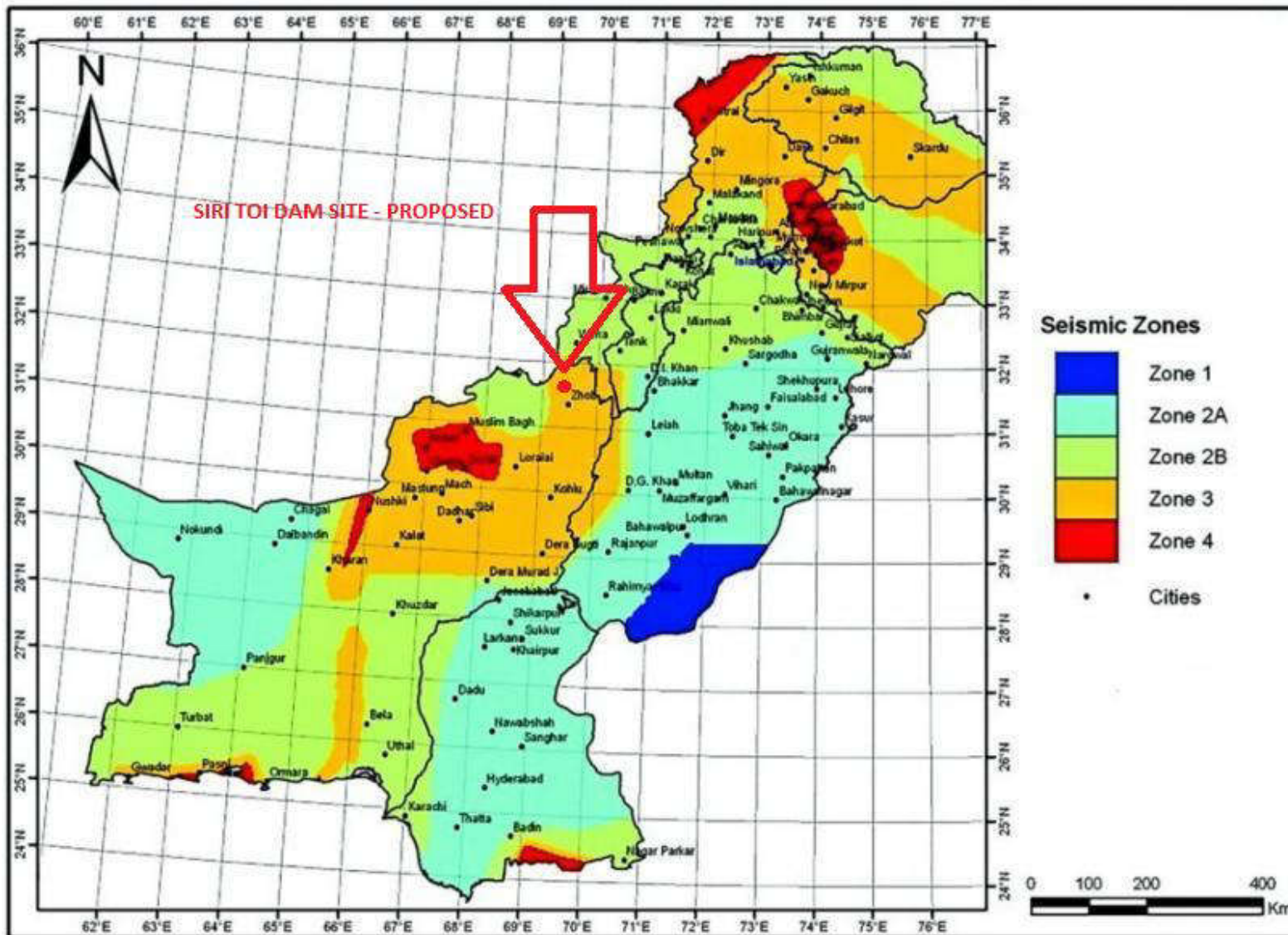
254. The project region is located on the western side of north moving Indian tectonic plate near the transform boundary between Indian and Eurasian tectonic plates, represented by Chaman Fault. The project region has been subjected from moderate to major earthquakes in the past, and therefore it is imperative that a study of tectonic and earthquake history of the region be conducted to determine the realistic seismic hazard of proposed project for the safe seismic design of the project components. Seismic Zoning Map of Pakistan is given as **Figure 17** below.

255. As per information (location of project components & geological site specific map) and the ground verification (of published map-Zhob fault line) with further detail information of fault zone, called 'Zhob Fault (Chukhan Manda Fault)'. Where surface rupturing may occur during an earthquake. It implies that abrupt ground rupture and displacements/ offsets cannot be ruled out during a moderate to major earthquake in future. Furthermore, meeting & discussions were made with Panel of Experts (POE) regarding Seismotectonic (Zhob fault & seismicity) environment of the project region.

256. As a result of detailed study for seismic hazard evaluation for the project (based on the "ICOLD Guidelines Bulletin 148, 2016, seismotectonic setting and local site specific geological information), the conclusions and recommendations, for Siri Toi Dam Subproject area are as follows:

- The main seismotectonic features considered critical for the seismic hazard for the project are as follows:
 - Zhob Fault (Chukhan Manda Fault)
 - Zhob Fault (Shingar Fault)
- The seismic design parameters were defined as per ICOLD guidelines (Bulletin 148, 2016). Both probabilistic and deterministic seismic hazard evaluations were made to determine the expected ground motions at the project site. The Peak Ground Accelerations for the Operating Basis Earthquake "OBE" (145 yrs return period earthquake) and Design Basis Earthquake "DBE" (475 yrs return period earthquake) were estimated based on Probabilistic Seismic Hazard Approach, whereas Safety Evaluation Earthquake "SEE" were estimated based on Deterministic Seismic Hazard Approach, as per ICOLD Guidelines (Bulletin 148, 2016).
- The site condition was taken as rock with average shear wave velocity for top 30 meters (V_{s30}) of 1000 m/sec.
- The recommended horizontal Peak Ground Acceleration (PGA) associated with SEE is 0.57g (84 percentile) based on MCE, as per ICOLD Guidelines (Bulletin 148, 2016).
- The recommended horizontal Peak Ground Acceleration (PGA) associated with DBE is 0.22g.
- The recommended horizontal Peak Ground Acceleration (PGA) associated with OBE is 0.13g.

Figure 17: Seismic Zoning Map of Pakistan



5.2.5 Climate

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

□ Temperature

258. The mean daily temperature ranges from (June being the hottest month) 25.7°C to 29.4°C in the summer season (May to September) and 6.3°C to 9.1°C in winter season (December to February). Mean monthly temperature in June rises to a highest value of 29.4°C and falls to the lowest value of 6.3°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 22** and shown graphically in **Figure 18**.

Table 22: Mean Monthly Temperature in Zhob(2016)

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

Source (Pakistan Meteorological Department)

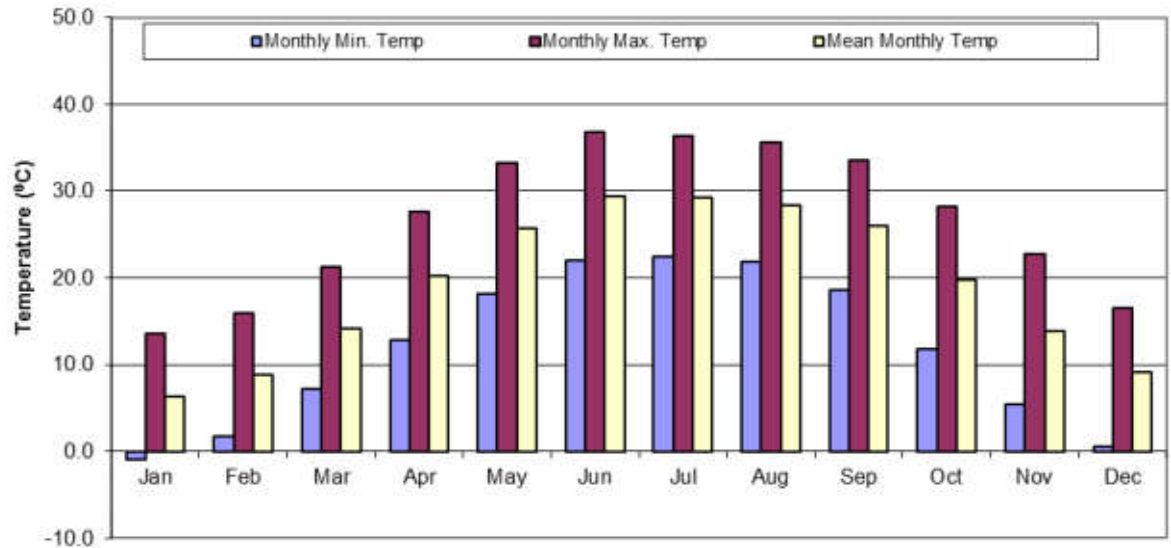


Figure 18: Mean Monthly Temperatures in Zhob

□ Precipitation

259. Mean monthly rainfall data and the number of rainy days recorded at the Zhob Met Station are given in **Table 23**. The average annual rainfall of the area is about 297.3 mm (11.7 inches), while on the average the maximum monthly rainfall is 66.4 mm during the month of July and a minimum of 5.2 mm in October. The maximum rainfall occurs during the months of June to September, which is about 50% of the annual rainfall. Winter rains generally occur during the months of January and February, whereas, October is normally the months with least precipitation. The distribution of average monthly rainfall is shown in **Figure 19** below.

Table 23: Mean Monthly Rainfall in Zhob (2016)

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

Source (Pakistan Meteorological Department)

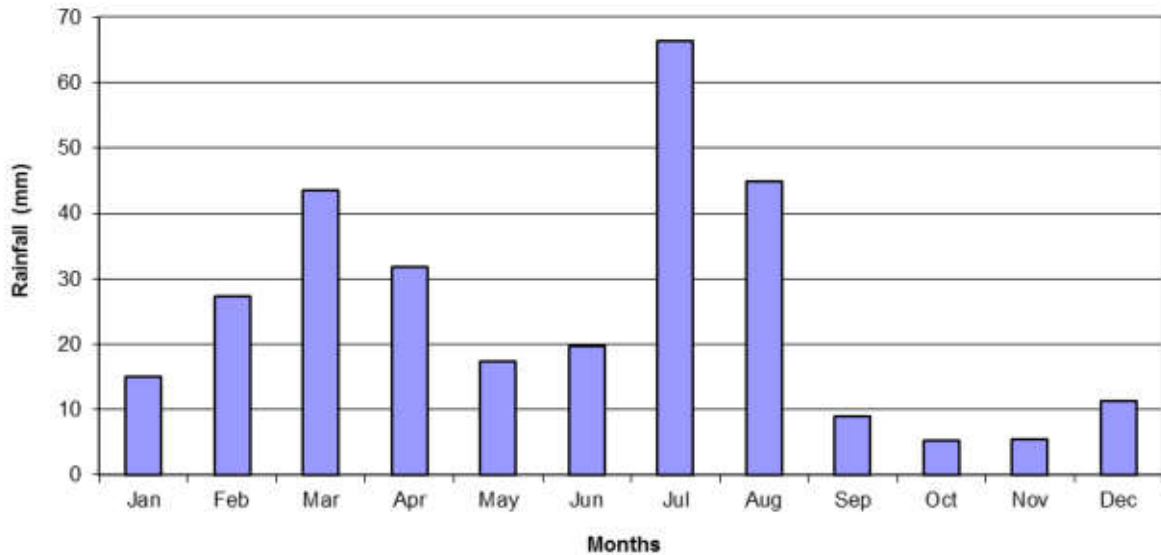


Figure 19: Monthly Distribution of Rainfall at Zhob

□ Relative Humidity

260. 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 24**. At 00:00 hr the relative humidity varies from lowest value of 45.4% in May to highest value of 69.4% in August. At 12:00 hr the lowest value is 16.5 % in May to highest value of 33.7 % in January.

Table 24: Mean Monthly Relative Humidity in Zhob(2016)

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

Source (Pakistan Meteorological Department)

□ Wind Speed

261. The mean monthly wind speed in knots is given in **Table 25**. 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 25: Mean Wind Speed at Synoptic Hours in Zhob(2016)

Month	Mean Wind at Synoptic Hours (Knots)		
	00:00	03:00	12:00
January	0.8	1.2	3.1
February	0.9	1.3	4.3
March	1.3	1.7	5.4
April	1.5	1.8	6.0
May	1.4	1.6	6.0
June	1.3	1.5	5.9
July	1.3	1.5	5.7
August	1.3	1.4	5.1
September	0.9	1.4	4.0
October	1.0	1.0	3.1
November	0.9	1.0	2.6
December	0.9	1.1	2.6

5.2.6 Soils

262. Major part of Balochistan is covered by mountains and stony/gravel terraces. Bolan and Jhal Mangsi districts exceptionally cover large tracts of plain area. The piedmont plain is the major landform in whole area. Due to intricate pattern of vast mountainous tracts influenced by network of many hill torrents, the soils are usually gravelly and shallow. The non-gravelly soils are deep and extensively occur in Quetta valley, Zhob valley, Kachhi plain and the southern districts. The colors of these soils are generally in 10 YR hue which are usually silty to clayey with pH ranging between 7.8 and 8.3. Extensive areas of undeveloped soils occur in Zhob river basin and flooding areas of Basol river, Dasht River and Porali River.

263. The soil of the Sri Toi Dam project area is alluvium material i.e. piedmont alluvium. The piedmont alluvium is nearly level to gently sloping. The top soil is dark brown, moist, silt loam to silty clay loam, slightly sticky, slightly plastic, friable, slightly hard, fine tubular pores, few scattered gravels, and has a clear smooth boundary.

264. The subsurface soil is dark brown to reddish brown in color texture, and has a weak sub angular block structure, sticky, plastic, friable, slightly hard, fine tubular pores, few fine roots, and a clear smooth boundary. The piedmont alluvium is used for limited general cropping, under irrigation and dry farming condition.

5.2.7 Ambient Air Quality

265. Ambient air in the Project Area, is generally clean, because only a few houses were visible in the project areas. There are no industrial setups within the area of influence of the Project Area. Vehicular traffic is absent as well as road infrastructure. Spot monitoring of Suspended Particulate Matter was tested during May 2017 and is given as **Table 26**. The monitoring for SPM was done for a period of **2 hours** as there wasn't any sensitive receptor near the proposed project area. **Table 26** below shows **average 2 hours** results. The proposed project site is a barren site and the nearest village, Kili Hazart Sahib is location about 16 km from the proposed project site. The equipment used for air monitoring is **Hazdust EPAM 5000** and test method is **USEPA PM₁₀, 2.5 method 201a** Lab reports are attached as **Annexure 13**.

Table 26: Results of Ambient Air Quality(2016)

Parameters	Location			NEQS	WHO
	Wall Side 1	Storage Area	Wall Side 2		
Suspended Particulate Matter ($\mu\text{g}/\text{m}^3$)	8	Nil	12	150 (24 hrs. avg)	150 (24 hrs. avg)

Source: Monitored in the Project Area by Laboratory Team.

266. The results presented in **Table 26** clearly depicts that the ambient air quality of the Project Area is clean as the values of all monitored parameters are far below the values of NEQS.

5.2.8 Ambient Noise

267. Ambient noise levels were measured and the **average 2 hours** monitoring results during May 2017 are given as following in **Table 27**. Noise monitoring was done with a type 1 noise meter.

Table 27: Summarized Results of Noise Monitoring (2016)

S. No.	Location	Noise Level dB(A)	NEQS		WHO/IFC	
			NEQS Day Time	NEQS Night Time	NEQS Day Time	NEQS Night Time
1	Wall Side 1	30.1	55	45	55	45
2	Storage Area	<28	55	45	55	45
3	Wall Side 2	<28	50-55	45	55	45

Source: Monitored in the Project Area by Laboratory Team.

268. 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 impact¹⁶. There are no sensitive receptors within the area. The nearest village is Kili Hazrat Sahib which is about 16.5 km from the proposed dam site.

5.3 Biological and Natural Environment

269. Sri Toi refers to an ephemeral stream collecting water from the surrounding mountains and travels almost 62 Kms to meet river Zhob, the surrounding area is dry and arid, when receive rain, it turns in to disaster, instead of benefits, as per estimates the system has the potential of 57 MCM of water covering around 971 km².

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

271. This has been observed during the desk review that only, 11% of resource has been documented and 89 % is still yet to be organized and documented. These possess a major challenge for the team engaged in EIA study. A careful estimate has been made to evaluate the net benefit and it revealed an enhancement in cultivable command area of 4,027 hectares.

272. This would definitely ease the burden on natural ecosystem of the surrounding areas. The dam site is a zonal and represents a rocky base, with patches of stagnant water.

273. The following sections present the current status of the project area vis-à-vis biotic environment. The section is based on extensive literature review, site visits, and interviews with key stakeholders (Forest and Wildlife Departments).

274. Sri Toi is tough terrain to approach, it has numerous rocky undulations, which makes it difficult to reach, this can be assessed by looking at the image of the access route.

¹⁶ http://www.smchealth.org/sites/main/files/file-attachments/651311584receptor_survey.pdf



Access road to proposed dam site



Approaching proposed dam site after meeting with local community



Another view of approach road to proposed dam site

275. Sri Toi like the whole district geography is typical of a mountain eco-system represents a typical pastoral dependence and rain fed agriculture. The habitat of the project area and its surroundings are broadly categorized as Hills, Foothills, plains and stream beds. Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover, mainly comprising of shrubs, no tree species was recorded during the field visit.

5.3.1 Flora

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

Table 28: Major Forest Types in Zhob District

#	Taxon	Vernacular/ English name	Family	Life form	Conservation status
01	<i>Pinus gerardiana</i>	Chilgoza Pine	Pinaceae	Tree	Near threaten
02	<i>Olea ferrugenea</i>	Olive	Oleaceae	Tree	Not assessed
03	<i>Pistacia khinjik</i>	Shina	Anacardiaceae	Tree	Least concern
04	<i>Pistachia cabulica</i>	Uzhgai	Anacardiaceae	Tree	Not assessed

#	Taxon	Vernacular/ English name	Family	Life form	Conservation status
05	<i>Reptonia buxifolia</i>	Gurgura	Sapotaceae	Tree	Not assessed
06	<i>Fraxinus xanthoxyloides</i>	Shang/ Wild Ash	Oleaceae	Tree	Not assessed
07	<i>Prunus eburnean.</i>	Wild almond	Rosaceae	Tree	Not assessed
08	<i>Periploca aphylla</i>	Barara	Ascalpidaceae	Shrub	Not assessed
09	<i>Prunus creasus</i>	Anang	Rosaceae	Shrub	Not assessed
10	<i>Scorzonera mollis</i>	Arghuch	Asteraceae	Shrub	Not assessed
11	<i>Datura fastuosa</i>	Datura	Solanaceae	Shrub	Not assessed
12	<i>Narium odorum</i>	Gandarae	Apocynaceae	Shrub	Not assessed
13	<i>Othonnopsis intermedia</i>	Gangu	Asteraceae	Shrub	Not assessed
14	<i>Sophora griffithii</i>	Ghuzera	Fabaceae	Shrub	Not assessed
15	<i>Allium sphaerocephalum</i>	Injaora	Alliaceae	Shrub	Not assessed
16	<i>Zizyphora clinopolioides</i>	Maurai		Shrub	
17	<i>Phragmites communis</i>	Nal	Gramineae	Shrub	Least concern
18	<i>Withania cougulans</i>	Khamazurgae	Solanaceae	Shrub	Not assessed
19	<i>Malcolmia africana</i>	Khatol	Brassicaceae	Shrub	Not assessed
20	<i>Caragana ambigua</i>	Makhi	Fabaceae	Shrub	Not assessed
21	<i>Eremurus aucheriana</i>	Shezgae	Aspholpdiaceae	Shrub	Not assessed
22	<i>Plantago ovata</i>	Shkanpara	Plantigenaceae	Shrub	Not assessed
23	<i>Haloxylon griffithii</i>	Shorae	Amarantheaceae	Shrub	Not assessed
24	<i>Artimesia meritima</i>	Tarkha	Asteraceae	Shrub	Not assessed
25	<i>Rhazya stricta</i>	Urgalama	Apocynaceae	Shrub	Not assessed
26	<i>Achillea santolina</i>	Zawala	Asteraceae	Shrub	Not assessed
27	<i>Peucedanum sp.</i>	Ragholae	Apiaceae	Shrub	Not assessed
28	<i>Panicum colonum</i>	Rakhpatti	Poaceae	Grass	Not assessed
29	<i>Tullipa stellata</i>	Sanda	Liliaceae	Shrub	Not assessed
30	<i>Lactuca sp.</i>	Sandreza	Asteraceae	Shrub	Not assessed
31	<i>Daphne oleoides</i>	Malaghunae	Thymelaeaceae	Shrub	Not assessed
32	<i>Nannorrhops ritchiana</i>	Mazari	Arecaceae	Shrub	Not assessed
33	<i>Dodonea viscosa</i>	Sanatha	Sapindaceae	Herb	Not assessed
34	<i>Chrysopogon aucheri,</i>		Poaceae	Grass	Not assessed

#	Taxon	Vernacular/ English name	Family	Life form	Conservation status
35	<i>Sorghum halepense</i>	Barau	Poaceae	Grass	Introduced
36	<i>Heteropogon contortus</i>	Barwaza	Poaceae	Grass	Not assessed
37	<i>Poa bulbosa</i>	Margha	Poaceae	Grass	Not assessed
38	<i>Typha angustifolia</i>	Lukha	Typhaceae	Shrub	Not assessed

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

□ Topographic distribution of vegetation

277. Vegetation zones of the district consist mainly of the following categories:

Table 29: Vegetation Zones of Zhob District

Vegetation Zone	Floristic composition
Hills	Olive (<i>Olea ferrugenea</i>), Blue pine (<i>Pinus gerardiana</i>), Shina (<i>Pistacia khinjik</i>), Uzhgai (<i>Pistachia cabulica</i>), Gurgura (<i>Reptonia buxifolia</i>), Shang/ Wild Ash (<i>Fraxinus xanthoxyloides</i>), Wild almond (<i>Prunus eburnean</i>), etc.
Foothills	Olive (<i>Olea ferrugenea</i>), Phulai (<i>Acacia modesta</i>), Sanatha (<i>Dodonea viscosa</i>), Gymnosporia spinosa, Ber (<i>Zizyphus nummularia</i>), Khamazurgae (<i>Withania cougularans</i>), Khatol (<i>Malcolmia africana</i>), Makhi (<i>Caragana ambigua</i>), Shezgae (<i>Eremurus aucheriana</i>), shkanpara (<i>Plantago ovata</i>), Shorea (<i>Haloxylon grifithii</i>), Tarkha (<i>Artimesia meritima</i>), Urgalama (<i>Rhzya stricta</i>), Zawala (<i>Achillea santolina</i>), Pamangi (<i>Boucea rosia aucheriana</i>), Raghbolae (<i>Peucedanum sp.</i>), Rakhpatti (<i>Panicum colonum</i>), Sanda (<i>Tillipa stellata</i>), Sandreza (<i>Lactuca sp.</i>), Malaghunae (<i>Daphne oleoides</i>), and Mazari (<i>Nannorrhops ritchiana</i>).
Plains and Stream beds	Commonly found in the entire district where <i>Tamarix sp.</i> and <i>Saccharam sp.</i> are commonly found.

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

□ Rangelands

278. The type of rangeland present in the district is classified as Suleiman Mountain Ranges. It has species like: *Stipa pennata*, *Pennisetum orientalis*, *Chrysopogon aucheri*, and *Cymbopogon sp.* etc. The productivity is good with average productive capacity of 250 kg /hectare. The rangelands in the district belong to communities living around them. Due to

communal ownership, usually these are accessible to all members of the community and also to nomads passing through the area on their traditional routes of migration to new areas.

279. Photographs of few floral and faunal representatives are given as **Annexure 14**.

280. Habit wise vegetation distribution at Sri toi attached as **Table 30**.

Table 30: Habitat wise vegetation distribution at Sri Toi

Vegetation Zone	Floristic composition
Hills	Bare
Foothills	Alhagi maurorum, Cympopogon sp, Chrysopogon sp
Plains and Stream beds	Narium oleander, Tamarix sp, Cympopogon

5.3.2 Fauna

□ Wildlife

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

282. As the floristic composition of the project area suggests a marginal condition for other life forms to support. This has been supported by the fact that most of the people living in the surroundings of project area has pastoral dependence. They left the area as the existing ecosystem lost its capacity to cater the need of other life forms.

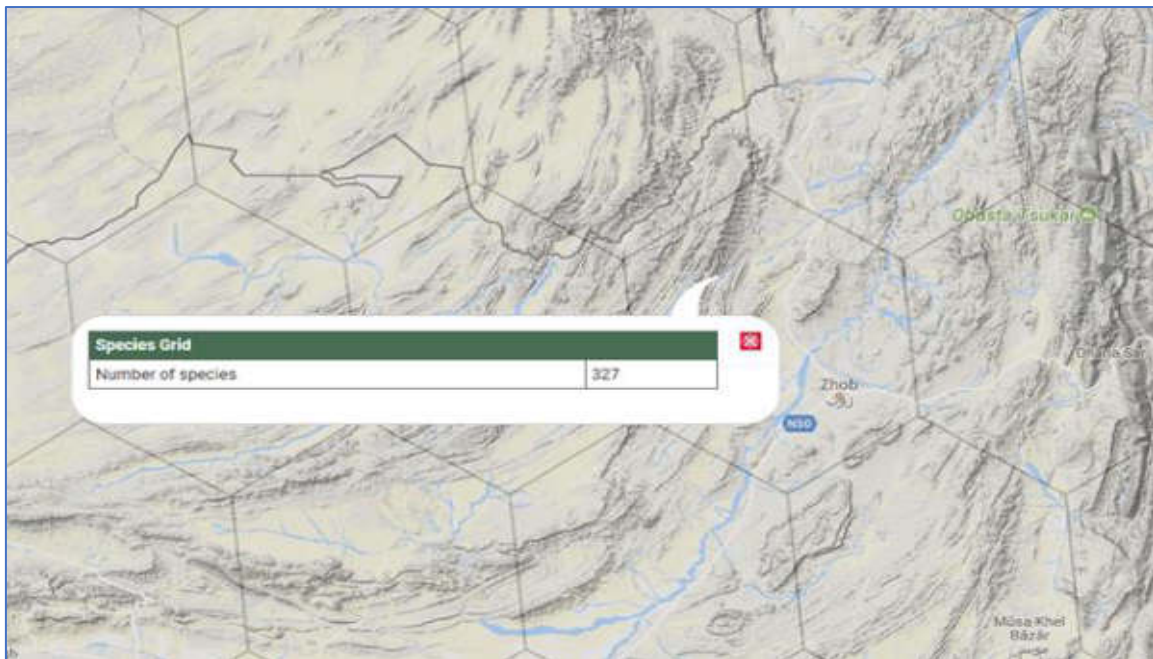
283. This has also reflected on the wildlife reported from the area, the ecosystem represents variation in its carrying capacity with the variation in seasonal change. As listed above, there was a marginal diversity and quantitative representation of flora, not offering much to attract other life forms.

284. No comprehensive data set was prepared for the faunal composition in Zhob district and as such no census report was available regarding status of key wildlife species in the district. Sri Toi represents an ephemeral system; therefore, it does not offer a consistent condition for aquatic life to flourish, therefore no aquatic fauna was listed.

285. The above-mentioned situation did not provide clear picture of fauna in the project area. Therefore, baseline faunal survey was carried out. Following are the justifications for performing baseline faunal survey:

- Not enough secondary data (related with faunal attributes) is available for the project area to make a sound judgement about the presence / absence of fauna;
- In the EIA study the faunal data is based on interview with local people which needs to be verified in field through spot sampling; and
- The IBAT database, shows 327 fauna and flora species in the area including VU species (Please refer to the **Figure 20**). This information can be interpreted as “possible occurrence”, i.e. have the same level of reliability as the data obtained from the local population.

Figure 20: IBAT Database VU Species



- Lastly, the expected arrival time of migratory birds in the area is November.

□ 1 st Round of Survey

286. Baseline faunal survey was based on spot monitoring for five days. The methodology to execute the survey is presented below:

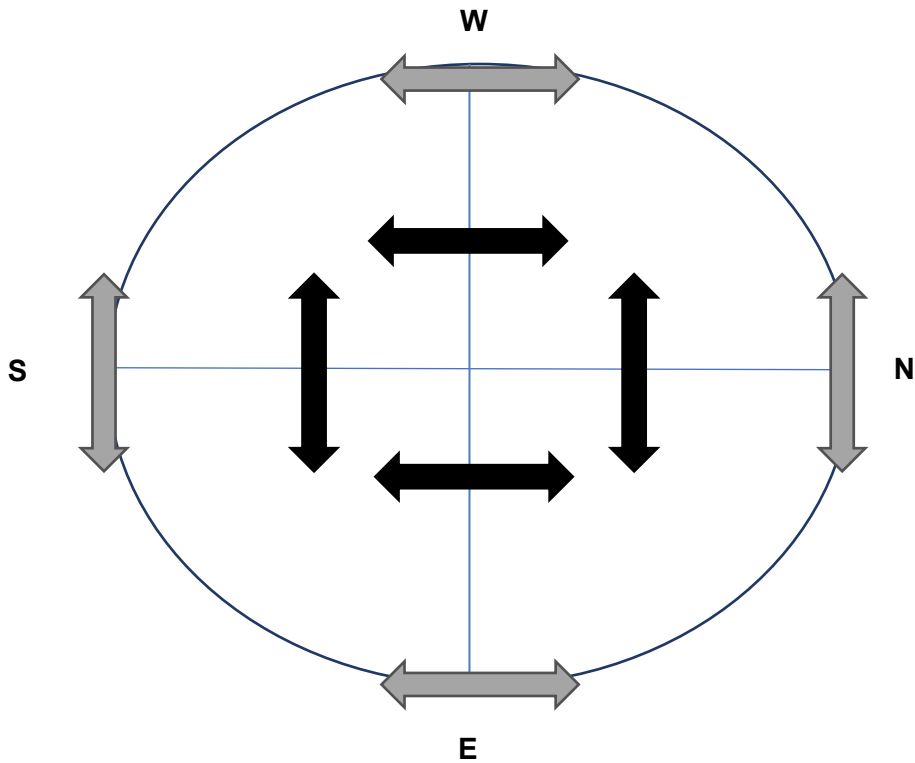
- **Methodology for Faunal Survey**

287. The faunal survey is based on spot sampling. A circumference of 2 kms from the proposed dam site was surveyed in four (4) dimensions, i.e. North, South, East and West. Two (2) sampling points were marked at each side thus making a total of eight (8) sampling points.

288. Each sampling point would be undertaken by a transect walk of 100 meters, and list the faunal composition for Mammals and Birds only on either side of transect, using

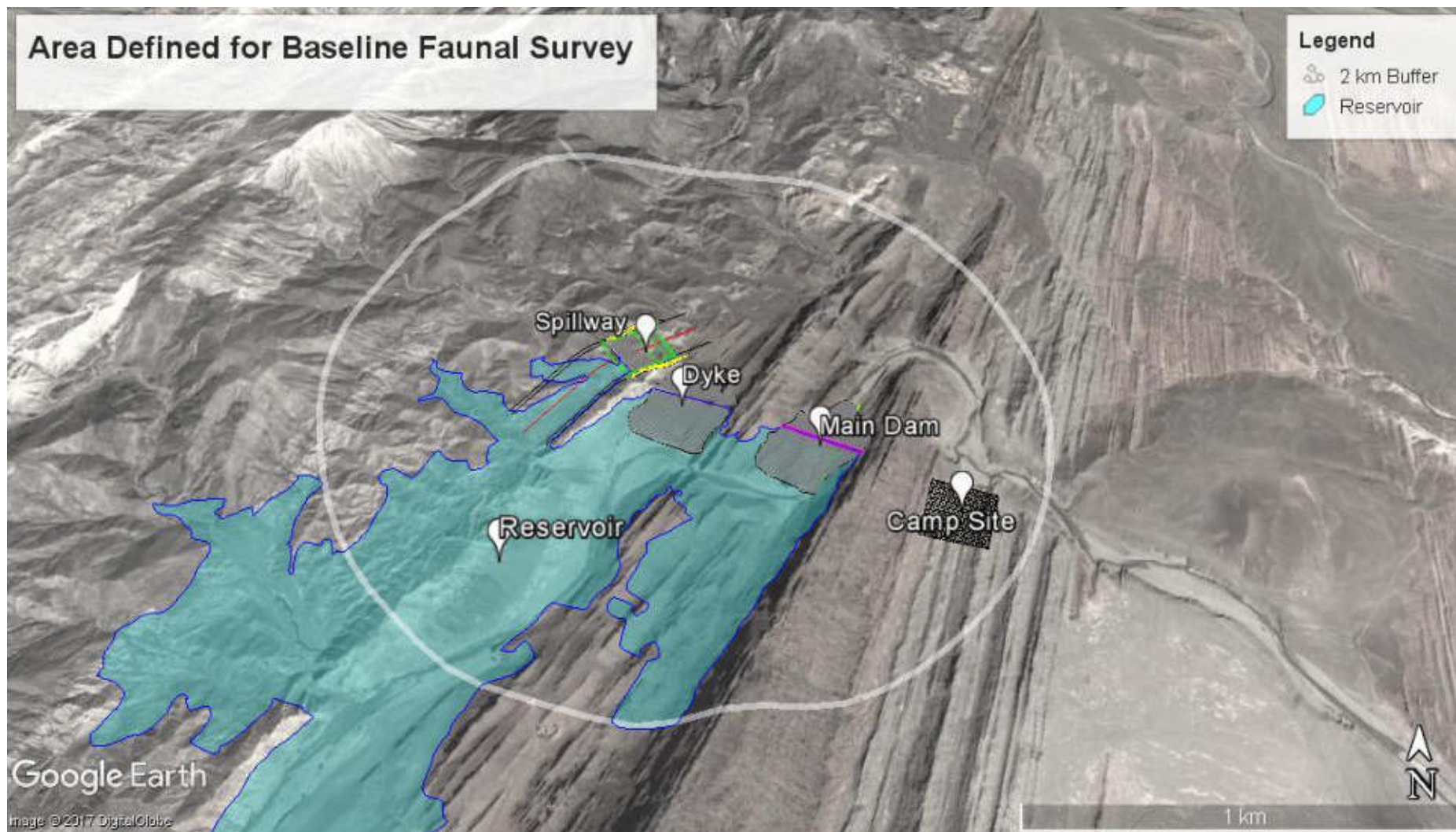
appropriate tools and equipment (GPS, binoculars, cameras and spot scope). This study would be qualitative, spot representative and does not reflect the seasonal variability of the ecosystem, since it's early winter in the project area which theoretically is the time for amphibians and reptiles to undergo hibernation, therefore, amphibians and reptiles is not included in the faunal survey.

Sampling Spread in circumference of 2 kms, 1 km on each radius



289. **Figure 21** presents defined area where faunal survey was carried out.

Figure 21: Area Defined for Baseline Faunal Survey



290. The survey is qualitative in nature and would represent spot composition of the fauna for the area sampled. The field activity was carried out in 5 days. The faunal survey was conducted during 1st week of November 2017, as it coincided with the arrival time of migratory birds in the area. Moreover, the weather conditions were also manageable during this period.

- **Findings of Faunal Survey**

291. Through interviews, direct sightings and evidences, recorded the occurrence of a total Seven mammal species (Table 31), of which we confirmed the occurrence of 3 species fox, wolf and Hyena through direct evidences like (pug marks, pelts, faces, territory marking signs and interviews with local residents. The Balochistan Black Bear, Suleiman Markhor and Afghan Urial, which was reported to occur in the past, are now apparently extinct.

292. During recent field visits, no changes noticed in Fauna of the project as per discussion with local communities.

Table 31: List of Mammal Species in Sri Toi Area

S. No.	Common Name	Zoological name	Local Name
1	Suleiman Markhor	<i>Capra falconeri jerordeni</i>	Ghar sanay
2	Common leopard	<i>Panthera pardus</i>	Prang
3	Fox	<i>Vulpes</i>	Gedara
4	Wolf	<i>Canis lupus</i>	Leva
5	Afghan Urial	<i>Ovis orientalis vignei</i>	Sezha
6	Asiatic steppe wild cat	<i>Felis silvestris</i>	Spilmai Gedara
7	Hyena	<i>Hyaena</i>	Kazhabal

- **Small Mammals**

293. Cape hare was found very common in the entire area during survey. A total 07 Cape hare were counted during the survey.

- **Carnivores**

294. For the determination of population status of carnivores, nights walks were arranged. In the plains the survey team used vehicle and search lights. After seeing the eyes of carnivores in high powerful lights, noted the eye colors and consulted the literatures. In foothills, used search light in same way. One Indian gray wolf, 2 red fox, 3 Asiatic jackals and one Indian Crested Porcupine were sighted. While indirect observations were made on the droppings, foot prints of several carnivore species such as stripped hyena, Jungle cat, afghan hedgehog, Caracal and Indian gray wolf. Skin of Panther observed in a house, using for prayers.

- **Resident and Migratory Birds**

295. Direct sight techniques like ground nests searching and stand watch techniques were used for this survey. 16 species of birds observed in the area (**Table 32**). Chakoor and Seese partridges were found very common throughout the area. The birds were mostly observed near water points. 2 small flocks of Chakoor and see partridges were observed in the area. Hunters to trap eagles were observed on three different locations with hunting materials.

Table 32: List of birds sighted during survey

Common Name	Scientific Name
Chukar	<i>Alectoris chukar</i>
See-see Partridge	<i>Ammoperdix griseogularis</i>
Eurasian Griffon	<i>Gyps fulvus</i>
Eurasian Sparrowhawk	<i>Accipiter nisus</i>
Demoiselle Crane	<i>Anthropoides virgo</i>
Rock Pigeon	<i>disambiguation</i>
Eurasian Collared Dove	<i>Streptopelia decaocto</i>
Spotted Sandgrouse	<i>Pterocles senegallus</i>
Common Buzzard	<i>Buteo</i>
Common Swift	<i>Apus</i>
Common Kingfisher	<i>Alcedo atthis</i>
Green Bee-eater	<i>Merops orientalis</i>
Hoopoe	<i>Upupa epops</i>
Crested Lark	<i>Galerida cristata</i>
Common Rock Thrush	<i>Monticola saxatilis</i>
Rock Bunting	<i>Emberiza cia</i>

Table 33: People Who Contributed

S. No.	Name	Profession
1	Saeedullah Khan	Sociologist
2.	Muzaffar Khan	Field Biologist
3.	Mayen Khan	Zoologist
4.	Naqeebullah Khan	Field Coordinator

- Reptiles**

296. The survey team observed lizards in six different locations. At one location hunted Afghan Tortoise shell was observed. Many snake species are reported from the area. Due to hibernation period, no snake species observed in the present survey while 2 lizard species observed in the survey, Clif rcer (*Coluber rhodoracus*) and Agama (*Agama spp.*) are available in everywhere. Baseline Faunal Survey Report of Sri Toi Dam Area attached as **Annexure-30**.



❑ 2nd Round of Survey

• Terrestrial Survey Methodology

297. The second round of terrestrial survey was carried out in three main zones (upstream, down stream, proposed command area, proposed right irrigation channel, left irrigation chennal and outside of the project area along Wana road to Zhob and hill many stream beds of Torkhar. Terrestrial biodiversity data was collected from different sampling points including upstream, dam pond area and its sounding hills. From dam structure along the Sri Toi River Tangiwar, Tangiwar Khar, Usman Khail, Sashri stram, Dona nkhal, Salwata and Shahidano nkhal in south part through river. Killi Hazarat, Murgha Lkai to Killi Hazrat Check post, Wana road cross in proposed project command area and outside of project area including Tordarga Nkhal, Karchar River, Karchar Irrigation scheme and different locations of Zhob River also searched out.

298. Reptile species were recorded from the study area during early dawn and dusk in low sunlight. Many diurnal reptiles such as skinks and some lizards are active after sunrise whereas nocturnal reptiles such as certain snakes and geckos active only at night. Hence, both nocturnal spotlight search and diurnal plot search in different locations of project area and buffer zone were conducted. Other wildlife groups including mammals and birds were also recorded at these sampling sites. Large mammals including Jackals were observed during night survey in Killi hazarat area as well as while driving back from Wana road to Zhob. Wild boar and wild cat physical marks were identified from wet area of Zhob river. Further data was rectified by community focus group discussion and data acquired from Wildlife department, IUCN and WWF. Moreover, stone turning practice was used for collecting reptile and small mammal species.

299. Water birds such as waders, and other wetland birds were recorded in dawn and dusk watch by the help of binoculars and spotting-scope. For recording wildlife field data by the help of different equipment's like binocular, DSLR camera and some video record where needed, hand notes were also taken, Information from local people was also gathered through Focus Group Discussions (FGD's). Passerine and non-passerine birds were identified by techniques such as their call signs and songs.

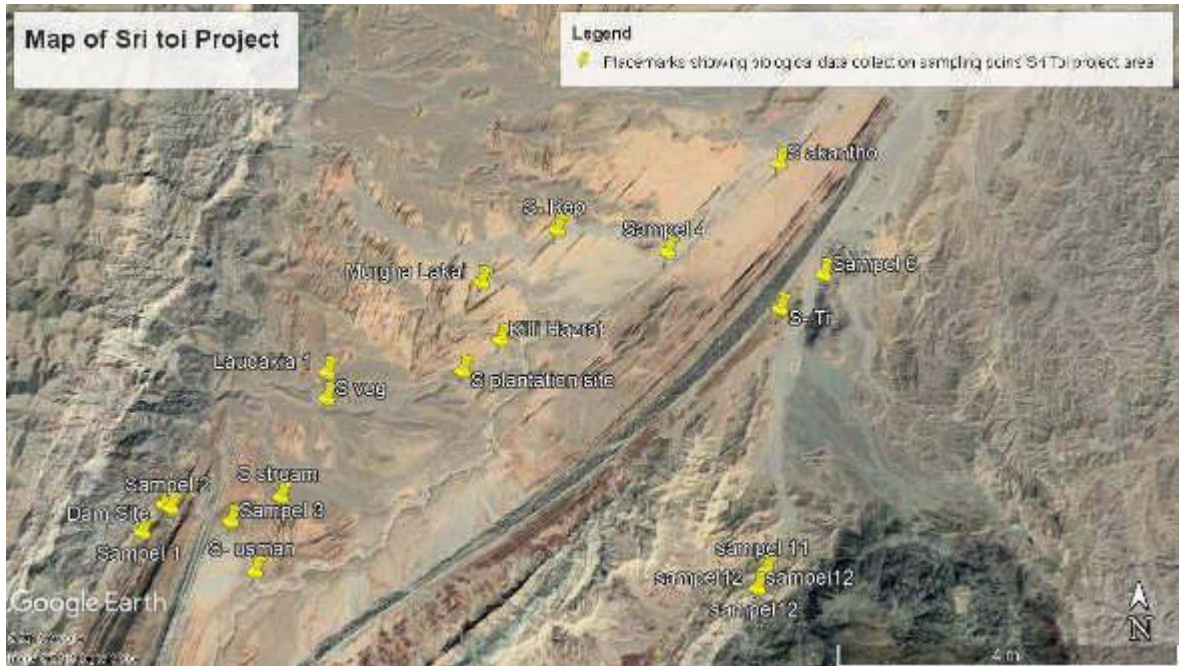
300. Physical marks/signs such as impression of body, tail or footprints, fecal pellets, tracks, dens or nests in the Project area. Indicator species and habitat type helped to identify the species like any group of Insects population in specific area indicating predator species (reptiles, flycatchers, green beater, bats and hedgehog). Foot prints, feeding signs, droppings were also recorded for identification of animals. This method is effective for small and large mammal surveys. Secondary data sources including Birds of Pakistan, Mammals of Pakistan, Hrpetafauna, Authors (Richard Grimmit, Salom Ali, TJ Robirt, Shrif Khan, Salim Ali etc) were also consulted for this purpose.

301. Following items were used while carrying out the terrestrial survey:

- Binoculars,
- Spotting scope,
- Handset GPS,
- DSLR Camera,
- Measuring Tapes,
- Sticks, (10x2 meter)
- Fine nets (2 in number),
- 10 buckets for setting pitfall trap
- Hock,
- Snake clutch,
- Zip-able polybags,
- Jars,
- Sherman traps,
- Bait materials, and
- Colored ribbons

302. The sampling location map is provided in Figure 22.

Figure 22: Sampling Locations for Second Terrestrial Survey



- **Survey Findings**

- **Floral Attributes**

303. The proposed dam site area is located in tobakakari range. The climate is arid and subtropical, and the area has relatively better rainfall (both in winter and monsoon seasons) than in other parts of the province. Vegetation type is scrub forest. The trees and woody shrubs are sparsely scattered mainly confined to gorges and edges of ephemeral streambeds. Although, the vegetation shows sign of preserved area and some species have exhibited remarkable capacity of regeneration especially, *Acacia modesta*, *Pistacia khinjuk*, *olea ferrugiana* and *Ziziphus nummerulia*.

304. The dominant plant species found on rangeland are *Withania coagulans*, *Peganum harmala*, *Hordium murinum*, while rugged area have scattered wood forest including *Pistacia khinjak*, *Olea ferrugina* and *Pinus gerardiana* trees found very limited hill tops, and gorges and valleys have *Nerium oleander*, *Tamarix indica*, *Tamarix aphylla*, *Saccharum* and other grass species found on the edges of streams. Aquatic plant species found in wet areas in Sri Toi and Zhob has bunch of *Typha* cover.

305. List of floral attributes is provided in Table 34.

Table 34: List of floral Attributes

S.No.	Scientific Name	Local Name	Family
1	<i>Artemisia meritima</i>	Terkha spera	Atracerae
2	<i>Alhagi maurorum</i>	Zoz	Fabaceae
3	<i>Acacia modesta</i>	Palosa	Mimosaceae
4	<i>Berberis Sp.</i>	Zarlog	Berberidaceae

S.No.	Scientific Name	Local Name	Family
5	<i>Calatropis procera</i>	Spalmai	Asclepiadaceae
6	<i>Chenopodium album</i>	Tor sag	Chenopodiaceae
7	<i>Cocculus pendulus</i>	Parwatee	Menispermaceae
8	<i>Convolvulus arvensis</i>	Bachakai	Convolvulaceae
9	<i>Cymbopogon Jawarancusa</i>	Sargarhai	Gramineae
10	<i>Dalbergia sissoo</i>	Tali	
11	<i>Ephedra intermedia</i>	Parar oman	Ephedraceae
12	<i>E. procera</i>	Nari oman	Ephedraceae
13	<i>Heliotropium Sp.</i>	Lashta	Boaganaceae
14	<i>Hordium murinum</i>	Washa	Gramineae
	<i>Heteropogon contortus</i>	Barwaza	Gramineae
15			
16	<i>Haloxylon griffithii</i>	Shori	Chenopodiaceae
17	<i>Lactuca orientalis</i>	Sandraza	Astraceae
18	<i>Malva neglecta</i>	Cherhya biscut	Malvaceae
19	<i>Malcolmia Africana</i>	Khatool	Brassicaceae
20	<i>Olea ferrugina</i>	Zaitoon	Oleaceae
21	<i>Periploca aphylla</i>	Bararha	Asclepiadaceae
22	<i>Poa bulbosa</i>	Washa	Gramineae
23	<i>Nerium oleander</i>	Jaor	Apocynaceae
24	<i>Prosopis juliflora</i>	Maskat	Mimosaceae
25	<i>Tamarix indica</i>	Ghaz	Tamaricaceae
26	<i>Typha angustifolia</i>	Lukha	Typhaceae
27	<i>Withania coagulans</i>	Khamazora	Solanaceae
28	<i>Ziziphus nummularia</i>	Karkan	Rhamnaceae
29	<i>Peganum harmala</i>	Kisan kur	Zygophyllaceae
30	<i>Tamarix aphylla</i>	Gaz	Tamaricaceae
31	<i>Pinus gerardiana</i>	Zanghozae	Pinaceae
32	<i>Pistacia khinjak</i>	Shna	Anacardiaceae

❑ Faunal Attributes

Mammals

306. During the field survey conducted in June 2018, 16 mammalian species including 7 large mammals and 9 small mammal species were recorded from different micro habitats and indirect sources. 4 species including Afghan Pica (*Ochotona rufecens*), Persian Jird (*Meriones persicus*), Afghan hedgehog (*Hemiechinus auritus*) and Kuhl's Bat (*Pipistrellus kuhlii*) recorded by direct sighting from different sites of study area. 5 species including Indian wild boar, Asiatic Jackal, Cape hare, Indian Porcupine and Balochistan Gerbil were identified by its physical marks and indirect source. From the recorded species, 2 mammal species are insect feeding (Insectivore), among them 2 species are belong to Grain eating (Granivore), 7 grass feeding animal (Herbivore) and 5

animal belong to Meat eating (Carnivore) group. No endangered species were found during the survey. 13 recorded species are least concern (LC), Royal high mountain vole (*Alticola roylei*), Suliman Markhor (*Capra falconeri Jerdoni*) and Pallas cat (*Otocolobus manul Pallas*) are listed as Near Threatened (NT) species by IUCN red list.¹⁷

307. Ecological balance depends on prey and predator relationship, and by population of species controlled by its predator. In the past due to human interference and introduction of modern guns, carnivore animals (e.g. Leopard, Wolf) were killed and exorcized from the project area. It was also observed that the population of Indian Porcupine and other rodents has increased. Porcupine is very difficult to hunt. As Common Leopard is active hunter of this animal, therefore absence of Leopard has resulted in a significant increase in the Porcupine population. The same is also considered as agricultural pest animal.

308. Formerly Straight-horned Markhore, Afghan Urial were also found frequently on hilly areas, but with the passage of time now they have confined to very selective areas with minimal numbers. Common leopard was the big cat carnivore specie which has now become extinct from the area. Major cause of wildlife degradation is habitat degradation and fragmentation by anthropogenic activities, road access and other food scarcity.

309. Most of the mammalian species were recorded near the water source namely Tangiwar stream, agriculture form-land, near villages and along Zhob River sites. In the evening, Bat species was found frequently flying over surface of river. Source of water in form of river harbor a variety of wildlife. Growing insect population nourishing small mammal and reptile population provide food source to large carnivore species like Jackal and foxes. The mammalian species were identified during the survey by its physical marks and body impressions in wet areas in the study area. Nocturnal surveys were also arranged to determine population status of carnivores within the project area. Various vehicles and equipment such as search lights were also used for this purpose. Appropriate literature was consulted to identify the species after observing the eyes of carnivores in high powerful lights. 1 red fox, 2 Asiatic jackals and one Indian Crested Porcupine were directly sighted. While indirect observations were made through droppings, and footprints of several other carnivore species such as stripped hyena, Jungle cat, afghan hedgehog.

310. List of mammals recorded from the project area and surroundings is provided in Table 35.

Table 35: List of Mammals

Mammals								
Sr. No	Order	Common Name (English – Pashto)	Scientific Name	Source information			Conservation status by IUCN red list	Feeding behavior
				Direct sighting	Indirect/physical mark	Secondary data /local information		

¹⁷ This is based on secondary data. None of these species (with NT status) were directly sighted during the survey.

1	Artiodactyla	Sulaiman Markhor/Uz	Capra falconeri Jerdoni			√	NT	HRV
2		Indian wild boar	Sus scrofa		√	√	LC	HRV
3	Carnivor	Pallas Cat/ Deri Poshok	Otocolobus manul Pallas			√	NT	CAV
4		Wolf/ Levo	Canis lupus			√	LC	CAV
5		Jackal/ Shagal	Canis aureus				LC	CAV
6		Red Fox/Geydarh	Vulpes vulpes			√	LC	CAV
7		Blanford's Fox/ Salmi gidar	Vuloes cana			√	LC	CAV
8	Lagomorpha	Cape Hare/ Khersuy	Lepas capensis		√		LC	HRV
9		Afghan Pika /Muza	Ochotona rufecens	√			LC	HRV
10	Rodentia	Indian Porcupine/ Scon	Hystrix indica		√		LC	HRV
11		Royal high Mountain vole	Alticola roylei			√	NT	HRV
12		Parsian Jird	Meriones persicus	√			LC	HRV
13		Balochistan Gerbil	Gerbillus nanus		√		LC	GRV

14		Indian Gerbil	Tatera indica			√	LC	GRV
15	Insectiv or a	Afghan Hedge Hog/ Jeshgay or Scow	Hemiechinus auritus	√			LC	INV
16	Chiropter a	Kuhl's Bat/Chamra	Pipistrellus kuhlii	√			LC	INV
<p>HRV = herbivore</p> <p>CRV = carnivore</p> <p>INV = insectivore</p> <p>NT = near threatened</p> <p>LC = least concern</p>								

Birds

311. A large group of bird species migrate from South Pole using Indus flyway through Balochistan Province. The Province is also the getaway of Siberian bird migration. International boundary from Sulaiman range, Tobakakar range up to Chaghai desert is entry point to winter visitors. But considerable population of bird remains throughout the year in the local area. These include garden birds like Warblers, Babblers, Larks, buntings, Tits and Finches etc. The activities of birds are highly seasonal and are influenced by the variation of weather even on a daily basis. However, bird inventory could be divided in to two seasons (migratory and non-migratory) seasons. Species compassion vary with both summer and winter. Resident and local birds were mostly observed during the field survey of the project area.

312. Orchards and agriculture field along the valley of Tor Darga-nkhal area and wet areas of far downstream of Sri Toi River where water is available and marginal areas of Zhob provide excellent feeding roosting and breeding of local resident birds. While rangeland near Killi Hazarat and Killi Zavi area potential habitats for Crested Larks (*Galerida cristata*), Black Redstart (*Phoenicurus ochruros*), Rainbow Bee-eater (*Merops ornatus*) and Rock Pigeon (*Columba livia*).

313. A total of 52 bird species were identified during this survey. These include 40 resident birds, 8 migratory and 4 partially migrant bird species recorded from different locations of project area. Majority of recorded avian species are local and having a "least concern: (LC) status as per IUCN red list. However, Bearded vulture and Eurasian Black Vulture has a "Near to threatened" (NT) status whereas, Black partridge has a "Vulnerable" (VU) status as per IUCN red list²². Some partially migrant (waders) species including Sand piper, stint, and Green shank were also observed along the Zhob River during the field survey. Other species including Riven, Eurasian starling and Golden eagle were also observed on sky near Tngiwar and Nakai Murgha area. Species richness among the group of passerine and non-passerine is of equal ratio. Vulture species have become very rare from the region, while Magpie and Eurasian Roller population is quite satisfactory.

Species including Common Myna, Tree Sparrow, Swift and Martin were also recorded in the cultivated areas. Starling is migratory bird species, which visits this area in the month of November in significant number. They feed on Juniper and pistachio seeds.

314. Bird diversity is quite low due to the long drought and human made disturbance including over grazing, agriculture practices, over harvesting of wild plant species, and regular nomad movements. The area is also characterized by semi-arid zone with food scarcity as the limiting factor, which plummets the fauna as well as flora of the area. Most of these birds are commonly found in different habitats within the project area. However, few species can be categorized as very rare and have importance in conservation context including Bearded Vulture, Black Vulture, Golden Eagle and Crane. These species need high degree of conservation efforts.

315. List of bird species recorded from study area is provided in Table 36.

Table 36: List of Avifauna

S/N	Common Name	Scientific Name	Birds			Conservation status by IUCN	Occurrence
			Source of information				
			Direct sighting	Indirect/p hysical mark	Secondary data /local		
1.	Bearded Vulture	<i>Gypaetus barbatus</i>	√			NT	Resident
2.	Black-throated Accentor	<i>Prunella atrogularis</i>			√	LC	Resident
3.	Black-throated Thrush	<i>Turdus ruficollis atrogularis</i>			√	LC	Resident
4.	Bluethroat	<i>Luscinia svecica</i>			√	LC	Resident
5.	Demoiselle crane	<i>Grus virgo</i>		√		LC	Migratory
6.	Chukur Partridge	<i>Alectoris chukar</i>			√	LC	Resident
7.	Eastern Rock Nuthatch	<i>Sitta tephronota</i>	√			LC	Resident
8.	Chestnut-breasted Bunting	<i>Emberiza stewarti</i>				LC	Resident
9.	Chukar Partridge	<i>Alectoris chukar</i>		√		LC	Resident
10.	Common Kestrel	<i>Falco tinnunculus</i>		√		LC	Resident
11.	Common Raven	<i>Corvus corax</i>	√			LC	Migratory
12.	Common Swift	<i>Apus apus</i>	√			LC	Resident
13.	Crested Lark	<i>Galerida cristata</i>	√			LC	Resident

14.	Dark-grey Tit	<i>Parus rufonuchalis</i>			√	LC	Resident
15.	Eurasian black Vulture	<i>Aegyptius monachus</i>			√	NT	Migratory
16.	Eurasian collared Dove	<i>Streptopelia decaocto</i>	√			LC	Resident
17.	Eurasian eagle Owl	<i>Bubo bubo</i>			√	LC	Migratory
18.	Eurasian Wryneck	<i>Jynx torquilla</i>			√	LC	Migratory
19.	European Nightjar	<i>Caprimulgus europaeus</i>		√		LC	Resident
20.	European Roller	<i>Coracias garrulous</i>	√			LC	Resident
21.	European Starling	<i>Sturnus vulgaris</i>		√		LC	Migratory
22.	Golden Eagle	<i>Aquila chrysaetos</i>	√			LC	Resident
23.	Great grey Shrike	<i>Lanius excubitor</i>	√			LC	Resident
24.	Great Tit	<i>Parus major</i>			√	LC	Resident
25.	Greater short-toed Lark	<i>Calandrella brachydactyla</i>	√			LC	Resident
26.	Green Warbler	<i>Phylloscopus trochiloides</i>	√			LC	Migratory
27.	Hume's Lark	<i>Calandrella acutirostris</i>			√	LC	Resident
28.	Isabelline Shrike	<i>Lanius isabellinus</i>			√	LC	Resident
29.	Isabelline Wheatear	<i>Oenanthe isabellina</i>		√		LC	Resident
30.	Laughing Dove	<i>Stigmatopelia senegalensis</i>	√			LC	Resident
31.	Long-billed Pipit	<i>Anthus similis</i>			√	LC	Resident
32.	Magpie	<i>Picapica</i>	√			LC	Resident
33.	Mistle Thrush	<i>Turdus viscivorus</i>		√		LC	Resident

34.	Oriental Skylark	<i>Alauda gulgula</i>			√	LC	Resident
35.	Pied Bushchat	<i>Saxicola caprata</i>				LC	Resident
36.	Red-breasted Flycatcher	<i>Ficedula parva</i>	√			LC	Resident
37.	Red-headed Bunting	<i>Emberiza bruniceps</i>			√	LC	Resident
38.	Rock Pigeon	<i>Columba livia</i>	√			LC	Resident
39.	See-see Partridge	<i>Ammoperdix griseogularis</i>		√		LC	Resident
40.	Black partridge	<i>Melanoperdix niger</i>	√			VU	Resident
41.	Tree Sparrow	<i>Passer montanus</i>	√			LC	Resident
42.	Black redstart	<i>Phoenicurus ochruros</i>	√			LC	Resident
43.	White-cheeked Bulbul	<i>Pyconotusleucogenys</i>	√			LC	Resident
44.	red-wattle lapwing	<i>Vanellus indicus</i>	√			LC	Resident
45.	Common Greenshank	<i>Tringa nebularia</i>	√			LC	Partially migrant
46.	Sandpiper	<i>Tringa ochropus</i>	√			LC	Partially migrant
47.	Long-toed Stint	<i>Calidris subminuta</i>	√			LC	Partially migrant
48.	Eastern Yellow Wagtail	<i>Palau</i>	√			LC	Resident
49.	Rainbow Bee-eater	<i>Merops ornatus</i>	√			LC	Resident
50.	Northern Waterthrush	<i>Parkesia noveboracensis</i>	√		√	LC	Resident
51.	Griffon Vulture	<i>Gyps fulvus</i>			√	LC	Migratory
52.	Long-legged Buzzard	<i>Buteo rufinus</i>			√	LC	Partially migrant

NT = near threatened
VU = vulnerable
LC = least concern

Reptiles

316. The activities of reptilian fauna are highly seasonal and are influenced by the variation of weather even on a daily basis due to their ectothermic and cryptic nature. The survey may bring very fruitful result in the monsoon (July and August) and comparatively warmer seasons as they more active in these months.

317. Amphibians are usually most active just after dusk during their breeding season. Many diurnal reptiles such as skinks and some lizards are active in mid-morning, whereas nocturnal reptiles such as certain snakes and geckos would be active only at night. Among these group *Laudakia melanura melanura*, *Laudakia nupta*, *Acanthodactylus* and *Bufo stomaticus* are the most common species found in hard and harsh conditions. These species have a wide distribution ranging from Sulaiman range to Coastal belt. Tortoise species found throughout the range is seasonal. This specie can also be easily encountered in cultivated areas and marginal bushy areas.

318. According to M. A. Batur, the described reptile and amphibian of Baluchistan Province consist of about 100 species. These are mostly a blend of Palaearctic and oriental elements. Whereas, the reptilian species recorded in Pakistan is about 195. The most commonly observed reptiles were *Agama* species recorded from Killi Hzarat to Sri Toi track and Murgha Lakai command area of dam.

319. Several of the micro habitats of study zones were scanned for the observation of Herpeto-fauna including stream beds, of Tangiwar, Killi lbrhima, Killi Hazarat and proposed command area of Sri Toi dam. Most of *Laudakia* species recorded from stony area near Killi Hazarad, two species Desert monitor lizard and *Laudaki Nupta* were recorded near wet area in Tordarga-nkhal, Persian spider gecko (*Agamura parsica*) is an endemic specie found basking on rock, while heading to the Dam site.

320. There are various techniques to develop inventory of Herpeto-fauna. Pit-fall is a very effective technique especially for recording nocturnal species. Due to limitation of time, techniques related with plot search, stone turning and active search were used to determine presence of various reptilian species within the project area. Moreover, nocturnal plot search was also carried out with the help of suitable equipment (e.g. torches etc.). Presence of the species was also confirmed through FGD's with locals as well by consulting secondary data sources and literature review.

321. A total of 21 species of reptiles and amphibians were recorded from the project area during the survey. 18 Genras among 10 families from reptiles including 2 families and 2 genras of amphibians were identified. Gecko Species including *Bunopus tuberculatus*, *Crossobamon lumsdenii* and *Cyrtopodion scabrum* were recorded during dusk. Afghan tortoise (*Testodine*

horsfieldii) reported in the area were also observed during the survey. None of the recorded species is endangered as per IUCN Red List.

322. List of reptiles and amphibians recorded from the study area is provided in Table 37.

Table 37: List of Reptile and amphibian species collected/observed

Reptiles and Amphibians									
Sr. No	Common Names	Scientific Names	Family	Source of information			Activity behavior	CITES list	Endemism
				Direct sighting	Indirect/physical mark	Secondary data /local information			
Reptilia: Sauria (Lacertilia)									
1.	Tuberculated Rock Gecko	<i>Bunopus tuberculatus</i>	Gekkonidae	√			NC	Non CITES	
2.	Lumsden's Fringe-toed Gecko	<i>Crossobamon lumsdenii</i>	Gekkonidae	√			NC	Non CITES	
3.	Keeled Gecko	<i>Cyrtopodion scabrum</i>	Gekkonidae	√			NC	Non CITES	
4.	Spider gecko	<i>Agamura persica</i>	Gekkonidae	√			NC	Non CITES	Endemic
5.	Brilliant Ground Agama	<i>Trapelus agilis agilis</i>	Agamidae	√			DU	Non CITES	
6.	Ocellate Ground Agama	<i>Trapelus megalonyx</i>	Agamidae	√			DU	Non CITES	
7.	Black Rock Agama	<i>Laudakia melanura melanura</i>	Agamidae			√	DU	Non CITES	
8.	Large-scaled Rock Agama	<i>Laudakia nupta</i>	Agamidae				DU	Non CITES	
9.	Caucasian Rock Agama	<i>Laudakia caucasia</i>	Agamidae	√			DU	Non CITES	
10.	Indian Fringe-toed Sand Lizard (Blue-tailed)	<i>Acanthodactylus cantoris</i>	Lacertidae	√			DU	Non CITES	

11.	Lesser Reticulated Desert Lacerta	<i>Eremias acutirostris</i>	Lacertidae	√			DU	Non CITES	Endemic	
12.	Transcaspiian Desert Monitor	<i>Varanus griseus caspius</i>	Varanidae	√			DU	Non CITES		
	Reptilia: Serpentes								Non CITES	
13.	Cliff Racer	<i>Platyceps rhodorachis</i>	Colubridae			√	NC	Non CITES		
14.	Diadem snake	<i>Spalerosophis diadema</i>	Colubridae			√	NC	Non CITES		
15.	Dhaman- (Rate snake)	<i>Ptyas mucosus</i>	Colubridae	√			DU	App.II		
16.	Sochurek's Saw-scaled Viper	<i>Echis carinatus sochureki</i>	Viperidae		√		NC	Non CITES		
17.	Labatine's viper	<i>Vipera libetina</i>	Viperidae			√	NC	Non CITES		
18.	Tartary Sand Boa	<i>Eryx tataricus speciosus</i>	Boaidae		√	√	NC	App.II		
19.	Afghan tortoise	<i>Agrionymus horsfieldii</i>	Testodine			√	DU	Non CITES		
	Amphibians								Non CITES	
20.	Bufo toad (marbled toad)	<i>Bufo bufo</i>	Bufoidae	√			NC	Non CITES		
21.	Skittering frog	<i>Euphlyctiscy anophlyctis</i>	Microhylidae	√			NC	Non CITES		
NT = near threatened VU = vulnerable LC = least concern DU = diurnal NC = nocturnal										

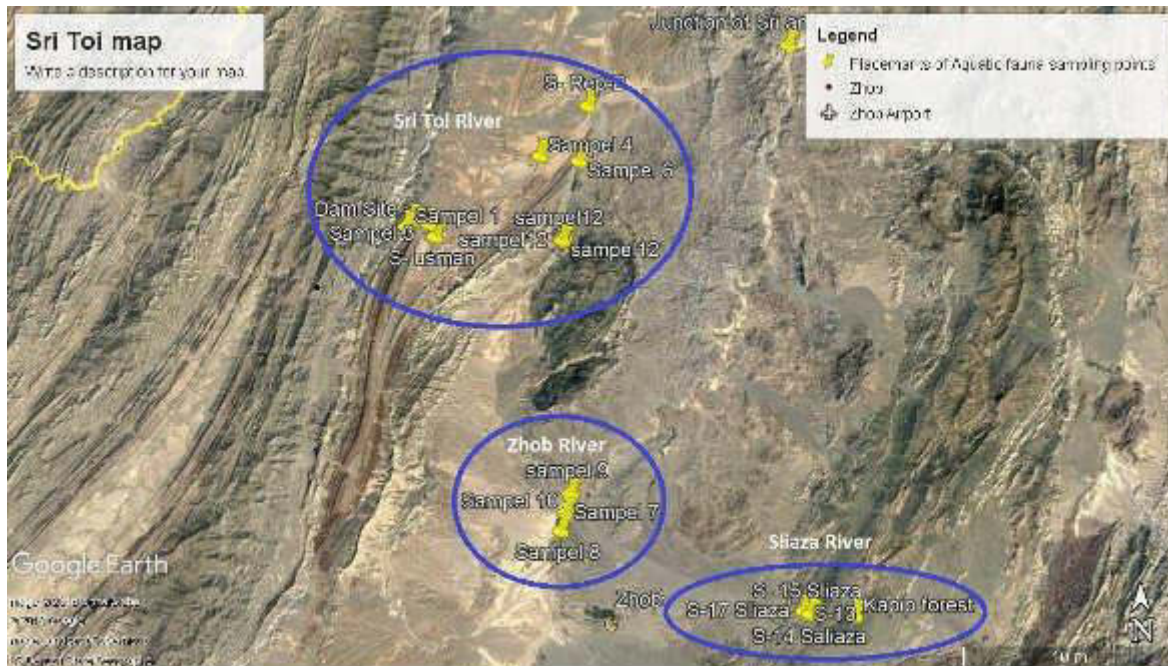
Detailed survey results related with terrestrial environment are provided in Annexure-30.

Aquatic Survey Methodology

323. Sampling for aquatic survey was done from Sri Toi River near the proposed dam site, Tangiwar, one sample was collected from upstream of Sri Toi River up to check post, other samples from Irrigation schema channel, Tordarga, Zhob River and Saliaza River.

324. Fishes were collected using various types of nets of different mesh sizes. Gillnet, drag net, cast net and scoop net was used to collect the aquatic fauna. The collected specimens were photographed and frozen for later examination. The fishes were identified with standard keys including Fishes of the Punjab (Mirza and Sandhu, 2007), Inland fishes of India and adjacent countries (Talwar and Jhingran, 1991) and Freshwater fishes of the Indian Region (Jayaram, 1999).

Figure 23: Aquatic Survey Sampling Locations



325. The following items were used for carrying out the aquatic survey:

- Cast net;
- Sein net;
- Fish hooks;
- fish lines;
- Insect net;
- Ropes;
- Bamboos;
- Buckets;
- Zip-able plastic bags; and
- Icebox.

326. Moreover, items such as handbooks, reference books, permanent board marker, pencils, clip board, maps/charts digital camera for recording specimens were also used during the survey.

327. The species collected during the present study are categorized into three; those occurring in Zhub River at proposed dam site. Streams collecting water from mountainous area are finally connected to each other and prenal spring water of Slaza reiver which is flowing from East to west and joining the Zhub River at Wana road bridge point. It is evident that fish fauna in upstream and downstream are almost similar which represent to be different from composition as observed by Hasan et al. (2015). This may be mainly seasonal changes that may affect species composition. Moreover, aquatic fauna in the springs of Sri Toi Project Area and Zhub River was observed to be

quite different. These include species such as *Systemus serrana*, and *Labeo bata* which have been reported for the first time from the River Zhob and *Mastacembelus Armatus* were observed to have colonize the in pools and isolated water along the Zhob river. In addition, Mozambique tilapia (*Oreochromis mossambicus*) was also collected from the Saliaza tributary of Zhob River.

328. Table 38 provides list of fish species recorded from the project area and its surroundings during the aquatic survey. As can be seen from the table, a total of 17 fish species were recorded from the project area and surroundings.

Table 38: Aquatic species collected from water bodies found in Zhob River, Sri Toi, and Saliaza during the Aquatic Survey.

S. No.	Scientific Name	Common Name	Local Name	Remarks
1	<i>Barilius modestus</i>	Baril	Chilwa	
2	<i>Barilus pakistanicus</i>	Pakistani Beril	Chilwa	
3	<i>Labeo microphthalmus</i>	Fringed-lipped peninsula carp	Rohel, Chitru	
4	<i>Puntius ticto</i>	Ticto barb	Dabbal; Chidu,	
5	<i>Labeo dyocheilus</i>	Brahmaputra labeo	Butal, Nugari	
6	<i>Mastacembelus armatus</i>	Tiretrack eel	Booan, Vahm, Guj, Groj Mar mahi	
7	<i>Salmophasia bacaila</i>	Large razorbelly minnow	Oothi, Pharbadur, Pharbadan	
8	<i>Glyptothorax punjabensis</i>	Pubjab catfish	Sulemani, Pahari khagga	
9	<i>Schizocypris brucei</i>	Waziristan snowtrout	Waziri	
10	<i>Botia birdi</i>	Birdi loach	Cheeta Machhli, Botia	
11.	<i>Botia lohachata</i>	Reticulate loach	Cheeta Machhli, Botia	
12	<i>Schistura pakistanica</i>	Pakistani loach	Sundali	Endemic
13	<i>Schistura punjabensis</i>	Punjab loach	Loalak, Singhat, Sundal, Sundali	
14	<i>Cyprinion watsoni</i>	Indus lotak	Botchee, Boassa, Sehrgoar	
15	<i>Oreochromis mossambicus</i> (Peters, 1852)	Mozambique tilapia	Tilapia	Exotic
16	<i>Euphlyctis cyanophlyctis</i>	Skittering frog	Changashak	
17	<i>Bufo stomaticus</i>	Marbeld toad	Changashak	

329. Since the species reported to occur in the River Zhob are mainly those species which inhabits mountainous areas of Balochistan and have adjusted to living in conditions such as those under fast running water. Whereas, the water in the dam is stagnant, therefore, only those species which can thrive deep waters as compared to shallow flowing water (like that of Zhob River) should be introduced in the the dam reservoir area.

Endemism and Species of Special Concern

330. The endemism in freshwater fauna is of great importance in Zhob River, it is suitable area for endemism and speciation. According to Mirza Zoogeographic setting of River Zhob make it possible for the speciation resulting in endemism. *Clupisoma naziri* was described by Mirza and Awan (1973). It is reported from Viahla, Mina Bazar, Narazai, Laka band and Ghosa in District Zhob (Kakarabdullahzai et al, 200; Mirza and Naik, 1969; Mirza et al, 1995b). Although this species is also known from sub mountainous area of the Khyber Pakhtunkhwa, Punjab, Azad Kashmir and Balochistan but it seems to be more abundant in Zhob River and its tributary.

331. *Naziritor zhobensis* (Mirza, 1967). Originally described as *Tor zhobensis* from Zhob River basin, Pakistan by Mirza (1967). This species has restricted distribution in rivers of northern Balochistan and southern Khyber Pakhtunkhwa but primarily this species endemic to the River Zhob and its tributaries. *Schistura arifi* Mirza and Banarescu, 1981 Described from Zhob City on Zhob River, Balochistan by Mirza et al (1991). This species is endemic to the River Zhob.

332. *Schistura pakistanica* (Mirza & Banarescu, 1969) was described from the Zhob River drainage (Froese and Pauly, 2002, Mirza et al, 1969, 1981). It was originally described as *Noemacheilus pakistanicus* from Muslimbagh (formerly Hindubagh). This is another species which is restricted distribution in the River Zhob.

333. During the current aquatic survey, only one endemic species (i.e. *Schistura pakistanica*) was recorded. The same along with other fish species (i.e. *Cyprinion watsoni*, *Schistura punjabensis*) were sampled from Tangi shadin, Tordarga and Karcher springs. These springs are almost perennial flowing round the year. These fishes are quite small in size, (6 - 10 cm, reference fishbase.org data). The sampling locations of the above mentioned fish species are marked in Figure 24.

Figure 24: Sampling Locations of Endemic and other fish species



334. As can be seen from the above figure, these fish species (including the endemic specie) were found from nearby springs draining into the Sri Toi River. Owing to their smaller size, the fishes can adapt well in small impoundments, and springs. Moreover, they can also survive under sub-surface flow conditions. However, these are unlikely to survive in large water bodies (such as rivers) due to higher chances of getting captured and eaten up by other bigger fishes. This was also evident during the aquatic survey as none of the endemic species were recorded at any other sampling locations. Hence, it is highly unlikely that any of the endemic species can be found at either the proposed dam site or at other locations within the Sri Toi River.

335. Detailed survey results related with aquatic environment are provided in Annexure- 30.

❑ Comparison of the Two Surveys

336. Ecological baseline data collected as part of the two surveys has remarkable difference in species composition, species richness and methodology adopted for collecting baseline information. Number of faunal species recorded as part of first ecological survey (November 2017) was quite low, with only 7 species of mammals, and 16 avian species.

337. Moreover, Herpeto-fauna checklist was not included in the report. Furthermore, aquatic species were not recorded due to unavailability of water in Sri Toi River at the proposed dam site.

338. During the field survey conducted in June 2018, 32 plant species were recorded from different micro habitats of the study area. Moreover, 16 mammal species, 52 bird species, 15 reptile species, and 2 amphibian species were also recorded during this field expedition. Lastly Aquatic species including 17 freshwater fish from 11 Genras were also recorded.

339. Significant difference in number of recorded species during these two surveys can be due to the following reasons:

- Baseline study conducted previously (November 2017) was spread over a relatively smaller area. Methodology adopted for collecting species data was limited at proposed dam site area, and in a buffer zone of two kilometers around the dam site. Species were collected from 8 sampling locations. The species were mostly recorded through plot search and by interviewing locals.
- Floral and faunal attributes were recorded from a relatively larger area during the recent survey (June 2018). Data on different species was collected from 23 sampling locations. Terrestrial species were collected 4 km upstream of dam site, from streambed as well as from a 20 km long stretch (from dam structure to its tail) and from project command area. Moreover, many bird and reptile species encountered from roadside were also included in the checklist. Zhob River is a hub of biodiversity hotspot, avian species lived in large home range. Many of birds found from this area are also included in the checklist. Various methods were adopted for species search including plot search both (Nocturnal/Diurnal) walk, identifying physical marks of animals, stone turning to locate small species (reptiles, small mammals).
- During recent survey, aquatic fauna (fish) species were recorded from 33 sampling locations including upstream of dam, dam pond site, downstream end of the Sri Toi River,

Irrigation scheme sites Karcher springs, and Saliaza river sites. Furthermore, different types of nets including Seine net, Cat net, small dredge nets were also used for collecting fishes. Other techniques such as active search and stone turning were also used for this purpose.

- The survey in 2017 was conducted under dry conditions with no water availability at the proposed dam site. Whereas, the survey in 2018 was conducted under wet conditions with water available at many locations including Sri Toi River. Moreover, the project area received heavy rainfall during the survey carried out in 2018. This provided an opportunity for fish species to get mobilized especially at the proposed dam site location. As a result, terrestrial species also got active during this survey.

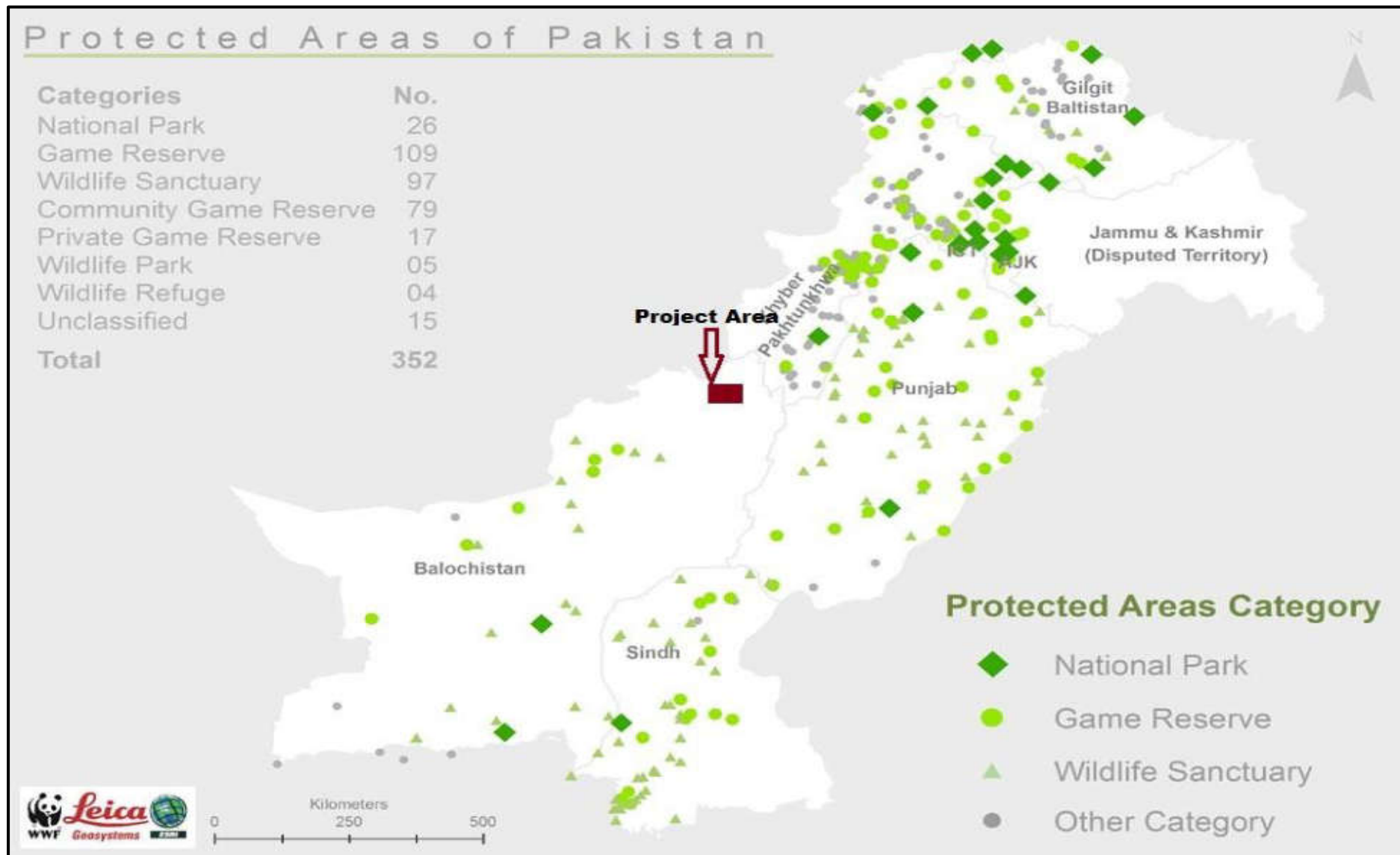
Wetlands

340. Sabakzai Dam, Zhob River, Wasta Dam, and Chakhon are important wetlands in the district. Among these Sabakzai Dam has been constructed recently. No study has been conducted yet for its potential as wetland and its resident and migratory/visiting species but it is anticipated that this lake will become an important wetland in the years to come. Wasta Dam is an important stop of migratory cranes. The Zhob River, throughout its length, is an important wetland for resident and winter visiting species.

Ecosystem Sensitivities

341. There are no notified protected areas present in the project vicinity. Approximately more than 200 km south of the project area is Tor Ghar Community Game Reserve in District Qila Saifullah game reserve. Figure 21 gives clear picture of the area ecosystem sensitivities:

Figure 25: Protected Area Map



5.4 Socioeconomic Profile

342. The total population of Zhob District according to 1998 census was 193,458 persons (105319 males 54.44% and 88139 females 45.56%) whereby; its projected population as of 2010 was 240,486 (132267 male and 108219 female) based on the 2.28% growth rate (Census 1998). The urban population is 23% and rural population is 77%. The household size accordingly was averaged as 8 dwelling in 34,294 housing units.

343. Despite being one of the oldest districts of the province, the district is underdeveloped. Poor and inadequate social infrastructure, less communication channels and public utilities, compared to other districts of Balochistan are the major reasons for low pace of development of the district, let alone the inadequate health facilities and in-sufficient education facilities. Only 70% percent of the population of Zhob district has access to clean drinking water and 62% has access to improved sanitation facilities (MICS 2010). The population is generally poor and due to high malnutrition, poor living conditions, inadequate health care facilities, high fertility, they experience high level of mortality and morbidity. The vulnerable groups including women and children are particularly at risk. Education sector is also very weak compared to other districts of Balochistan; as only 32% of the population complete primary or higher-level education (PSLM 2008-09).

344. The major portion of the population earns their livelihood from Agriculture and livestock husbandry owing to diverse agro-climate. Though only 6-8% of the geographical area of the district is being used for Agriculture, still the crop yields are far higher than rest of the province. Agriculture Crops are sown both in Rabi and Kharif seasons. Crops cultivated during Rabi season include: Wheat, Barley, Vegetables and Fodder whereas in Kharif Sorghum, Maize, onion, potato vegetables and Fodder are sown. Besides the field crops, farmers in the district also grow fruit crops. Major fruits grown in the district include Apple, Almond, Apricot, pomegranates and grapes.

□ Population and Community Structures

345. The main tribe living in the sub-project area belongs to the Arabzai clan of Mandokhail, list of the main villages is given in **Table 39**. These are ultimate beneficiaries of the project. Pushto 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. No issue of resettlement was observed.

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

Table 39: Name of Villages, Total Households and Population in Sri Toi Water Storage Dam Irrigation Sub-project

Sub-project Villages				
S. No.	Village Name	Tribe	Estimated No of Households	Estimated Population
1	Tora Darga	Mandokhail	262	2730
2	Killi Hazrat Sahib		48	2251
3	Tora Ghundi		37	509
4	Loya Mana		29	347
5	Shinawarhza		10	129
6	Qatal Khan		23	388
7	Ahmad khail		33	595
8	Landi Bobi		45	658
9	Nave Oba		75	548
10	Kanrhi Zam		21	227
11	killilandi		10	167
12	Orgharhi		8	250
13	Sankasi		9	250
14	Doshana		20	223
15	Zawai		20	546
16	Gada Khail		61	1926
17	Ormani Shpah		17	139
18	Bobi Arbzai		85	618
19	Sur Ghundi		36	273
20	Hashikasi		7	30
21	Fakhri		8	57
Total			864	12861
Average Family Size			15	

❑ Socio-economic Features of Visited Killies/Villages (September 2021)

347. The land under acquisition belonged to 4 killies names i) Killi Ahmad Khel (Killi Hazrat Sahib), ii) Killi Landi, iii) Killi Karigran and iv) killi Gadda khel. Except Killi Ahmad Khel, other three killies are located out of project area. People left the area and moved to other killies/area for their earning.

348. The land of whole project area is barren (banjer qadeem), gravel, stones, mountains and unlevelled. Not a single patch of land is under cultivation. The population in the area is poor with subsistence of small business of livestock (ruminants), labourer and few in services. Few households earn from harvest of pine nuts (chalghoza) grown on the mountains far away from project area. After completion the project and availability of irrigation supply, it is expected

to have a major positive effects on the socio-economic condition of the local people. Livestock is main sources of income of the locals. The communities in the sub-project area is composed mainly of Mandokhel tribe of Pashtoons. These communities are relatively remote and have very low income levels. Most of the households/families have migrated years ago to Zhob, Quetta and Karachi for their livelihoods.

349. A structured questionnaire was prepared. Data was collected directly and village profile of studied killies was prepared. On the basis of meetings, following are the main findings of the studied villages shown in Table 40.

Table 40: Main Features of the Studied Villages

Socio-economic indicators	Studied Villages		
	Ahmad Khel	Landi	Gadda Khel
HH Nos. and Family size	350 (10.8)	15 (11)	60 (12)
Sex Ratio (male: female)	52:48	50:50	52:48
Type of residential structure	70 % pacca, 30 % semi pacca	85 % pacca, 15% semi pacca	5 Pacca, 95 % semi pacca
Literacy rate	Male 30 %, female 0 %	Male 100 %, Female 0 %	Male 100 %, Female 0 %
Major Caste group	Ahmad Khel	Ahmad Khel	Erabzai (Mando khel)
Main Occupation	Small business, labour,driver, shop	Small business, labour, driver, shop	Small business, labour, driver
Farm income	Nil	Nil	Nil
Monthly Off farm income	Rs.12000	Rs. 10000	Rs.12000
Vulnerable (Nos.)	10	4	3
Widow	15	3	3
Decision Making	Jirga	Jirga	Jirga

– **Other Social Amenities in the Visited Villages**

350. The data/information were also collected to ascertain social amenities prevail in the studied villages shown below in the Table 41.

Table 41: Social Amenities Available in the Studied Villages

Facilities	Ahmad Khel	Landi	Gadda Khel
Electricity	yes	yes	Yes
Hospital/Dispensary	yes	No	yes
School	yes	No	Yes
Bank	No	No	No
Vet. Dispensary	No	No	No
Telephone/Mobile	Yes	No	yes
Drainage/sewerage	No	No	No
Police Check post	No	No	No
Grain Market	No	No	Yes
Shop	Yes	No	Yes

❑ Existing Irrigation Infrastructure

351. The upstream command area of the sub-project, (located on left bank of the river) is presently being sown as khushkaba during the Rabi season, and some 16 ha are being cultivated using groundwater abstracted from open wells/tubewells. The remaining command area is lying barren due to lack of access to surface water. The water table in the area varies from 37 to 46 m. In the command area of the dam some 4 Karezes/springs and around 180 open wells/tubewells are functional and providing water for irrigation.

❑ Land availability, Ownership and Land Tenure

352. The land rights are also equitable and nearly all landholders have pieces of lands as the land in the sub-project area is distributed. About 948 ha is the expandable land which could be commanded from the same source. While currently the left bank land cannot be commanded from the same source, therefore the farmers have developed tubewells in the left bank command area. However, if the sub-project is developed these lands could also come under command. In the watershed of the sub-project no villages were reported by the community and there was nearly no access in the watershed through vehicle. The land in the watershed also belong to the Arbzai clan. The project site has been used at grazing fields for many decades and has been in the protective custody of the Arabzai clan. The sub clan of Arabzai clan are Ahmed Khel, Saidal Khail and Karzai Ahmed Khel. This land is now a barren land due to absence of water. Resettlement in the form of physical dislocation of people or their homes is not envisioned for this project. Some land owners have demanded that this land should be properly distributed to individuals of the tribe. Balochistan Irrigation Department, the project proponent, involved Commissioner / Deputy Commissioner Zhob to resolve this matter at feasibility stage of this project. The matter has been resolved and the land has been handed over to its rightful owner. But due to change in alignment at detail design stage, LARP studies are being conducted again.

❑ Existing and Designed Interventions of Agriculture

353. At present there is no agricultural activity due to absence of irrigation system in the sub-project area and the landowner cannot brought the command area under cultivation. There is no existing cropped area. The land belongs to Ahmed Khail, which is a sub-tribe of Mandokhel tribe.

354. The projection of agriculture for the sub-project has been made keeping in view the current situation through findings of field surveys in and around the sub-project. The landowners were interested to propose the profitable crops and fruits in the future as by the sub-project development. The proposed cropped area is 4,832 ha with 120% cropping intensity. The gross irrigation requirement and detailed existing and proposed/projected agriculture analysis are attached in the Appendix.

355. The land is still under the communal ownership of the tribe and it has not been put to settlement. Although the crop cultivation on areas is already being practiced, the proper settlement has not been affected yet. A few villages are present beyond the project area (the nearest being 16 km away), where the inhabitants are busy in livestock rearing as major sources of livelihoods. The proposed area is accessible from Zhob town through a black topped road, which ends up at a village named Hazrat Agha Village. The crops are grown both in Rabi and Kharif season in the proposed command area. Crops grown during the Rabi season include: wheat, onion, garlic, cucumber, fodder crops and tomatoes. While in Kharif season following crops are cultivated: Okra, brinjal, vegetables, fodder, tomatoes, onion, garlic. The horticulture crops grown in the proposed command area include: grapes, pistachio, pomegranate and olive. One of the interesting aspects in the agriculture practices of the area that was the planting of mulberry and other wild trees along the water channels and farmlands. This practice not only indicates a tree loving bent of mind of local communities, but also suggests the full utilization of available space and resources for production. For irrigation of crops, village inhabitants are using diesel operated engines, Karezes and tube-wells. Water is transported mainly in the unlined channels, where more than one third is lost as seepage and evaporation losses.

6 STAKEHOLDER CONSULTATION

6.1 Introduction

356. The basic purpose of conducting the stakeholder consultation was to involve the important stakeholders and local people into the process of project implementation and to incorporate the appropriate environmental and social concerns into the process. Moreover, Pakistan Environmental Protection Act (PEPA) specifies that the stakeholder consultation process shall be an integral part of environmental assessment, and thus makes it mandatory. This section presents the essence of the stakeholder consultation process carried out for the proposed project.

357. Frequent meetings and consultations were held with the community and other stakeholders' vis-à-vis BID, forest, agriculture, wildlife, Local Government Representatives, Local Welfare Societies (NGOs), academia, NGOs and community influential. During the meetings, the project objectives were explained to the participants. Their concerns and suggestions were documented and taken care of to enhance the project acceptability on social grounds. Their major concerns related to the environmental impacts and mitigation measures. During field visits, a series of public consultations and scoping sessions were carried out at various locations in the project area.

6.2 Objectives

358. Basic objective of this activity is to have on board the project Affected People, related Governmental institutions and interested non-governmental organizations (NGOs) through:

- Introduction of the project;
- Creating awareness about the project including its impacts;
- Rapport building with APs;
- Involving them in the process of determining the right direction for area development;
- Assessment of the impacts of sub-project, which may occur and their mitigations; and
- Introduction of PEPA- 1997 and ADB environmental and resettlement policy.

6.3 Project Disclosure

258. According to ADB SPS (2009) guidelines on "Information Disclosure" (Para 53), ADB commits to timely and accessible dissemination of social and environmental safeguard information. This ensures meaningful stakeholder input into project design and implementation.. Consultation with Affected Persons (APs) is, therefore, the starting point for all these activities to allay misgivings and apprehensions about the project and elicit their acceptability, ensure their participation in planning and implementation and provide them with opportunity to participate in key decisions of the project that are likely to affect them.

6.4 Stakeholders Identification

259. The approach adopted by the consultants consists of the following steps:

Step 1 – List the various resources (natural and otherwise) within the site or in close proximity of proposed project area e.g. sweet water resources, agricultural lands, other types of lands, infrastructure, urban facilities, transportation facilities, forest etc.

Step 2 – List the functions and uses for each of the resources.

Step 3 – Identify the groups and actors that have a stake in each of the functions and uses of the various resources by asking the following questions.

- Who uses / provides the resource(s)?
- Who benefits from the use of the resource(s)? Who wishes to benefit but is unable to do so?
- Who impacts on the resource(s), whether positively or negatively?
- Who has rights and responsibilities over the use / provision of the resource(s)?
- Who would be affected by a change in the status, regime or outputs of proposed project area and its management?
- Who makes decisions that affect the use and status of the resource(s), and who does not?

260. These questions were answered using field observations, discussions with key persons, literature reviews and personal experience.

261. In doing Step 3, it emerged that a number of the same stakeholders (groups) is relevant for a number of the functions and uses. This allowed the consultants to begin to see the interconnected groups and stakeholders that have an important stake in the site or area.

262. The list of relevant stakeholders is provided in the following **Table 42**.

Table 42: Identification of Stakeholders

Resource	Stakeholders
Forest	Environmental Protection Agency
	Nature conservation NGOs, Academia
	Forest Department
	Wildlife Department
Waterways	Irrigation Department
	Agriculture and Agriculture Extension Department
Infrastructure / Fixtures	District Administration / DCO
	Local Administration / TMA / Assistant Commissioner
	Community at large
Land	Agriculture & Agriculture Extension Department
	Irrigation Department
	Livestock Department
Crops and Vegetation	Provincial Forest Department
	Agriculture Department

Resource	Stakeholders
	Irrigation Department, Livestock Department
	Local Communities
Access Roads	Local Communities
Live Stock	Local Communities, Livestock Department
Overall Issues & Benefits	Elders of the Local Communities DC and Assistant DC Zhob

6.5 Stakeholder Analysis

6.5.1 Organization and Composition

359. Typically, stakeholder consultation requires resources to manage. Therefore, most literature on the topic suggests classifying and categorizing them, so that more focus could be paid to the more important entities.

360. For this project, the stakeholders can be classified into two broad categories; i.e. Internal stakeholders who have some form of legal contract (in any form or at any level) with the proposed project (the project proponents), and External stakeholders who are made up of other individuals, groups or parties that have an interest in the project but are not contractually obligated in any way or form.

361. The approach adopted by the Consultants for identification and classification of the project stakeholders is based on a tailored form of Winch Matrix. This approach is being used for its simplicity, and its relevance for the situation at hand. The consultants first developed a blank format of a matrix containing 08 cells. For the internal stakeholders, the cells are based on the type of envisaged relationship (supply / demand), and the potential of influence (Direct / Indirect stake). For the external stakeholders, the cells are based on stakeholder origin (public / private) and again on their potential of influence. Once the matrix structure is created, each cell is filled with potential stakeholders' names.

263. **Table 43** maps and classifies the envisioned Sri Toi sub project stakeholders

Table 43: Classification of Project Stakeholders

	Internal Stakeholders		External Stakeholders	
	<i>Demand</i>	<i>Supply</i>	<i>Public</i>	<i>Private</i>
<i>Direct stake / Primary Stakeholder</i>	Local Community, BID	BEPA Agriculture Department, Forest Department	Land & revenue Department, Town/UC administration	Communities living or doing business in the area

Indirect stake / Secondary stakeholder		Service Providers for this project (technical vendors, labor force, consultants) ADB and other project financiers	Wildlife Department, Livestock Department	BRSP
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6.5.2 Public Consultation in Field

264. This activity was initiated by the consultants during May 2017 and earlier alongside the socio-economic survey.

265. During field survey, the Consultants discussed the basic requirements, views and perceptions with the local residents of these settlements about this project. Following opinions were shared by the people of respective areas.

- Generally, the community at Kili Hazrat Sahib has a very positive opinion regarding the proposed project as they perceive that the project will provide canals and supply water for irrigation purpose. This will improve their quality of life, initiate economic activities and income. It will provide grazing and water for live stocks etc;
- An impression exists that some people (Mr. Kareem Mandokhel, Mr. Shahbaz.), are opposing the proposed project and block access to project sites. A meeting with these people revealed that they understand the benefits of the project and were interested in the project but also wanted proper land distribution / delegation from the tribal holdings to individual holdings.

□ Meeting at Circuit House Zhob (May 12, 2017):

266. The team left Quetta around 9:30 am and arrived in Circuit House Zhob at 1:30 pm. The team was received and welcomed by the district officers and community members. After exchange of pleasantries, the meeting started, wherein the team leader first introduced the team members. This was followed by the introduction of district officers and community members. Team leader informed the line department officers (Forest and Wildlife Department) and community members that they are here to conduct the Initial Environmental Impact Assessment for construction of Sri Toi Dam. In this regard, they want to schedule meetings with the government line department and community members.

267. Community members and officers of government line department highly appreciated this project and showed their full support for the scheme. They were of the view that construction of dam will help in bringing more area under cultivation, which will increase the agriculture crop and livestock production in this entire area, which would in turn create income generation /livelihood opportunities for a large number of people. They informed that at present

community members are practicing agriculture crop production on a very small scale through rain fed mode.

268. For this purpose, water harvesting and spreading structures are used by community members. In some instances, where perennial flows are available, farmers have been also diverted water for crop production. Besides the rain fed and diversion of perennial flows, some of the community members have also sunk tube wells to pull out ground water for crop production. In some areas Karezes are also functional that provides water for crop production and drinking purposes. In addition to these sources of water, some community members in the project areas are pulling out ground water from dug well with the help of diesel operated engines and solar pumps. At present, community members are cultivation crops both in Rabi as well as in Kharif seasons. In Rabi season crops cultivated by the farmers include: wheat, onion, garlic, cucumber, maize, tomatoes vegetable and fodder crops, while in Kharif season the crops sown are: cucumber, brinjal, okra, vegetables fodder crops. Community members have also raised trees of Pistachio, Grapes, Almond and Pomegranate.

269. Agriculture produce is mostly marketed in Zhob town. Community members informed that the land in the proposed project area belongs to a single tribe, namely Ahmed Khel, which is a sub-tribe of Mandokhel tribe. They further added that 90% of the community members have shown their agreement to the construction of Sri Toi dam. They assured that there no issues related to the distribution of land and water exists in the area. However, due to the communal nature of the land ownership, the area needs to undergo settlement, which will determine the ownership pattern at the household/individual level.

270. Community members informed that almost all of the residents of the area are educated and have got good social awareness. They have got the capacities to resolve issues. Residents of the area are very happy that a dam is being constructed here, which would change their lives through conversion of barren land into a productive site. Community member have already taken necessary steps for resolving the issue of land settlement through constituting a committee for this purpose, which comprise two top leaders of the sub-tribe.

271. Community members informed that the entire command area along with dam construction and storage sites belongs to a single tribe Ahmed Khel. Therefore, they do not envisage any issue/challenge and dispute over dam construction, water distribution and land

settlement. Community members informed that dam construction would open new vistas of livelihood opportunities in the area that will also contribute towards increasing the productivity in the entire Sri Toi.

272. They also added that local labour is available for undertaking all sorts of activities. Besides labour, all types of machinery for dam construction and land preparation/levelling can also be made available here because Zhob is home of many big construction companies. Similarly, synergies can be developed with the projects of NGO, such as BRSP, and government line departments, which will greatly help in furthering the project goal and objectives.

6.5.3 Consultation with Institutional Stakeholders

273. Besides consulting with the people living in or around the sites that are potentially affected by the project, the consultants also met the major institutional stakeholders, including the Government line departments and the NGOs working in the area.

274. Brief account of the discussion during these meetings is given below:

☐ Syed Pervez Bukhari – Chief Engineer – Balochistan Irrigation and Power Department

275. Chief Engineer of the irrigation and Power Department, Government of Balochistan presented the project background information. The consultants probed the justification of the project and conditions on the ground. The Chief Engineer was very positive that the project would have a positive impact on the community of the sub-project areas.

☐ Mr. Nadir Gul Barech – CEO – Balochistan Rural Support Programme

276. consultations with BRSP were considered a good gesture and appreciated. They informed the consultants of successful work done by BRSP. The consultants briefed the BRSP team of the project interventions. BRSP expressed views on the positive impact the project may have on the local people and BRSP's role on agriculture extension in the project area. BRSP advocated synergistic approach as implementing partner for the sustainability of proposed interventions and wellbeing for the villagers.

☐ Aggrieved Community Representative Mr. Malik Shehbaz of Ahmed Khel – Mandokhel Tribe at Dam Site

277. The team visited the dam site on May 13, 2017, which was a very beautiful and most suitable for the purpose of dam construction. The site was located close to the village namely Gul Khan, while the second village close to the dam site was Landai Kalayi. The site belonged to Ahmed Khel a sub-tribe of Mandokhel tribe. Many community members also accompanied the team during the visit and had good discussion with them at dam site.

278. Malik Shahbaz representing the aggrieved community having stakes on the proposed dam land met the project team. He expressed his concerns regarding the distribution of land and would oppose the construction of dam if the land distribution was not done. The team noted his concerns and assured him that all the stakeholders will be taken on board and the matters will be resolved before the construction of Dam.

□ **Mr. Malik Baz Muhammad – Tribal Leader of Ahmed Khel – Arabzai Tribe**

279. On the way, back to Zhob town, the team made a brief stay in the guest house of Malik Baz Muhammad, who is the head of Ahmed Khel tribe. He and other influential of the Ahmed Khel tribe present at the occasion highly appreciated the construction of dam in their area. He assured full on behalf of his tribe for construction of dam and all the activities contained/planned in the project. He added that they are vigorously pursuing the land settlement issue and are very hopeful that this would be resolved in the next two/three months. He informed that all his tribesmen support this move of dam construction and are very happy. He added that by taking into account this fact he can say that the settlement issues would also be resolved very smoothly. He also requested for an increase in the command area so that more households could benefit from agriculture crop production. Influential and tribesmen present at the occasion informed that the entire tribe has delegated its power to Malik Baz Muhammad for land settlement and resolving other such issues that may arise in this context.

280. The consultations were considered a good gesture and appreciated, especially by the landowners and locals of the project. It improves their financial well-being to a great extent because 80 % people job associated with Agriculture work. They emphasized that local villagers should be given priority when employing people for various project-related works and activities according to their skills because non-Local work force coming in the project area that will not be aware of the local customs and norms, may result in conflicts with the local community, keeping in mind the sensitive law and order situation and culture of the area.

6.6 Gender Consultations (September 2021)

281. Consultations were held with the participants of three killies. Project interventions were discussed in details and questions/concerns were raised from the participants. The summary of consultation is provided in the following Table 44.

Table 44: Summary Table of Questions and Answers of Consultation

<ul style="list-style-type: none"> • Is the project approved? • When the work will be started? • What are project impacts? • What about the land compensation? 	<ul style="list-style-type: none"> • Yes, the project has been approved. • Bidding are in process, the work will be started with in few months. • Only land is under project impact. No structure will be impacted. • For Settled land, compensation will be paid prior to start the work, while for un-
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<ul style="list-style-type: none"> • Is it possible to provide crossing bridge between killies for social mobility? • Is there chance for job opportunity for the locals? • Any protection/safety measures for women and children near basti/killi? • Access to water and washing points for women? • Construction activities will disturb the people by noise pollution? • It is anticipated that a large quantity of excavated material will need to be disposed of (will be used in side lining of canal). If this waste material is not properly disposed of, it will contaminate the soil and water resources, especially during the rainy season. • Project activities may produce dust or gaseous emissions and vibration during construction phase. 	<p>settled land, Revenue department will decide.</p> <ul style="list-style-type: none"> • Yes, crossing bridges at appropriate locations will be provided. • Yes, Unskilled workers/labours will be hired from locals. • Yes, safety measures will be adopted. • Yes, sure, these facilities will be provided. • Remedial measures will be adopted to minimise the adverse effects during construction. • Excavated material will be managed properly, and if dumping required than dumped it in proper place. • Proper mitigation measures will be taken by contractor.
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□ Gender Survey and Meeting with PIO for GAP Tasks

282. Social and Environment teams conducted field visits of Sri Toi Dam, suproject for Gender consultation. The visited killies and participants are provided in the following Annexure 29 & 30. The photographs are shown in Figure 26.

– Purpose of the Visit

- I. Discuss social and environmental impacts of the project
- II. Share details of the interventions for the women designed in the project and document the views of the participants regarding their preferences and priority assigned to various interventions.
- III. Conduct training need assessment and document the details of training suggested by the women participated in the meetings.
- IV. Share GAP tasks with the women; and
- V. Consultation over their participation in GRC.

– Consultation with Female Participants

283. During the reporting period, introductory/preliminary meetings were held with female groups to share the project interventions.

- All the participants actively participated in the meetings. Gender sensitivities and causes of poverty were discussed in detail.
- There are no job opportunities for female. Most of women are dependent on their male family members which is the main cause to gender discrimination. Female have potential but they are not aware of opportunities for livelihood.
- The participants of Siri Toi Dam subproject showed their concerns that they are not encourage for education. 100 % participants found illiterate.
- Social team explained about social structures and facilities to be provided through the project interventions.

□ Gender Common Issues in the Sub-Project Area

284. According to the women participants their major and general issues were:

- Unavailability of clean drinking water, health facilities, schools for boys and girls, drainage and sewerage system, lack of income generating activities or opportunities.
- Drinking water is not good for health at all because of this people are suffering from diseases Diarrhea, Malaria, Hepatitis, Joint pain, Kidney diseases especially kidney stones includes typhoid.
- Private roads, transport, vehicles. mobile phone communication network and internet connections have a significant impact on socialization and modernization. In the sub-project areas these services are very poor.
- Embroidered works are done at home by women. Women have no facility to market their products and skill. The communities don't have any Vocational center for women and girls in the area.
- Lack of gynecologist/delivery facility in area.

□ Pressing Needs of Women

285. During consultations women expressed following pressing needs:

- Supply of clean drinking water and sanitation facilities;
- Access paved roads and public transport facilities;
- Trained lady health visitor;
- Participation of women in income generation activities;

□ Findings

- Women ensured their full support and they will participate in the grant project by applying to avail the project interventions.
- Capacity building of local health providers are also needed so that women have opportunity to avail better health services.
- Skill enhancement trainings are needed to build their capacity to ensure sustainable earning.
- Awareness sessions are needed to overcome gender discriminations in the area.
- Women community was not ready to share their name for attendance because if they share then interventions must be provided. This will be taken care once advertisement is made in the pilot site and women are asked to submit their applications. Women are

behaving little bit in a hyper mode as they were hardly provided any interventions in the past to enhance their income.

Common Issues (Pressing Needs) of Male Community in the Sub-Project Area

- Shortage of irrigation water;
- Un-levelled land, difficulty in cultivation;
- Worst condition of access road;
- No Government interest to improve educational facilities;
- Lack of proper health facilities.

Figure 26: Photographs of Meetings/Consultation with the Communities of Sri Toi Dam Subproject at Design Phase.

	
<p>Views exchange with farming community of Killi Ahmad Khel</p>	<p>Meeting with the community of Killi Ahmad Khel</p>
	
<p>Data Collection of Village Profile of Killi Ahmad Khel and Landi (Sep.2021)</p>	<p>Data Collection of Village Profile of Killi Ahmad Khel and Landi</p>
	
<p>Farmers of Killi Gadda Khel are discussing on channels alignment</p>	<p>Farmers of Killi Gadda Khel are listening to project Consultants</p>

6.7 Stakeholders Concerns Summary

286. **Table 45** provide a summary of stakeholders' concern, and proposed mitigation measures. Pictorial profile of stakeholder consultation is given as **Annexure 2**.

Table 45: Concerns Raised by Stakeholders

Concerns	Proposed Mitigations
General	General perception of all the people is that the proposed project will bring economic prosperity and that they would support the project.
Aggrieved Party at the dam site represented by Mr. Malik Shehbaz, stated that distribution of land is mandatory before the construction of dam.	Chief Engineer, Balochistan Irrigation and Power Department has instructed DC Zhob to resolve this matter in accordance with land revenue records and local customs.

6.7.1 Continual Engagement with Stakeholders

287. 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.

288. The related institutional arrangements should also be in place for continuous consultation throughout the process of planning and implementation.

7 ENVIRONMENTAL IMPACTS & MITIGATIONS

7.1 General

289. 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 both Project Area and AOI is presented in the following sections.

290. A methodology has been proposed with the objectives to assess the identified impacts for their significance keeping in mind their consequences, reversibility, occurrence, duration, location, timing etc..

7.2 Impact Assessment Methodology

291. Determining the significance of 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.

292. In order to describe the significance of an impact it is important to distinguish between two concepts, magnitude (of impact) and sensitivity (of receptors). The use of these two concepts for this EIA is outlined below.

293. In order to assess the type and intensity of impacts of the project, potential impacts were identified on the basis of the literature review, field surveys, investigations, and stakeholder consultations. The impacts have been rated with respect to their severity, in addition to determining whether the potential impact can be avoided through better project design and planning or mitigated with the help of appropriate measures to be taken during the project execution. The potential impacts thus identified are discussed in the following sections.

294. Impacts can be both adverse and beneficial and the methodology defined below has been applied to identify both beneficial and adverse impacts of the project. The criteria for assessing the impact significance are based on a combination of the sensitivity of the receptors and the magnitude of the impact. Impacts have been considered for the design, construction and operation phases of this project.

295. The assessment of the environmental impacts has been carried out adopting a risk-based approach and considering the engineering proposals prepared during the previous feasibility study and updated in the detail design phase.

7.2.1 Impact Magnitude

296. The assessment of impact magnitude was undertaken considering the following:

1. Duration of the impact;
2. Spatial extent of the impact;

3. Reversibility;
4. Likelihood; and
5. Legal standards and established professional criteria.

297. Accordingly, the magnitude of impacts was identified according to parameters outlined in Table 46 below.

Table 46: Parameters for Determining Magnitude of Environmental Impact

Parameter	Major	Moderate	Minor	Negligible
Duration of impact	Longterm (more than 35 years)	Medium term Life span (5-15 Years)	Confined only to project construction P eriod (less than 5 years)	Temporary with no detectable impact
Spatial extent of impact	Widespread far beyond project component site boundaries	Beyond immediate project component, Site boundaries or local area	Within project components and site boundary	Specific location within project component or site boundaries with no detectable impact
Reversibility of Impacts	Impactis effectively Legal standards and established professional criteria Likelihood of impacts occurring permanent, requiring considerable intervention to return to baseline	Requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant

Source: Handbook of Environmental Impact Assessment, Volume II, Judith Petts, 1999. Blackwell Science Ltd.

7.2.2 Impact Significance

298. The assessment of significance is based on the combination of magnitude of impact and sensitivity of receptor using the impact significance matrix in the following Table 47.

Table 47: Assessment of Environmental Impact Significance

Magnitude Of Impacts	Very High	High	Medium	Low
Major	Critical	Major	Moderate	Minor
Moderate	Major	Major	Moderate	Minor
Minor	Moderate	Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

7.2.3 Mitigation and Enhancement Measures

299. Mitigation measures are identified to address negative impacts. The following hierarchy of mitigation will be applied:

- Elimination/mitigation through design (embedded mitigation);

- Site / technology choice; and,
- Application of best practice.

300. Where appropriate, enhancement measures were also identified to create new positive impacts or benefits, increase the reach of positive impacts or benefits, or distribute them more equitably.

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

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

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

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

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

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

306. **Table 48** below presents the screening of activities for proposed Sri Toi water storage dam and irrigation system during design, construction and O&M phases.

Table 48: Screening of Activities

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Construction of Dam, Main Canal, Left Canal & Right Canal and Irrigation Structures							
A. Design & Planning Phase							
Field surveys	P			P			<ul style="list-style-type: none"> No potential Impact
Assessment of water availability		P			P		<ul style="list-style-type: none"> Failure of design
Proper Dam site selection and its land acquisition		P			P		<ul style="list-style-type: none"> Design failure Social issues Resettlement/relocation of assets and displacement of people
Route selection (Alignment) of proposed new canal and its land acquisition		P			P		<ul style="list-style-type: none"> Social issues Resettlement/relocation of assets and displacement of people
Water rights issues in the area		P			P		<ul style="list-style-type: none"> Social issues
Design works construction of Dam, new canal and other irrigation structures as per proper engineering standards		P			P		<ul style="list-style-type: none"> In case of design failure system will be collapsed
Dam reservoir sedimentation		P			P		<ul style="list-style-type: none"> System sustainability
Public disclosure of final design		P			P		<ul style="list-style-type: none"> Social issues
Coordination with all relevant departments for NOCs		P			P		<ul style="list-style-type: none"> Delay in project implementation & cost overruns
Construction of metaled road of about 16 km from Killi Hazrat Sahab to Project site for transportation of construction material and other logistics.		P			P		<ul style="list-style-type: none"> Delay in project implementation & cost overruns

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Disruption to public life	P			P			<ul style="list-style-type: none"> No potential Impact
Disruption to wildlife	P			P			<ul style="list-style-type: none"> No potential Impact
Risk due to Natural Hazard i.e. flooding and earthquakes		P			P		<ul style="list-style-type: none"> System sustainability
B. Implementation & Construction Phase							
Security and Safety Risks		P			P		<ul style="list-style-type: none"> Delay in project execution
Continued stakeholder engagement		P			P		<ul style="list-style-type: none"> Social issues
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard		P			P		<ul style="list-style-type: none"> Changes in land use pattern Influx of external work force Social conflicts Workshop facilities may spread oils & chemicals Deterioration of air quality due to machinery & equipment Noise Land degradation due to solid waste disposal of camp site Water contamination Loss of vegetation Health and Safety issues including COVID-19 related
Transportation of construction material		P			P		<ul style="list-style-type: none"> Soil erosion and contamination Air pollution Noise pollution Health and Safety issues Damage to infrastructure

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Excavation, backfilling and compaction works		P			P		<ul style="list-style-type: none"> • Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues including COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material
Construction of dam and new canal		P			P		<ul style="list-style-type: none"> • Noise pollution • Air pollution • Health and safety issues including COVID-19 related • Blocked of access due to construction works
Construction of structures (Including Road Pavement)		P			P		<ul style="list-style-type: none"> • Noise pollution • Air pollution • Water contamination • Health and safety issues including COVID-19 related • Blocked of access due to construction works • Social Disruption
C. Operation & Maintenance Phase							

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Unavailability or improper distribution of irrigation water in the area		P			P		<ul style="list-style-type: none"> Social issues
Breaching of Dam, canal, and structures		P			P		<ul style="list-style-type: none"> System sustainability
Use of irrigation water for drinking purposes		P			P		<ul style="list-style-type: none"> Health issues
Ground water contamination in command area		P			P		<ul style="list-style-type: none"> In case of improper drainage ground water will be contaminated
Disposal of waste (connection of waste streams) in the canal		P			P		<ul style="list-style-type: none"> Health issues Social issues
Use of fertilizers & pesticides		P			P		<ul style="list-style-type: none"> Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff
Increase of agricultural lands		P			P		<ul style="list-style-type: none"> Loss of pastoral lands
Periodic cleaning and maintenance of the system		P			P		<ul style="list-style-type: none"> Solid waste generation
Community participation for management and operation of the irrigation system		P			P		<ul style="list-style-type: none"> Social issues System sustainability
Disruption to wildlife		P			P		<ul style="list-style-type: none"> Conservation issues
Safety		P			P		<ul style="list-style-type: none"> Drowning issues
Risk due to Natural Hazard i.e. flooding and earthquakes		P			P		<ul style="list-style-type: none"> System sustainability

307. The following sections dilate upon the environmental issues and the assessment of their impacts. It is to be noted that since most impacts will be similar irrespective of the project component, the description follows a phase wise approach. However, whenever any particular impact is envisaged to be linked to a specific component, the description has been adjusted accordingly.

7.2.4 Impact Evaluation

308. The next stage of the EIA process is a detailed assessment to forecast the characteristics of the main potential impacts. Known as impact analysis. Impact identification and prediction are undertaken against an environmental baseline, often through indicators e.g. air/water, noise, ecological sensitivity, biodiversity. The aim is to take account of all of the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are taken into consideration. The anticipated environmental impacts due to project is based on the methodology provided in section 1.8.11 of this report presented below in **Table 49**.

Table 49: Anticipated Environmental Impacts Assessment

Activity / Issue	Site Specific Impacts	Assessment of Risk
Construction of Dam, Main Canal, Left Canal & Right Canal and Irrigation Structures		
A. Design & Planning Phase		
Field surveys	<ul style="list-style-type: none"> No potential impact 	-
Assessment of water availability	<ul style="list-style-type: none"> Failure of design 	C-3
Proper Dam site selection and its land acquisition	<ul style="list-style-type: none"> Design failure Social issues Resettlement/relocation of assets and displacement of people 	C-3
Route selection (Alignment) of proposed new canal and its land acquisition	<ul style="list-style-type: none"> Social issues Resettlement/relocation of assets and displacement of people 	C-3
Water rights issues in the area	<ul style="list-style-type: none"> Social issues 	D-4
Design works construction of Dam, new canal and other irrigation structures as per proper engineering standards	<ul style="list-style-type: none"> In case of design failure, system will collapse 	D-4

Activity / Issue	Site Specific Impacts	Assessment of Risk
Dam reservoir sedimentation	<ul style="list-style-type: none"> System sustainability 	D-4
Public disclosure of final design	<ul style="list-style-type: none"> Social issues 	D-4
Coordination with all relevant departments for NOCs	<ul style="list-style-type: none"> Delay in project implementation & cost overruns 	D-4
Construction of metaled road of about 16 km from Killi Hazrat Sahab to Project site for transportation of construction material and other logistics.	<ul style="list-style-type: none"> Delay in project implementation & cost overruns 	B-2
Disruption to public life	<ul style="list-style-type: none"> No potential impact 	-
Disruption to wildlife	<ul style="list-style-type: none"> No potential impact 	-
Impact on aquatic life or ecosystem	<ul style="list-style-type: none"> No potential impact 	-
Risk due to Natural Hazard or climate change i.e. flooding and earthquakes	<ul style="list-style-type: none"> System sustainability 	D-4
B. Implementation & Construction Phase		
Security and Safety Risks	<ul style="list-style-type: none"> Delay in project execution 	C-3
Continued stakeholder engagement	<ul style="list-style-type: none"> Social issues 	C-3
Soil Erosion	<ul style="list-style-type: none"> Land slide Loss of vegetation 	D-4
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	<ul style="list-style-type: none"> Changes in land use pattern Influx of external work force Social conflicts Workshop facilities may spread oils & chemicals Deterioration of air quality due to machinery & equipment Noise Land degradation due to solid waste disposal of camp site Water contamination Loss of vegetation Health and Safety issues including COVID-19 related 	B-2

Activity / Issue	Site Specific Impacts	Assessment of Risk
Transportation of construction material	<ul style="list-style-type: none"> • Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues including COVID-19 related • Damage to infrastructure 	B-2
Excavation, backfilling and compaction works	<ul style="list-style-type: none"> • Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archaeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues including COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material 	B-2
Construction of Dam and new canal	<ul style="list-style-type: none"> • Noise pollution • Air pollution • Health and safety issues including COVID-19 related • Blocked of access due to construction works 	B-2
Construction of structures (including Road Pavement)	<ul style="list-style-type: none"> • Noise pollution • Air pollution • Water contamination • Health and safety issues including COVID-19 related • Blocked of access due to construction works • Social Disruption 	B-2
COVID-19	<ul style="list-style-type: none"> • Health and safety issues 	B-2
Flora	<ul style="list-style-type: none"> • Degradation of local environment 	D-4

Activity / Issue	Site Specific Impacts	Assessment of Risk
Gender	<ul style="list-style-type: none"> Hindrance to the mobility of local women Social Issues 	C-3
C. Operation & Maintenance Phase		
Unavailability or improper distribution of irrigation water in the area	<ul style="list-style-type: none"> Social issues 	C-3
Breaching of Dam, canal, and structures	<ul style="list-style-type: none"> System sustainability 	D-4
Use of irrigation water for drinking purposes	<ul style="list-style-type: none"> Health issues 	C-3
Ground water contamination in command area	<ul style="list-style-type: none"> In case of improper drainage ground water will be contaminated 	C-3
Disposal of waste (connection of waste streams) in the canal	<ul style="list-style-type: none"> Health issues Social issues 	C-3
Use of fertilizers & pesticides	<ul style="list-style-type: none"> Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff 	C-3
Increase of agricultural lands	<ul style="list-style-type: none"> Loss of pastoral lands 	C-3
Periodic cleaning and maintenance of the system	<ul style="list-style-type: none"> Solid waste generation 	C-3
Community Participation for management and operation of the irrigation system	<ul style="list-style-type: none"> Social issues System sustainability 	C-3
Disruption to wildlife	<ul style="list-style-type: none"> Conservation issues 	C-3
Safety	<ul style="list-style-type: none"> Drowning issues 	C-3
Risk due to natural hazard i.e. flooding and earthquakes	<ul style="list-style-type: none"> System sustainability 	C-3

7.3 Mitigation and Enhancement Measures

309. Mitigation measures are identified to address negative impacts. The following hierarchy of mitigation will be applied:

- _ Elimination/mitigation through design (embedded mitigation);
- _ Site / technology choice; and,
- _ Application of best practice.

310. Where appropriate, enhancement measures were also identified to create new positive impacts or benefits, increase the reach of positive impacts or benefits, or distribute them more equitably.

7.4 Mitigation Measures

311. Adverse impacts due to Sri Toi water storage dam and irrigation system and mitigation measures are as follows:

7.4.1 Impacts during Planning and Design Phase

312. Understandably, the potential environmental impacts, in a physical sense, of the design stage are quite low. Since the design stage involves only limited physical activity, its direct impact on environment is also low. The various surveys carried out at the planning level may result in short term impacts on air and soil quality. If the design is carried out without regard to the environmental considerations, it will lead to long term negative implications for local flora, fauna, water quality, water resources, land acquisition etc.

□ Assessment of Water Availability

Potential Impact

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

Mitigation Measures

314. Design works will ensure the proper assessment of water availability. BID will ensure the annual average available water of 57 MCM for irrigation water from tributary of Zhob River.

□ Proper Dam Site Selection and its Land Acquisition

Potential Impact

315. The alignment of the main canals (both left and right) and their distributary canals are changed from the feasibility alignments. So LARP prepared at feasibility stage is being revised. The impact is of high significance

Mitigation Measures

316. Appropriate efforts were made and route optimization criterion has been adopted by design experts to minimize the impacts of land acquisition and resettlement. Where avoidance is not possible, the impacts are reduced, minimized and mitigated in accordance with the ADB's SPS, 2009. Land demarcation has been completed in December 2020. The land record is under preparation by Revenue department. Section 4 was notified in July 2021. There is

settled and un-settled land fall in the ROW. Settled land under impact belonged to the private owners, while the ownership of un-settled land is also claimed by the locals. No project impacts on private structure, fixture, tree and crop, so DMS is not required. No public structure/fixture is under project impact. No indigenous peoples found in the area.

317. The land acquisition will be carried in accordance with the LAA 1894 and ADB's SPS, 2009 requirements. The acquisition process will follow the general guidelines for land acquisition as stipulated in LARP document. A reasonable package for compensation under the updated LARP will be provided for all the land owners and affected people. Market rates of land will be obtained from the concerned district revenue department. Fair monetary compensation, with due consideration of mandatory acquisition, will be given to the owners of land. The proponent will ensure duly payment of compensation to the Project affectees to avoid social conflicts. Moreover, fair agreements shall be made with owners of temporary acquired lands i.e. land for borrow areas and construction camps etc. Complete records should be maintained, particularly for asset valuation and compensation payment. The communities' grievances associated with the land acquisition and compensation should be addressed on priority basis, in order to avoid any unrest/mistrust among the communities towards the project. By adopting the aforementioned measures, the impact would be of low significance.

❑ Water Right Issues in the Area

Potential Impact

318. The Water being the most precious commodity in the area, its usage rights has been established traditionally. Any perceived or real disturbance to these water rights will almost certainly lead to social disturbance in the area. This impact would be of moderate significance.

Mitigation Measures

319. Proper water distribution through "Warabandi System" engaging Water User Associations and BID (Irrigation department).

320. An important aspect to be taken into account at the design level is the traditional water rights. This will need to be minutely considered while carrying out the detail designs. Coupled with this, continual two-way communication with the local population will be necessary, to ensure that their perceptions about the project remain realistic, rational, and positive.

321. Conduct social surveys to involve local public at the maximum in design phase, and probe ways and means to tackle these issues so as to maximally benefit them from the proposed project. By adopting the measures, the impact would be of low significance.

❑ Design Works Construction of Dam, New Canal, road and Other Irrigation Structures as per Proper Engineering Standards

Potential Impact

322. Design engineer should ensure the use of proper engineering standards internationally acceptable for all the project components, otherwise it leads to design failure and system will be collapsed. This impact would be of moderate significance.

Mitigation Measures

323. Design of Sri Toi Dam Irrigation Project should be reviewed by the detailed design consultant at detailed design level. By adopting the aforementioned measures, the impact would be of low significance.

□ Dam Reservoir Sedimentation**Potential Impact**

324. Storage capacity of dam will be reduced. This impact would be of moderate significance.

Mitigation Measures

325. Watershed management and erosion control measures have been included as an integral component of the project to control the reservoir sedimentation. These interventions include; structural measures like earthen micro-catchments (eyebrow terraces), digging of pit, addition of compost, termite treatment, plantation of trees, seeding of native grasses, small check dams and water storage ponds. By adopting the aforementioned measures, the impact would be of low significance.

□ Public Disclosure of Final Design**Potential Impact**

326. Many respondents during the public consultation exercise expressed their concerns about the design and construction quality of the proposed interventions. Failure of any intervention due to inappropriate design or sub-quality construction, will lead to malfunctioning of the system, and may cause localized disaster (e.g. breach of dam and canal). Similarly, many people stressed that maximum possible area should be included in the direct command area by taking the main canal to maximum possible elevation. This impact would be of moderate significance.

Mitigation Measures

327. During the next coming stage of project, it is recommended to share the dam type and canals alignment with the identified stakeholders and local public through meetings and detail presentations;

328. Continued stakeholder engagement and timely public disclosure will help to decrease the significance of impact from moderate to low.

Coordination with all Relevant Departments for NOCs

Potential Impact

329. Under the current mandates of various departments, the proposed project will need approvals and NOCs from various government departments e.g. BEPA etc. These approvals take substantial time and cause delays in project implementation and undue cost overruns. This impact would be of moderate significance.

Mitigation Measures

330. The most important mitigation measure, however, remains satisfactory level of inter-departmental coordination. Once the draft feasibility is ready, the proponent i.e. Balochistan Irrigation and Power Department, should call a meeting of all stakeholder departments and present the project.

331. The meeting should discuss and finalize the role and contribution of various departments in the project. This will be in line with the advice given by various stakeholders during consultations. By adopting the above measure, the impact would be of low significance.

Construction of Metaled Road

Potential Impact

332. Construction of metaled road of about 16 km from Killi Hazrat Sahab to Project site for transportation of construction materials and other logistics. If the road will not be paved it make delay in the transportation of construction materials and other logistics which causes undue cost overruns.

Mitigation Measures

333. Design team should provide the design of metaled road as a part of feasibility report.

Risk due to Natural Hazards i.e. earthquakes etc.

Potential Impact

334. As per para 212 chapter 3 the Sri Toi Dam Project area lies in zone 3 as per seismic map of Pakistan which clearly shows that the area is in moderate to high risk zone. So due to earthquake the breaching of dam, canal and other irrigation structures can be possible. This

impact would be of moderate significance. The other natural hazard which affect the area is flood which would also be of moderate significance.

Mitigation Measures

335. Design engineer should ensure that seismic design of dam, spillways, reservoir and other allied and irrigation structures should be carried out on international engineering standards. By adopting the above measure, the impact would be of low significance.

336. Flood protection bunds has been included as an integral component of the project to control the damages occurred by floods. By adopting the above measure, the impact would be of low significance.

7.4.2 Impacts during Implementation and Construction Phase

337. This will mainly entail construction of dam, canal and irrigation structures.

338. The construction phases of the project might result in a number of environmental aspects that are identified in this section. Activities that have been perceived as potential sources of these environmental concerns are also discussed. These environmental aspects may create temporary hazards of moderate significance to the environmental resources of the Project Area during the project construction phase. However, if managed properly these activities will not pose any serious threat to the environment.

339. The main responsibilities for mitigation during the construction phase of the project rest with contractors appointed to construct the various interventions. BID Project Director will however, have the responsibility to manage the monitoring of implementation of mitigation measures by the contractors and will need to implement his own system of internal checks.

340. In order to avoid creation of misunderstandings regarding who is responsible for particular activities recommended for the construction phase, the mitigation measures (in the form of a plan) to be taken should be appended to tender documents. This will ensure that contractors include the cost of mitigatory actions into their bids and will provide a reliable mechanism for enforcement. In fact, most of the recommended actions involve no or very little capital investment, but it depends on the contractor's management to adopt a responsible attitude to environmental protection; ensuring construction activity is being properly planned and mitigatory actions are correctly implemented.

341. This EIA document attempts to enlist all major potential impacts of the project, and their likely mitigations. These impacts and mitigations will be presented in the form of an EMP in the next chapter of this document. During the stakeholder consultation meetings, they strongly mentioned the need to establish a formal mechanism to monitor project progress in terms of environmental compliance.

342. Once the project construction starts, and through its operations phase, the most likely source of environmental or social impact could be non-compliance of EMP by the concerned entities; whether willingly or otherwise.

❑ **Social Disturbance due to Poor Expectation Management**

Potential Impacts

343. More than any major impact on the physical or biotic environment in the real terms, the proposed project may cause social impact due to misperceptions or poor expectation management. During the various surveys, it was encouraging to note that people were very positive about the potential benefits of the proposed project.

344. It should be noted that in the past, unfulfilled expectations from various false starts to the proposed project have contributed greatly to the disillusionment of the local population.

345. If the expectations of area people are not kept at a realistic level; and then those realistic expectations are not met, the project will cause negative social impact.

Mitigation Measures

346. The public consultation carried out for this EIA assignment is good first step in the direction of expectation management. The project proponent should make formal arrangement for continued communication and engagement with local stakeholders, through the BID during construction activities. This will also serve as the grievance redressed mechanism for the project. The prime responsibility will be to keep the community informed about project facts in a proactive manner.

347. The BID will formally keep in record all the issues and rational expectations desired by the local public in a register, to ensure that they are duly addressed and fulfilled by the end of the Project.

❑ **Public Utilities**

Potential Impacts

348. Due to the proposed project in construction stage, public utilities affected may create disruption of public services and economics. This impact is however temporary and moderate in significance.

Mitigation measures

349. Incorporate technical design features to minimize effects on public utilities and all public utilities likely to be affected by the proposed project need to be relocated well ahead of

the commencement of construction work and Contractor to obtain NOCs from concerned Departments.

Communicable Diseases

Potential Impacts

350. The Laborer's in the Contractor Camp, truck drivers and like personnel who interact with each other have the potential for the spread of HIV/AIDS if the incidence exists. Majority of the people living in the surrounding of the Project, and potential Labor are not aware of the source, mode of communication or consequences of HIV/AIDS. Although their religious and cultural value system, to a large extent excludes the outbreak or rapid communication of HIV/AIDS, yet its occurrence in such a situation cannot be precluded. It is necessary that awareness and preventive campaigns are run from time to time in the Labor campus and the field offices of the Project to prevent the communicable diseases like Cholera, Typhoid and Tuberculosis.

Mitigating Measures:

351. The Contractor shall:

- Arrange to run an active campaign, in the labour camp, to make people aware of the cause, mode of transmission and consequences of COVID-19, HIV/AIDS;
- Strengthen the existing local health & medical services for the benefit of labour as well as the surrounding villages;
- Ensure cleanliness and hygienic conditions at labour camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by Health Department; and
- Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures (especially including COVID-19 related) and related documents.

Lifestyle and Culture

Potential Impacts

352. There are chances of arising of issues related to cultural differences/conflict between the Contractor's workforce and the local inhabitants, conflicts arising due to the mix of local and migratory job seekers as the use of local resources and products be increased. In this situation, local residents may resist Contractor's workforce attitudes, cultural clashes particularly when local/international contractors are engaged, social disturbance and dissatisfaction with employing outsiders, competition for natural resources e.g. with farmers/livestock raisers etc. may arise. This impact is temporary and minor negative in nature.

Mitigating Measures:

353. This impact can be mitigated by adopting the following mitigation measures:

- Timely and full public consultation and announcement of mobilizing equipment;
- Establishment of formal links with affected communities;
- Seek assistance from and cooperation with local NGOs;
- Familiarize outside labourers on local etiquettes;
- Local labour should be employed for construction works. A dedicated quota (50%) of unskilled jobs should be allocated for the nearby villages; and
- Water supply and sanitation facilities, Contractor's workforces should exacerbate the existing shortages and environmental hazards; contractor should primarily seek their own sources of water in due distance (min. 1 km) from local user's wells.

 Security and Safety Risks**Potential Impacts**

354. It is a prerequisite for the construction of the project that the project area is not safe from a security point of view. All people working on the project and all local people should be allowed to go about their lives without risks to their safety. This impact is however temporary and moderate in significance.

Mitigating Measures:

355. Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed. There are safety requirements for construction projects that include control of public access to the site along with regulations aimed at safeguarding workers. Suitable arrangements that conform to national health and safety requirements (including COVID-19 related) and also appropriate international best practice will need to be followed. There are specific procedures that need to be observed for the transport, storage and handling of explosives that will be required for the operation of quarries and also underground excavation. It will be necessary to liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites.

 Continued Stakeholder Engagement**Potential Impacts**

356. Social issues arise due to improper dissemination of project progress. This would generate moderate significant impact.

Mitigation Measures

357. Proponents to establish an environmental & social cell responsible for stakeholder engagement and timely information dissemination. After this measure, impact would be of low significance.

❑ Sites of Historical, Cultural, Archaeological or Religious Significance**Potential Impacts**

358. Social issues arise if sites of Historical, Cultural, Archaeological or Religious Significance are not properly managed during the construction phase.

Mitigation Measures

359. During the baseline survey for EIA no sites of Historical, Cultural, Archaeological or Religious Significance were found. However, if such sites encountered during construction following measures should be adopted:

- Proponent and the Supervision Consultant to ensure that the construction staff is educated about the location and importance of the cultural sites that exist in the Project Area.
- Contractor to ensure that these sites are not affected by the construction related activities. These aspects will be included in the trainings to be conducted for the contractor's staff.
- Stop the work immediately in case of chance find of any sites or artefacts of historical, cultural, archaeological or religious significance. Chance Find Procedure, attached as **Annexure 21**. and Antiquities Act 1975 should be followed.
- No disturbance to Graveyards during the construction activities.

Deterioration of Air Quality**Potential Impacts**

360. During construction period, the impacts on air quality are mainly due to material movement and the actual construction activities. Due to loading/unloading and stocking of construction material, the air quality over the immediate influence area will be affected and the PM levels in ambient air might increase, though not in significant levels. The emissions from diesel generator sets, construction equipment and vehicles may deteriorate the air quality in the area. Baseline results of ambient air quality clearly shows that ambient air quality of the Project Area is currently clean as all the measured parameters are within the permissible limits of NEQS and WHO.

361. Pollution causing activities during the construction phase are as follows:

- Transportation of construction and excavated material to and from the site in diesel fueled trucks would cause the production of combustion gases (CO, CO₂, NO_x, SO_x). Considering the scale of construction, the population size, and relatively clean environment, moderate impact is expected from this activity. However, the emissions would be of temporary nature.
- Considerable amount of dust would be generated from slope cutting activity and also from other activities such as site clearance, excavation and transportation of excavated and construction material and concrete batching, but its effect would be of localized and temporary nature; and
- The concrete mixer used during concreting also causes above mentioned emissions. Based on the scale of construction and frequency of the operation, the impact of emissions is also assessed to be moderate but temporary.

Mitigation Measures

362. In order to reduce the airborne dust emissions in the construction area due to material transport and construction activities, provisions will be made for sprinkling of water in the area where earth filling and excavation is being carried out. It will be ensured that the construction debris is removed daily. By adopting following measures, impact would be finally of low significance:

- During windy conditions stockpiles of fine material will be wetted or covered with plastic;
- PPEs such as dust masks will be made available to the construction workers at the site to avoid potential health hazards(including COVID-19 related);
- Idling of delivery trucks or other equipment will not be permitted during periods of unloading or when they are not in active use;
- In no case, loose earth will be allowed to pile up along the approach roads;
- All vehicles and other equipment's used during construction will be properly and regularly tuned and maintained;
- All permanently deployed vehicles exhausts will be monitored against NEQS; and
- The possibility of excessive dust generation may be reduced by adopting the best construction practices, precautions such as periodic watering, covering of construction material and usage of low emission equipment's during construction.
- Although blasting is planned currently in any project activity, however at any latter stage during construction, blasting may be required for quarrying or any other activity. A blasting management plan has been attached as **Annexure 15**. Which need to be implemented by construction contractor.

☐ Deterioration Water Quality

Potential Impacts

363. Surface Water: The construction of the proposed project may have impact on the surface water quality, in the form of increased turbidity of water, and also from potential discharge of anthropogenic or construction wastes. The activity that may cause impact on surface water is mainly washing of construction equipment and machinery.

364. Contamination to receiving water may also result due to spilling of construction materials. There may be increase in the turbidity levels due to the surface runoff from the construction sites. Results of tested water quality that water is good for irrigation purpose, so the significance of impact is assessed as moderate.

365. Ground Water: Earth works like soil excavation is the only construction activity that may affect groundwater resources the depth of ground water in the project area varies from 25 to 30 meters, but as the groundwater quality is not good having high content of suspended solids. Ground water pollution can take place, if chemical substances and oily waste get leached by precipitation of water and percolate to the ground water table. The activities mentioned above will deteriorate the quality of water, hence the significance of impact is assessed as moderate.

Mitigation Measures

366. By adopting following measures, impact would be finally of low significance:

- The construction activities such as excavation and earth filling and construction of embankment will be scheduled during non-monsoon season;
- Surplus earth will be transported from the construction site and no other disposal will be allowed;
- Spillage of fuel/oils and other construction materials shall be contained with best handling/construction practices and strict skilled supervision;
- Appropriate sanitation and water supply facilities will be provided in the labor camps; and
- Proper sewerage disposal arrangements to be provided such as septic tanks and soaking pits at Camp Sites.

Soil Stability & Erosion

Potential Impacts

367. Significant excavation and slope cutting is expected for the project to negotiate level differences. The cut and fill volume of the proposed project is 2,662,000 cubic meter.

368. While every effort should be made to minimize the excavation by optimal utilization of the existing contours, the cutting and filling operations may lead to erosion due to loosening of topsoil. Excavation of soil approximately 2,050,000 m³ may alter the topography and may also lead to soil erosion. This impact would be of moderate significance.

Mitigation Measures

369. By adopting following measures, impact would be finally of low significance:

- Erosion control measures such as ramming of topsoil immediately after excavation and silt controls will be provided to minimize erosion;
- Construction work will not be carried out during heavy monsoon rains;
- It will be ensured that no soil is left unconsolidated after completion of work;
- Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites;
- Monitoring during the project execution will ensure compliance to the above mitigation measures and their adequacy;
- Prepare material borrowing and disposal plan by the contractor;
- Obtain written consent of the land owner for material (soil) borrowing;
- Keep photographic record (before, during, after) for borrow and disposal areas;
- Leveling of borrow sites;
- Possible natural areas with a high elevation will be demarcated for borrowing earth material;
- Strip and stockpile the top 300 mm of the plough layer for redressing the land where the use of agriculture land is unavoidable;
- Where deep ditching is to be carried out, the top 1 m layer of ditching area will be stripped and stockpiled. The ditch will be initially filled with scrap material from construction and then leveled with the stockpiled topsoil;
- Ditches or borrow pits that cannot be fully rehabilitated will be landscaped; and
- Land owners will be compensated according to the terms of lease agreement.

Soil Contamination

Potential Impacts

370. Soil may be contaminated as a result of fuel/oils/chemicals spillage and leakage, and inappropriate disposal. The waste would be generated from site clearance, excavation, concrete batching, concrete conveyance and construction of substructures and superstructures. This impact would be of moderate significance. The generated solid waste would be in the form of:

- Excavated soil;
- Residual from construction material (construction debris etc.);
- Residual from equipment cleaning (oiled rags, used oil, worn out spare parts etc.); and
- Domestic solid waste from labor camps.

Mitigation Measures

371. By adopting following measures, impact would be finally of low significance:

- The surplus soil from the excavation activity may be reused within the site or recycled to other intervention sites;
- Clearance waste and construction debris should be sent to designated disposal site while waste from equipment cleaning and maintenance should be segregated and stored in color coded containers, these can be resold or reprocessed. No accumulation of solid waste at site shall be allowed;
- Avoid Vehicular traffic on unpaved roads as far as possible;
- Vehicles and equipment shall not be repaired in the field;
- If unavoidable, impervious sheathing shall be used to avoid soil and water contamination;
- Solid waste should be disposed of at designated places and contractor to obtain NOC from district governments for disposal of any material in existing disposal points; and
- Contractor to prepare a primary and secondary solid waste collection system within the premises of contractor camps and get approved by BID.

□ Increase in Ambient Noise

Potential Impacts

372. During baseline survey, the recorded ambient noise level was found to vary between 25 to 30 dB (A). When the project activities would start, it is very likely that the existing noise level would be amplified.

373. The major sources of noise pollution during construction activities would be during slope cutting, excavation, loading, transportation, loading/unloading of materials and operation of construction equipment etc. The vibrators used for concreting also produce noise. The amplified noise levels will be temporary in nature and easily mitigated. At most of the construction sites, there are no major sensitive receptors except for some native reptiles that may inhabit the proposed sites will be temporarily affected by noise.

374. The equipment to be used for the construction of Sri Toi Dam is mostly powered by internal combustion engines including earth moving equipment, handling materials and stationary equipment. An outline of major machinery and vehicles that are envisaged to be required for the project construction works along with its maximum noise level are given in the following Table 50.

375. Construction machinery and vehicle numbers and anticipated noise level from the machinery and vehicles are presented in Table 45 below.

Table 50: Noise pollution sources and Relative Range of Noise

S	Machinery/Equipment	Noise Levels, dBA at 15m									
		60		70		80		90		100	
		60	65	70	75	80	85	90	95	100	105
1	*Excavators	6						92			

2	Dumpers	4									
3	Batching Plants	1									
4	Loaders	2					92				
5	Power Generators	6									
6	Rollers	4									
7	Tractor Trolley	6									
8	Transit Mixer	1									
9	Compactor / Roller	2									
10	Crane	1									
11	**Crush Plant	1					92				
12	Concrete Pump	1				82					
13	Vibro Hammer	1									
14	Welding Generators	4									
15	Watering Tanks (moveable)	3									
16	Haulage Trucks	40									
17	Cars/Pickups	15									

Range of sound levels from various types of construction equipment to be used for GTC (Sources: Analysis in the light of US-EPA 1972).

376. The above table depict that use of construction equipment will change the noise levels in nearby settlements, which is approximately 16 km from project site. However, in comparison with Residential Area Noise Quality Standards by WHO the values are within the range.

Mitigation Measures

377. Enhanced noise levels could be prevented and mitigated by careful planning of machinery operations, use of low noise equipment and scheduling of operations only during the daytime in order to reduce these levels.

378. Though the impact of noise may be of temporary nature, the following measures shall be considered and implemented:

- Construction contract will clearly specify the use of equipment emitting noise of not greater than 85 dB (A) for the eight-hour operation shift;
- High noise emitting equipment if any will be fitted with noise reduction devices such as mufflers and silencers wherever possible;
- For protection of construction workers, earplugs will be provided to those working very close to the noise generating machinery;
- High noise emitting equipment if any will be used during regular working hours so as to reduce the potential of creating a noise nuisance during the night;
- Slope Cutting activity will be carried out during fixed hours (preferably during mid-day). The timing should be made known to all the people within 500m from the site in all directions;

- Regular inspection and maintenance of the construction vehicles and equipment will be carried out;
- Replacement of worn out and noise producing parts of construction machinery will be timely done; and
- In case of severe noise, sound barriers will be used to avoid dispersion of sound waves into the nearby community.

379. The implementation of the above measures will generate impacts of low significance.

Water Availability

Potential Impacts

380. Water is available through Karaiz at nearby villages. Labor influx will stress water consumption temporarily. However, it should make sure that contractor will not use village Karaiz for construction and drinking purposes as estimated that water for drinking and construction for the 36 months span of construction period is 81,000 cubic meters and 20,000 cubic meters respectively. In case of water usage from domestic sources (Karaiz), may cause impact of moderate significance.

Mitigation Measures

381. Balochistan Power and Irrigation Department should make arrangements to supply water during construction for drinking as well as construction purposes.

382. Alternately the contractor shall procure water bowsers and store water on site for drinking and construction purposes.

383. Implementation of the above measures will generate impacts of low significance.

Blockage of access due to construction works

Potential Impacts

384. Blockage of access road due to construction activity could cause traffic congestion and will interrupt the construction works.

Mitigation Measures

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

386. A traffic diversion plan should be formulated by the contractor and shall be approved by the Supervision Consultant.

❑ Deterioration of Flora

Potential Impacts

387. The surrounding area is dry and arid. Flash floods occur in case of intensive rain. It is estimated that the system has the potential of 57 MCM of water covering around 971 km². Livelihood of resident of Sri Toi depends on pastoral activities and rain fed agriculture. The geography of the area is comprised of Hills, Foothills, plains and stream beds. Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover-mainly comprising of shrubs. No tree species were recorded during the transact survey. The construction activity will be no negative impact on the flora of the project area.

❑ Deterioration of Fauna

388. The impacts on wildlife will be negligible and the construction activity will have no negative impact on the fauna of the project area .

❑ Socio-economic Impacts

Potential Impacts

389. The construction activity would involve people of labor class frequenting the area for the entire length of construction period. The surrounding residential area is inhabited by people who associate very closely with a certain set of cultural values. The area being a part of a rural setup, it is quite uncommon for residents to experience and easily adjust to the presence of outsiders in their areas for any length of time. The significance of the impact is considered to be moderate.

Mitigation Measures

390. By adopting following measures, impact would be finally of low significance:

- In case, people from outside the area are engaged in the construction or operation of the project activities, this might result in cultural conflict with the local communities. Therefore, it is imperative to engage local work force as much as possible, and also develop and implement a strong community communication and participation plan;
- The contractor will be liable to engage at least 50% of its required (unskilled) labor force from within or around the project area; and
- It is highly recommended that the project proponent includes some CSR measures specifically for the tail-end population.

□ Health & Safety

Potential Impacts

391. Various activities during the construction phase of the project could have health & safety impacts on workers and the people living in the nearby vicinity.

392. The activities such as loading and unloading of excavated soil and construction material will be expected during the construction phase of the project. Workers safety would be at risk if they are not adequately trained. The impact on worker safety will be direct and of moderate significance.

393. During the construction of structures, activities such as fabrication, installation of formwork, installation of scaffoldings could have serious safety risks to the workers. The use of heavy machinery and vehicle is expected during the excavation and transportation activities. The safety of workers is of prime concern while dealing with such machineries and vehicles. The probability of such accident at project site is low but the significance might be of moderate nature.

Mitigation Measures

394. By adopting the following measures, the impact would be finally of low significance:

- Usage of heavy machinery will be planned carefully and only skilled persons will be allowed to operate the equipment;
- Provisions of proper signboards and informing the local people about the activity will be important. In addition, personal protection equipment such as helmets, gloves, dust masks, boots and earmuffs etc. will be provided for the workers;
- Adequate water supply and sanitation facilities will be provided in the labor camps;
- Caution signboards for the road users and surrounding people will be provided to avoid any accidents at the work site;
- In case of traffic diversions, proper signboards will be provided sufficiently ahead of the work site; and
- First aid facility should be in place and an ambulance should be available at site for 24 hrs.
- Contractor should develop and implement Health and Safety Manual for Construction works.
- 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 will prepare Site-specific EMP (SSEMP) , Contractors Health and Safety Plan (HSP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant.

7.4.3 Impacts during Operation and Maintenance Phase

395. This will be the phase where major impacts, both positive and negative, can surface, and the earlier predictions could be validated. This phase will comprise commissioning the new interventions. While the operations phase entails mostly engineering activities, it has an equally important requirement of inter-departmental coordination, for harvesting the full potential of positive impacts of the project.

Unavailability or Improper Distribution of Irrigation Water in the Area

Potential Impacts

396. 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

- It is obvious that more consistent and regulated availability of water will be a beneficial outcome. To further improve the situation, BID could play a key role to involve the local staff of agriculture department to ensure the best utilization of available water;
- As previously mentioned, many area people mentioned the need for potable water supply arrangements for the area. Once the consistent availability of water is assured, the Local Government could make potable water supply arrangements for the nearby villages;
- Agreements between different communities;
- Water management rules and regulations must incorporate ways to tackle such issues as water scarcity and surplus flows;
- Local water user associations and groups need to be trained and involved to operate the canals, channels, gates, inlets, outlets and other structures;
- Compensate downstream Farmers in case of any water rights losses; and
- Discourage Spate agriculture.
- Desilting of irrigation channel on regular intervals.

397. Above measures will step down the significance of impact from moderate to low.

Breaching of Dam, Canal and Structures

Potential Impacts

398. Breach of dam, canal and irrigation structures is unlikely to occur. However, it will threaten system sustainability and following factors may also contribute to this process:

- Improper operation of water control facilities;
- Reservoir sedimentation
- Deterioration of free board due to cattle trespass and other factors;

- Tampering of outlets;
- Canal siltation;
- Action of borrowing animals such as rats and porcupines;
- Inadequate supervision;
- Lack of timely and adequate repairs; and
- Lack of coverage of hydraulic gradient.

Mitigation Measures

399. To mitigate the above-mentioned impacts following measures shall be adopted:

- BID (Irrigation Department) to monitor the system regularly;
- The important facilities that need attention and annual maintenance are canal embankments, falls and control structures and bed levels which are affected by siltation or scour. Canal section has been designed to ensure safety by following the standard design principals to design the banks against piping. In addition, all *nullah* crossings have been provided with Cross-drainage structures of at least 40 years return period flood capacity with adequate freeboard. For major *nullahs*, canal syphons have been provided so that *nullah* flows unhindered and therefore does not cause damage to the canals;
- Include capacity building of the communities in the O&M activities;
- Liaise with the communities to identify potential weaknesses in the system that could cause breaches;
- Ensure that the canal brick lining is regularly monitored to avoid any cracking impact from weathering;
- The construction and rehabilitation of flood protection bunds as part of the project will be regularly checked to undertake any prone damage;
- Repairs on urgent basis; and
- Emergency response plan for Dam and canal breach shall be followed, which is attached as **Annexure 16** of this report.

400. Above measures will step down the significance of impact from moderate to low.

□ Use of Irrigation Water for Drinking Purposes

Potential Impacts

401. Karaiz is the only existing water source in the project area. With availability of sweet water in the canal, there will be a tendency to use it for potable purposes as well. However, this may lead to health-related issues. This impact would be of moderate significance.

Mitigation Measures

402. To mitigate the above-mentioned impacts following measures shall be adopted:

- Train local community on safe drinking water;
- Coordinate with Local Government to install small filter plants at suitable locations for potable water;
- Place warning and information signs about dangers of using irrigation water for potable purposes;
- Local Government to assure potable water quality as per WHO/ GOP standards;
- Turbidity and free residual chlorine tests shall be regularly performed;
- Arsenic will be tested as per WHO/GOP standards; and
- Keep continuous check on the site by employing security professional to check and shun the water usage (for potable purposes) by local public.

403. Above measures will step down the significance of impact from moderate to low.

❑ **Ground Water Contamination in Command Area**

Potential Impacts

404. New irrigation infrastructure might hinder and adversely affect the natural drainage pattern. This may result in localized flooding. This may also lead to water use rights issues later on. However, the current natural flow of rain water is such that it generally comes in flash floods from the hill torrents in the Project Area. In case of improper drainage system ground water will contaminate (become brackish). This impact would be of moderate significance.

Mitigation Measures

405. By adopting the following measures, the impact would be finally of low significance:

- Periodic maintenance of drainage structures; and
- Ground water monitoring wells should be established in command area to monitor the salinity of ground water by BID.

❑ **Disposal of Waste (Connection of Waste Streams) in the Canals**

Potential Impacts

406. This impact will lead to serious health issues and will be of moderate significance.

Mitigation Measures

407. Proper monitoring of canals alignment and disconnect all identified waste streams would step down the significance of impact to low.

- Keep regular monitoring through that no waste is dumped within the canals; if it is dumped, fine should be imposed;
- Arrange awareness programs for the local public to educate them about the harms caused by disposal of waste into canals;
- Labelled sign boards to avoid entry of waste disposal;

Enhanced / Induced Use of Fertilizers and Pesticides

Potential Impacts

408. 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

409. By adopting the following measures, the impact would be finally of low significance:

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

Increase of Agricultural Lands

Potential Impacts

410. The cultivated area currently is very low. The reason for this low level of cultivation is poorly distributed rainfall, and poor position of perennial water streams (either natural or man-made). In the Project Area, the cropping intensity is around 0%. One of the key factors is that the area lacks a dependable irrigation system despite having the potential for one.

411. Hence it is safe to assume that the proposed project will increase the area under cultivation with a cropping intensity of around 120%. There may be tendency that farmers may cultivate crops at their own decisions that may also affect efficient use of water. The impact should be of moderate nature.

Mitigation Measures

412. By adopting the following measures, the impact would be finally of low significance:

- One aspect that will need to be monitored is that additional area under cultivation should be used for crops suitable to the overall climatic conditions of the area and farmers should follow the pattern as given in Agriculture Report of this Project; and.
- Increase in the cultivated area will also mean reduction in pastoral lands. However, the livestock would still benefit by using farm residue and mostly by availability of fodder crops. The Irrigation department (Project proponent) will work with the Agriculture department to ensure that stall feeding practices take root for livestock, so that the remaining pastoral lands are available for the wild animals.

□ Periodic Cleaning and Maintenance of the System

Potential Impacts

413. The blessing of any available resource might be wiped out by poor governance. Non-functional water use associations, leakage, improper maintenance of structure, broken outlets, and poorly maintained field channels may result in unequal utilization of water. This impact would be a moderate significant impact.

Mitigation Measures

414. By adopting the following measures, the impact would be finally of low significance:

- The proposed project is an integrated irrigation program. The proponent will also facilitate it to become an integrated community development program through formal structure made by BID and through the community engagement. Timely and correct sharing of information will enable other line departments to implement their own development schemes in the area;
- The BID will develop and implement a proactive maintenance plan for the proposed project, with predefined periodicity;
- Monitoring results;
- Ensure proper disposal of waste at designated landfill/disposal sites; and
- Efficiency of the system will be at its best by adopting proper maintenance activities such as silt removal and bed scratching at periodic intervals.

□ Community Participation for Management and Operation of the Irrigation System

Potential Impacts

415. The impact may lead to social and system sustainability issues and would be of moderate significance.

Mitigation Measures

416. By adopting the following measures, the impact would be finally of low significance:

- Ensure community participation in management and operation of the irrigation system; by implanting O & M manual for Farmers' management of Irrigation System prepared as a separate document for Sri Toi Irrigation Project;
- Training of related communities; and
- Interaction of FAO with the rest of community is recommended throughout the Project implementation. Moreover, any change in the design or structure or operation if incurred, it must be done in consultation with the local public.

□ Disruption to Wildlife**Potential Impacts**

417. Expected changing behavior of the wildlife for movement and drinking water due to canal is envisaged. The other impacts which likely to be occur is as follows:

- The dam traps sediments, which are critical for maintaining physical processes and habitats downstream of the dam (include the maintenance of productive deltas, barrier islands, fertile floodplains and coastal wetlands).
- Agriculture expansion will disturb habitat and use of chemical sprays will affect biodiversity.
- Discharge of toxic matters (pesticides, toxic metals etc.) and their condensation in food chain may affect sensitive animals immediately; all living organisms may expire when the stream becomes unable to recover itself.
- Hunting of migratory birds because of wetland may affect their population

418. The impact may lead to wildlife conservation issues and would be of moderate significance.

Mitigation Measures

419. Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. Watershed management activities on the catchment and stream bank will be afforested. Agricultural advisory services will be started to grow organic vegetables and crops. Biological control of pests will be adopted through agriculture department support. As dam will be constructed, with the coordination of Forest and wild life and conservation organization, environmental awareness regarding hunting control will be raised. It will be the responsibility of BID to ensure the proper maintenance of aforementioned structures. By adopting the aforementioned measures, the impact would be finally of low significance.

□ Safety

Potential Impacts

420. During the operational stage of project significant human safety issues will arise due to the impounding of the reservoir. These include the need to raise awareness of the dangers of drowning in the reservoir, especially due to the rapid changes in water level that will be experienced. This issue is particularly important for children. The impact may lead to safety issues and would be of moderate significance.

Mitigation Measures

421. A training program will be organized by BID at community level for safety practices adoption and ensure the community participation. This program should be instigated through the local schools to warn of these dangers to children. By adopting the aforementioned training on safety, the impact would be finally of low significance.

422. Team members of HSE shall be deputed for the prohibiting swimming in dam, spillway or dykes. Warning signs should be posted and restrict the personnel working or visiting the site to follow the instructions.

□ Risk due to Natural Hazard i.e. Flooding and Earthquakes

Potential Impacts

423. Occurrence of natural hazard i.e. flooding and earthquakes can damage even destroy the dam, canals and irrigation structures and will be a threat of system sustainability and impact would be of moderate significance.

Mitigation Measures

424. Emergency Response Plan for Flood Protection Bund will be followed which is attached as **Annexure 18** of this report. By adopting this measure, the impact would be finally of low significance.

7.5 Cumulative Impacts

425. The best definition of Cumulative Impact Assessment (CIA) is defined by The US Council on Environmental Quality as “the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions”

426. The purpose is to assess the impacts of Sri Toi Dam Project cumulatively with those of other proposed projects within AOI limits and this chapter has been prepared in accordance with TOR.

□ Methodology

427. AOI or Study Area of project is defined in Chapter 5 of this report that includes the area to be considered for cumulative assessment, Map showing the boundaries of AOI. This CIA draws on the findings from other assessments conducted as part of this EIA including:

- Chapter 5.0 Baseline
- Chapter 7.0 Impact Assessment

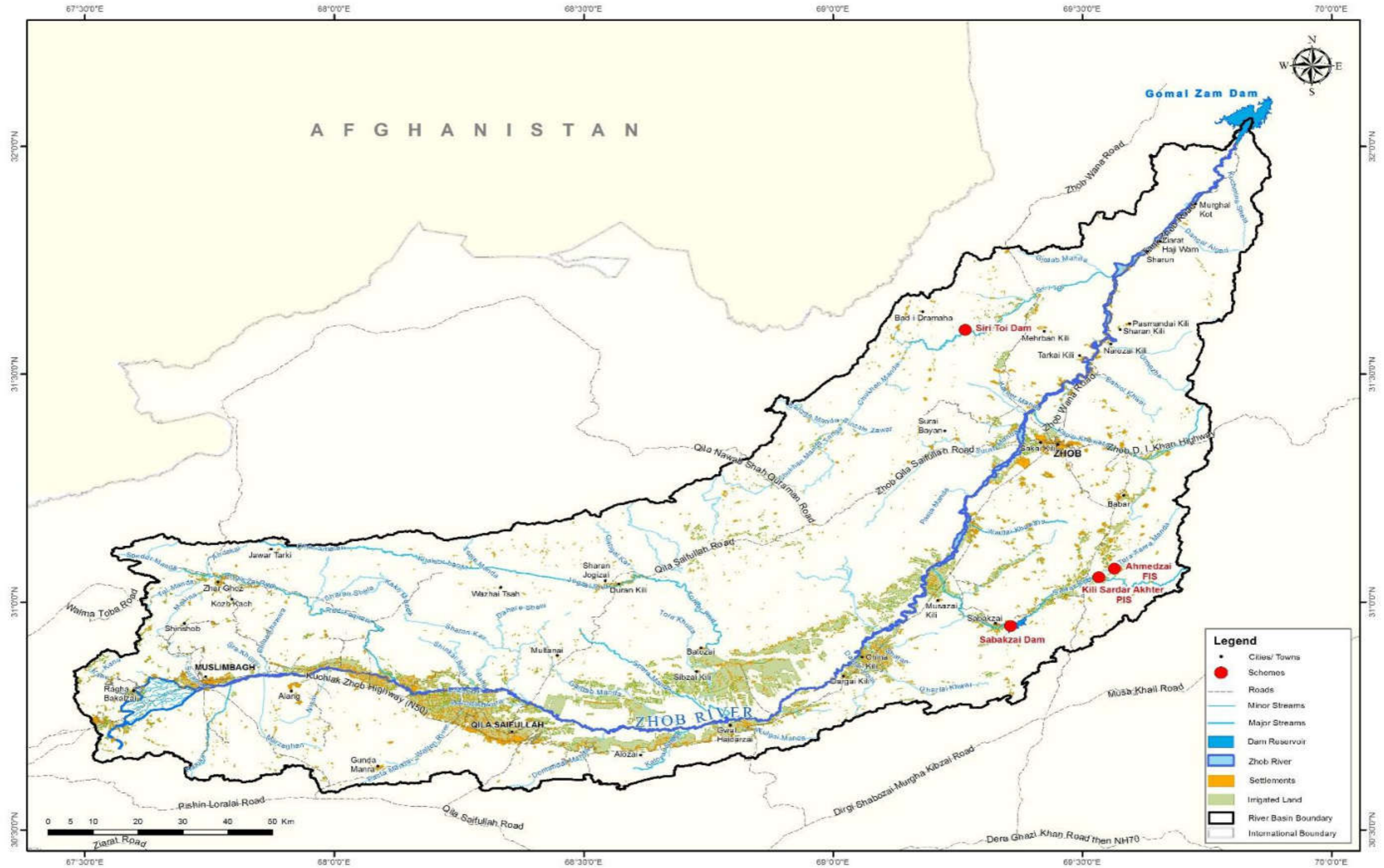
□ Identification of Current and Proposed Projects

428. CIA is a challenging task as its analysis builds upon information derived from direct and indirect impacts due to present and future interventions in a defined geographical area including the current and proposed project. Therefore, cumulative impacts on the projects are, in concept, related to (i) existing projects located within AOI of Sri Toi; and (ii) proposed developments planned within and nearby to AOI of Sri Toi. As a first step, an effort was made to identify the projects within the AOI through various sources such as district level departments, Government of Balochistan planned programs and information through locals. These projects will be considered along with Sri Toi Irrigation Project for direct and indirect effects as part of CIA. However, no planned projects were found within the AOI of Sri Toi Dam. Moreover, the following projects are planned under Balochistan Water Resources Development Project (BWRDP) Preparatory Technical Assistance by ADB:

- Ahmedzai Perennial and Floodwater Irrigation – Sub Project
- Sabakzai Dam Irrigation Project – Sub Project
- Killi Sardar Akhter Perennial Irrigation – Sub Project

429. Again, there will be no cumulative impact due to Sri Toi Irrigation Project and the above-mentioned projects as these are planned on different tributaries of Zhob River and are far away (70 – 100 kms) from the Sri Toi Project site. **Figure 27** presented below provides clarity regarding the distance of above-mentioned projects with Sri Toi Irrigation Project:

Figure 27: Location Map of Sri Toi Irrigation Project and Other Sub-Projects



7.6 Residual Impacts

430. Residual impacts after implementation of mitigation measures have also been evaluated and presented below in **Table 51**.

Table 51: Residual Impacts

Activity / Issue	Site Specific Impacts	Assessment of Risk	After Implementation of Mitigation Measures Residual Impacts
Construction of Dam, Main Canal, Left Canal & Right Canal and Irrigation Structures			
A. Design & Planning Phase			
Assessment of water availability	<ul style="list-style-type: none"> Failure of design 	C-3	C-1
Proper Dam site selection and its land acquisition (LARP Revision)	<ul style="list-style-type: none"> Design failure Social issues Resettlement/relocation of assets and displacement of people 	C-3	C-1
Spillway location	<ul style="list-style-type: none"> Prone to damage due to Seismic impacts 	C-5	C-1
Route selection (Alignment) of proposed new canal and its land acquisition	<ul style="list-style-type: none"> Social issues Resettlement/relocation of assets and displacement of people 	C-3	C-1
Water rights issues in the area	<ul style="list-style-type: none"> Social issues 	D-4	D-1
Design works construction of Dam, new canal and other irrigation structures as per proper engineering standards	<ul style="list-style-type: none"> In case of design failure system will be collapsed 	D-4	D-1
Dam reservoir sedimentation	<ul style="list-style-type: none"> System sustainability 	D-4	D-1
Public disclosure of final design	<ul style="list-style-type: none"> Social issues 	D-4	D-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	After Implementation of Mitigation Measures Residual Impacts
Coordination with all relevant departments for NOCs	<ul style="list-style-type: none"> Delay in project implementation & cost overruns 	D-4	D-1
Construction of metaled road of about 16 km from Killi Hazrat Sahab to Project site for transportation of construction material and other logistics.	<ul style="list-style-type: none"> Delay in project implementation & cost overruns 	B-2	B-1
Risk due to Natural Hazard i.e. flooding and earthquakes	<ul style="list-style-type: none"> System sustainability 	D-4	D-2
B. Implementation & Construction Phase			
Security and Safety Risks	<ul style="list-style-type: none"> Delay in project execution 	C-3	C-1
Continued stakeholder engagement	<ul style="list-style-type: none"> Social issues 	C-3	C-1
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	<ul style="list-style-type: none"> Changes in land use pattern Influx of external work force Social conflicts Workshop facilities may spread oils & chemicals Deterioration of air quality due to machinery & equipment Noise Land degradation due to solid waste disposal of camp site Water contamination 	B-2	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	After Implementation of Mitigation Measures Residual Impacts
	<ul style="list-style-type: none"> • Loss of vegetation • Health and Safety issues including COVID-19 related 		
Transportation of construction material	<ul style="list-style-type: none"> • Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues including COVID-19 related • Damage to infrastructure 	B-2	B-1
Excavation, backfilling and compaction works	<ul style="list-style-type: none"> • Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archaeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues including COVID-19 related • Blocked of access due to earth works and stockpiling of excavated material 	B-2	B-1
Construction of Dam and new canal	<ul style="list-style-type: none"> • Noise pollution • Air pollution • Health and safety issues including COVID-19 related 	B-2	B-1

Activity / Issue	Site Specific Impacts	Assessment of Risk	After Implementation of Mitigation Measures Residual Impacts
	<ul style="list-style-type: none"> Blocked of access due to construction works 		
Construction activities due to additional scope ¹⁸ at Dam, Spillway and Dyke	<ul style="list-style-type: none"> Air pollution Health and safety 	B-2	B-1
Road Pavement	<ul style="list-style-type: none"> Air pollution Noise pollution Traffic Congestion Health and safety Social disruption 	B-2	B-1
Construction of structures	<ul style="list-style-type: none"> Noise pollution Air pollution Water contamination Health and safety issues including COVID-19 related Blocked of access due to construction works 	B-2	B-1
C. Operation & Maintenance Phase			
Unavailability or improper distribution of irrigation water in the area	<ul style="list-style-type: none"> Social issues 	C-3	C-1
Breaching of Dam, canal, and structures	<ul style="list-style-type: none"> System sustainability 	D-4	D-2
Use of irrigation water for drinking purposes	<ul style="list-style-type: none"> Health issues 	C-3	C-1
Ground water contamination in command area	<ul style="list-style-type: none"> In case of improper drainage ground water will be contaminated 	C-3	C-1

¹⁸ Additional Scope involves - Change in design of D/S slope of main dam embankment
- Change in design of slope protection of main dam and Dyke - Change in design of spillway structure and provision of plum

Activity / Issue	Site Specific Impacts	Assessment of Risk	After Implementation of Mitigation Measures Residual Impacts
Disposal of waste (connection of waste streams) in the canal	<ul style="list-style-type: none"> Health issues Social issues 	C-3	C-1
Use of fertilizers & pesticides	<ul style="list-style-type: none"> Banned fertilizer & pesticides will cause health issues Contamination of fresh water through surface runoff 	C-3	C-1
Increase of agricultural lands	<ul style="list-style-type: none"> Loss of pastoral lands 	C-3	C-1
Periodic cleaning and maintenance of the system	<ul style="list-style-type: none"> Solid waste generation 	C-3	C-1
Community Participation for management and operation of the irrigation system	<ul style="list-style-type: none"> Social issues System sustainability 	C-3	C-1
Disruption to wildlife	<ul style="list-style-type: none"> Conservation issues 	C-3	C-1
Safety	<ul style="list-style-type: none"> Drowning issues 	C-3	C-1
Risk due to natural hazard i.e. flooding and earthquakes	<ul style="list-style-type: none"> System sustainability 	C-3	C-1

7.7 Positive Impacts due to Sri Toi Dam and Irrigation Project

431. Positive impacts due to proposed interventions are presented in **Table 52** with their enhancement measures:

Table 52: Positive Impacts of proposed interventions

Positive Impacts	Likelihood/Significance
The design modifications for the downstream (D/S) slope of the main dam embankment, slope protection of the dam and dyke, and spillway structure significantly enhance the	Likely/High

Positive Impacts	Likelihood/Significance
<p>environmental sustainability and safety of the Siri Toi Dam project. By addressing the identified eddies, the improved D/S slope design will prevent potential undercutting, thus reducing erosion and sedimentation downstream. This stability will protect water quality and aquatic ecosystems. The enhanced slope protection design, utilizing robust materials like riprap and sandy fill, will increase resilience against environmental stressors, further preventing erosion. Additionally, the spillway modifications will ensure controlled water discharge, minimizing the risk of flooding and maintaining downstream hydrological balance, which will benefit both human communities and natural habitats.</p>	
<p>Employment opportunities to some locals for design phase surveys.</p>	Possible/Low
<p>An anticipated positive impact on socio-economic conditions during construction phase is the creation of limited-time employment opportunity for the local population. Since the project interventions will require substantial input from manual labor, even people with relatively lower levels of education or skills could get short term employment.</p>	Possible/Moderate
<p>A substantial land will be irrigated under the proposed scheme.</p>	Almost Certain/High
<p>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.</p>	Almost Certain/High
<p>The Project will positively contribute in improving the carrying capacity of biological environment and overall improvement of the ecosystem.</p>	Almost Certain/High
<p>Availability of irrigation and agriculture would support livestock growth and in due course of time would enable farmers to diversify in areas of dairy production</p>	Likely/Moderate
<p>Water storage in the dam body will attract water birds especially those migrating from Siberia to warm area during winter. Depending upon the size of the water body, it serves the purpose of a wetland.</p>	Almost Certain/High

Positive Impacts	Likelihood/Significance
<p>Availability of water for cultivation of crops will support cropping during Rabi as well as Kharif season over the entire command area. During due course of time, availability of water will support agriculture and other production system and will help in converging into an integrated system wherein all the components of the ecosystem will be producing at their optimal level including the human element.</p>	<p>Likely/High</p>

8 ENVIRONMENTAL MANAGEMENT PLAN

8.1 General

502. 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.

503. 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.

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

8.2 Structure Of EMP

505. 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 Management Plan
- Environmental Monitoring Plan
- Implementation of EMP
 - NOC and other Approvals
 - Stakeholder Coordination
 - Trainings

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

8.3 Regulatory Requirements

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

8.4 Purpose & Need of the EMP

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

- Ensure that attention is paid to the actual environmental effects arising from construction, and operation of the proposed project;
- Ensure that anticipated impacts are maintained within the levels predicted;
- Ensure that unanticipated impacts are managed or mitigated before they become a problem; and
- Ensure that environmental management brings about real environmental benefits and achieves environmental sustainability, rather than the Environmental Approval Process being a mere paper chase to secure a development approval¹⁹.

8.5 Objectives of the EMP

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

8.6 Scope of the EMP

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

- Planning and Design Phase;
- Implementation and Construction Phase; and

¹⁹ Guidelines for Preparation and Review of Environmental Reports, 1997

- Operation Phase.

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

8.7 Institutional Arrangement for Implementation of EMP

511. 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 Sri Toi Irrigation Project. The final organizational structure, working and monitoring of Institutional setup would be proposed by the BID and would be finalized in consultation with ADB's Resident Mission in Pakistan.

8.7.1 Institutional Arrangements for Implementation of EMP during Construction Phase

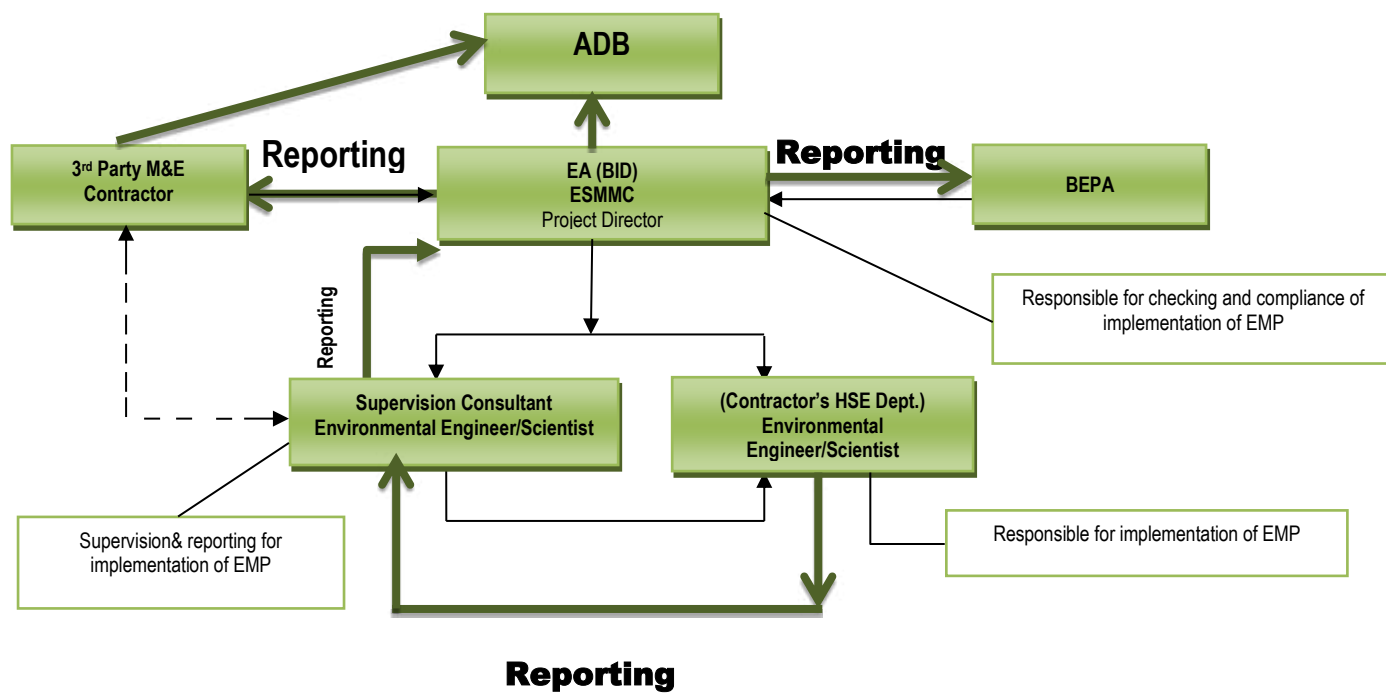
512. The Project Director (PMO, BWRDSP) will formulate an Environmental & Social Management and Monitoring Cell (ESMMC) which will comprise senior professionals, and should preferably have representative of various stakeholders including local administration.

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

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

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

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



□ Roles and Responsibilities

a) BEPA

516. BEPA is the regulatory authority for issuance of NOC for this proposed project. As part of its mandate, protection of environment is its responsibility. Therefore, this agency will undertake an audit (as and when required) of project activities with respect to the protocols as defined in EMP.

b) Third Party Monitor (Individual Consultant)²⁰

517. Third Party Monitor shall be responsible for:

- Review updated EMP and confirm that mitigation measures have been included in the detailed engineering design.
- Provide technical assistance to the project management office (PMO), implementing agencies, and contractors to implement the EMP.
- Review bidding documents to ensure that the EMP clauses are incorporated.
- Verifying the project's environmental performance to ensure that it complies with the national environmental legislation, requirements under Pakistan Environmental Protection Act, ADB's environmental safeguards as stipulated in Safeguard Policy Statement (SPS),

²⁰ Normally in other ADB's Projects 3rd Party M&E contractor performed the monitoring of EMP as well.

EIA, Site Specific Environmental Management Plan (SSEMP) and other related documents;

- Select the most critical areas of the EMP implementation such as “having significant impacts including cumulative ones”, “located near sensitive receptors/areas”, “having potential for residual impacts”, etc. based on the EIA/EMP;
- Conducting environmental monitoring of those critical areas. Monitoring can include instrumental and / or non-instrumental techniques (visual monitoring). The monitoring can also be used to validate the results of environmental monitoring conducted by the Contractor;
- Assess the capacities and resources of project proponent PMU, PMC and contractors in implementing and addressing all relevant environmental risks and impacts of project activities
- Coordinate with EA/ADB, the working schedule and inputs so as to be on-site when construction activities with potentially significant impacts are going on;
- Monitor both critical environmental as well as occupational and community health and safety areas; findings and recommend gap-filling and enhancement measures for the overall environmental management, with action plans agreed by the Executing Agency. Monitoring results shall be analyzed to identify key issues and gaps to be addressed during implementation of the EMP and Environmental risk mitigation measures, and recommendations shall propose clear actions. In case of unanticipated environmental impacts, providing guidance on the preparation of a corrective action plan, and monitor its implementation in coordination with the PIC;
- Monitor Grievance Redress Mechanism (GRM) database and resolution of complaints; Assess the effectiveness of the project’s Feedback and Grievance Redress Mechanism (FGRM) for project in terms of its accessibility, credibility, effectiveness in resolving grievances, resourcing, etc.
- Document the results of the monitoring activities;
- Report to EA/ADB quarterly, and immediately inform them in case of unpredicted potentially significant impacts;
- Preparation of quarterly environmental monitoring reports providing details related with (but not limited to) EMP compliance, monitoring of significant environmental impacts, as well as details on unanticipated impacts with mitigation measures. Details on GRM as well as any Health & Safety issues encountered at site will also be provided. Lastly, a conclusion and recommendation section will also be provided. The External Environmental Monitoring (EEM) Consultant will also furnish and provide a close out report at the end of construction phase.

- Prepare and submit bi-annual monitoring reports to ADB during construction phase of Siri Toi Dam subproject.

c) Project Director, PMO-BWRDSP:

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

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

d) Supervision Consultant: Resident Engineer

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

- To oversee the performance of Construction Contractor to make sure that the Construction Contractor is carrying out the work in accordance with the tender design and follow the specifications;
- Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;
- Strong coordination with the Construction Contractor and ESMMC.

e) Supervision Consultant: Environmental Inspector

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

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

f) Construction Contractor: Environmental Supervisor/Inspector

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

- Implementation of the mitigation measures at construction site;
- Contractor will be bond through contract to take actions against all the special and general provisions of the contract document;
- Contractor will make sure the compliance of EMP recommendations and will also be responsible for effective liaison with local heads of villages;
- Provision of proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use;
- To conduct the environmental and health & safety (especially COVID-19 related) trainings to the workers/labor; and
- Coordinate with RE/Environmental Specialist of SC.
- Baseline monitoring sample of air, water and noise is to be taken before starting civil works for establishing updated baseline.

□ Reporting Mechanism

522. 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.

523. 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.

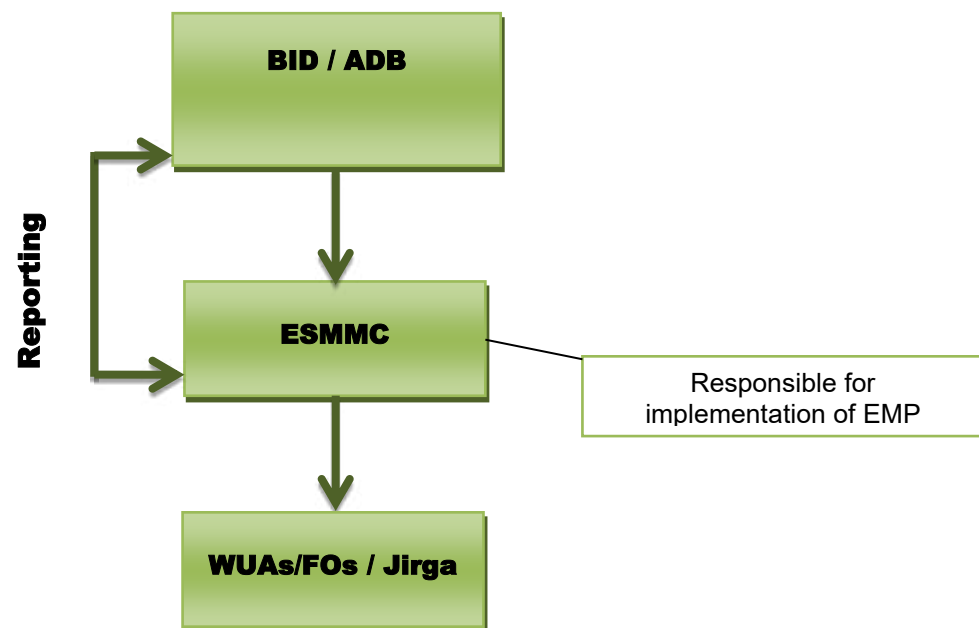
□ Non-Compliance of the EMP

524. 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

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

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



□ Roles and Responsibilities

a) Environmental Engineer/Scientist

526. 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

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

8.8 Environmental Management Plan

528. 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 53**. 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 53: Environmental Management Plan

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
Construction of Dam, Main Canal, Left Canal & Right Canal, Roads and Irrigation Structures				
A. Implementation & Construction Phase				
A1. Implementation and Contractor Mobilization Phase				
Social Disturbance due to Poor Expectation Management	Social issues	The project proponent should make formal arrangement for continued communication and engagement with local stakeholders, through the BID during construction activities. BID will formally keep in record all the issues and rational expectations desired by the local public in a register, to ensure that they are duly addressed and fulfilled by the end of the Project.	Record register of all the issues and rational expectations desired by the local public.	Irrigation Department
Continued stakeholder engagement	Social issues	Proponents to establish an environmental & social cell responsible for stakeholder engagement and timely information dissemination	Minutes of meetings of stakeholders consultation Dissemination material	Contractor ESMMC
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Communicable Diseases	Arrange to run an active campaign, in the labor camp, to make people aware of the cause, mode of transmission and consequences of HIV/AIDS/COVID-19; Strengthen the existing local health & medical services for the benefit of labor as well as the surrounding villages;	Training records Health and safety manual	Contractor

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>Ensure cleanliness and hygienic conditions at labor camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by Health Department; and</p> <p>Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents.</p>		
	Security and Safety Risks	<p>Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed.</p> <p>Control of public access to the site along with regulations aimed at safeguarding workers.</p> <p>Liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites</p>	Minutes of meetings of community consultation Dissemination material	Contractor
	Lifestyle and Culture	Timely and full public consultation and announcement of mobilizing equipment;	Minutes of meetings of community consultation Labor cultural training	Contractor

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>Establishment of formal links with affected communities; Seek assistance from and cooperation with local NGOs;</p> <p>Familiarize outside laborers on local etiquettes;</p> <p>Local labor should be employed for construction works. A dedicated quota (50%) of unskilled jobs should be allocated for the nearby villages; and</p> <p>Water supply and sanitation facilities, Contractor’s workforces should exacerbate the existing shortages and environmental hazards; contractor should primarily seek their own sources of water in due distance (min. 1 km) from local user’s wells.</p>	<p>records implementation of policy on local employments Employment record</p>	
	<p>Changes in land use pattern Influx of external work force Social conflicts</p>	<p>Select campsite in view of the cultural norms of the area to avoid undue interference of the Construction contractor’s staff with the local residents. Approval of campsite will be taken as per attached approval form in Annexure 19.</p> <p>Give priority employment to local residents.</p> <p>The land shall be rented for the camp</p>	<p>Monthly rent receipts. Development & implementation of policy on local employments Employment record</p>	<p>Construction Contractor Monitoring by Supervision Consultant and Reporting to ESMCC</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
	Workshop facilities may spread oils & chemicals	<p>site and equipment yard.</p> <p>Disposal of used oil and chemical waste in accordance with MSDS.</p> <p>Efficient Use of Chemicals.</p> <p>Good housekeeping practices at workshop areas.</p> <p>Mixing of waste into fresh water sources shall not be allowed.</p>	Visual inspection	Construction Contractor Monitoring by Supervision Consultant and Reporting to ESMMC
	Deterioration of air quality due to machinery & equipment	<p>Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits for air quality Annexure 5</p> <p>Water should be sprinkled where needed and appropriate, particularly if the campsite is near the communities;</p> <p>During windy conditions stockpiles of fine material will be wetted or covered with plastic;</p> <p>PPEs such as dust masks will be made available to the construction workers at the site to avoid potential health hazards;</p> <p>Idling of delivery trucks or other equipment will not be permitted during periods of unloading or when they are not in active use;</p>	Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are SO _x , CO, NO _x and particulate matter (PM _{2.5} , PM ₁₀) Evidence of measurement records.	Construction Contractor Monitoring by Supervision Consultant and Reporting to ESMMC

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>In no case, loose earth will be allowed to pile up along the approach roads;</p> <p>All vehicles and other equipment's used during construction will be properly and regularly tuned and maintained;</p> <p>All permanently deployed vehicles exhausts will be monitored against NEQS;</p> <p>The possibility of excessive dust generation may be reduced by adopting the best construction practices, precautions such as periodic watering, covering of construction material and usage of low emission equipment's during construction.</p> <p>Although blasting is not planned currently in any project activity, however at any latter stage during construction, blasting may be required for quarrying or any other activity. A blasting management plan has been attached as Annexure 15. Which need to be implemented by construction contractor.</p>		
	Noise	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and</p>	<p>Monitoring compliance to NEQS Annexure 5 for noise (SRO 72 (KE) / 2009)</p> <p>The sampling shall be done</p>	<p>Construction Contractor</p> <p>Monitoring by Supervision</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		lubrication of the construction vehicle and equipment. Use of PPEs by the workers Avoid night time activity	twice on monthly basis at 7m distance from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)	Consultant and Reporting to ESMMC
	Soil contamination due to solid waste disposal of camp site	Ensure proper disposal of camp site waste at designated disposal sites according to waste management plan attached as Annexure 20 . An impervious liner shall be laid to waste sites before the dumping of solid waste. The approval for impervious liner shall be granted by Supervision Consultant on a form attached in Annexure 19 . Good housekeeping practices within the camp site. Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed. Construction work will not be carried out during heavy monsoon rains; Clearance waste and construction debris should be sent to designated disposal site while waste from equipment	Visual inspection Solid waste management plan Photographic records	Execution by Construction Contractor Monitoring by Supervision Consultant and EMMP implementation reporting to ESMMC

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>cleaning and maintenance should be segregated and stored in color coded containers, these can be resold or reprocessed. No accumulation of solid waste at site shall be allowed; Avoid Vehicular traffic on unpaved roads as far as possible;</p> <p>Vehicles and equipment shall not be repaired in the field;</p> <p>If unavoidable, impervious sheathing shall be used to avoid soil and water contamination;</p> <p>Solid waste should be disposed of at designated places and contractor to obtain NOC from district governments for disposal of any material in existing disposal points; and</p> <p>Contractor to prepare a primary and secondary solid waste collection system within the premises of contractor camps and get approved by BID.</p>		
	Water contamination	Proper sewerage disposal arrangements to be provided such as septic tank and soaking pits for camps.	Monitoring compliance to NEQS Annexure 5. of sanitary wastewater generated from Camp Site. Waste management plan in place Photographic record	Construction Contractor Monitoring by Supervision Consultant and EMMP implementation

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
	Loss of vegetation	<p>The construction crew shall use LPG as cooking fuel. Use of fuel wood shall not be allowed.</p> <p>Although as per impact assessment Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover-mainly comprising of shrubs. No tree species were recorded during the transact survey. The construction activity will have no adverse impact on the flora of the project area. However, if any possibility of such practice may arise, following mitigation measure shall be adopted:</p> <p>Tree cutting to be done only when absolutely necessary, with prior approval as per form given in Annexure 19.</p> <p>Compensatory tree plantation in consultation with Forest department. Removal of one (01) tree should be compensated by plantation of ten (10) trees as per Forest (Amendment) Act 2010.</p>	<p>Use of LPG cylinders at campsite</p> <p>Tree cutting approvals</p> <p>Pictorial evidence of compensatory tree plantation</p>	<p>reporting to ESMMC</p> <p>Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.</p>
	Health and Safety issues	<p>Protective fencing around the camps.</p> <p>Firefighting equipment at the camps.</p>	<p>Use of personal protective equipment</p>	<p>Construction Contractor Monitoring by Supervision</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>Firefighting training to the camp staff.</p> <p>First aid facility should be in place.</p> <p>An ambulance should be available at site for 24 hrs.</p> <p>The contractor will prepare Sitespecific EMP (SSEMP), Contractors Health and Safety Plan (HSP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant/BID²¹</p> <p>Contractor to prepare OHS plan & SOP to manage COVID-19 risks and get it approved by Supervision Consultant.</p>	Contractors Health and Safety Plan (HSP) & SOP to manage COVID-19 risks in place	Consultant and reporting to ESMMC.
Transportation of construction material	Soil erosion and contamination	<p>Avoid vehicular traffic on unpaved roads as far as possible.</p> <p>Vehicles and equipment shall not be repaired in the field and all the repairing work will be done at designated workshop facilities.</p> <p>Construction material should be covered while transportation.</p>	Log of vehicle and equipment repairs	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.

²¹ Contractor will make these plans take 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",

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		If unavoidable, impervious sheathing shall be used to avoid soil and water contamination.		
	Air pollution	<p>Minimize operation of vehicles and machinery close to the water channels, water reservoir.</p> <p>Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions</p>	<p>Route maps of vehicle movement</p> <p>Log of vehicle maintenance</p>	<p>Construction Contractor</p> <p>Monitoring by Supervision Consultant and reporting to ESMMC.</p>
	Noise pollution	<p>Vehicles to have exhaust mufflers (silencers)</p> <p>Nighttime traffic shall be avoided near the communities.</p> <p>Inform local population beforehand if nighttime traffic is unavoidable.</p>	<p>Log of vehicle movement time</p> <p>Visual inspections of the vehicles</p>	<p>Construction Contractor</p> <p>Monitoring by Supervision Consultant and reporting to ESMMC.</p>
	Health and Safety issues	<p>Road signage fixed at appropriate locations</p> <p>Train all drivers on defensive driving</p> <p>Low vehicle speeds 15 km/hr near / within the communities.</p>	<p>Visual inspections</p> <p>Training record</p>	<p>Construction Contractor</p> <p>Monitoring by Supervision Consultant and reporting to ESMMC.</p>
B2. Construction Phase				
Excavation, backfilling and compaction works	Soil erosion	<p>Prepare material borrowing and disposal plan</p> <p>Avoid cultivation fields for borrowing material to the extent possible</p> <p>Obtain written consent of the land</p>	<p>Evidence of plan in place.</p> <p>Photographic record</p>	<p>Construction Contractor</p> <p>Monitoring by Supervision Consultant and reporting to ESMMC.</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		owner for material (soil) borrowing Keep photographic record (before, during, after) for borrow and disposal areas. Leveling of borrow sites.		
	Water availability for construction works	BID should make arrangements to supply water during construction for drinking as well as construction purposes Alternately the contractor shall procure water bowsers and store water on site for drinking and construction purposes	Permit of water supply Contract agreement with water suppliers	Irrigation Department Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
	Site overburden	Consider wind direction while selecting sites for stock piles. Keep Stockpiles of overburden covered. Ensure proper disposal of construction waste at designated disposal sites. Take approval for selection of solid waste disposal site if landfill is not available from Supervision Consultant on the form attached in Annexure 19 . An impervious liner shall be laid to waste sites before the dumping of solid waste. The approval for impervious liner shall be granted by supervision consultant on a form attached in Annexure 19 .	Visual inspections Monitoring Particulate Matter PM ₁₀	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>It will be ensured that no soil is left unconsolidated after completion of work;</p> <p>Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites;</p> <p>Prepare material borrowing and disposal plan by the contractor.</p>		
	<p>Borrow pit</p>	<p>Possible natural areas with a high elevation will be demarcated and used for borrowing earth material.</p> <p>Strip and stockpile the top 300 mm of the plough layer for redressing the land where the use of agriculture land is unavoidable.</p> <p>Where deep ditching is to be carried out, the top 1 m layer of ditching area will be stripped and stockpiled. The ditch will be initially filled with scrap material from construction and then leveled with the stockpiled topsoil.</p> <p>Ditches or borrow pits that cannot be fully rehabilitated will be landscaped.</p> <p>Land owners will be compensated according to the terms of lease</p>	<p>Monthly rent receipts.</p>	<p>Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		agreement. The approval forms are attached as Annexure 19 .		
	Damage to infrastructure	All damaged infrastructure shall be restored to original or better condition.	Visual inspections Photographic records Infrastructure restoration records	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
	Sites of Historical, Cultural, Archeological or Religious Significance	Proponent and the Supervision Consultant to ensure that the construction staff is educated about the location and importance of the cultural sites that exist in the Project Area. Contractor to ensure that these sites are not affected by the construction related activities. These aspects will be included in the trainings to be conducted for the contractor’s staff. Stop the work immediately in case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance. Chance Find Procedure, attached as Annexure 21 . and Antiquities Act 1975 should be followed. No disturbance to Graveyards during the construction activities.	Evidence of training provided to contractor staff. Evidence of maps in place with these sites shown. Records of appropriate action taken in case of chance find. Photographic record of chance find.	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
	Noise pollution	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and lubrication of the construction vehicle and equipment</p> <p>Use of PPEs by the workers</p> <p>Avoid night time activity</p>	<p>Monitoring compliance to NEQS Annexure 5. for noise (SRO 72 (KE) / 2009)</p> <p>The sampling shall be done twice on monthly basis at 7m distance from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)</p>	<p>Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.</p>
	Air pollution	<p>Proper engine tuning of machinery/equipment to meet National Environmental Quality Standards of Pakistan limits shall be ensured. NEQS for ambient air quality is attached as Annexure 5.</p> <p>Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.</p>	<p>Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are SO_x, CO, NO_x, particulate matter (PM_{2.5}, PM₁₀).</p> <p>Evidence of measurement records.</p>	<p>Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.</p>
	Health and Safety issues	<p>The contractor will prepare Site-specific EMP (SSEMP), Contractors Health and Safety Plan (HSP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant/BID*²⁴</p> <p>Health & safety plan & SOP to manage COVID-19 risks should be prepared by contractor and get it approved by</p>	<p>Contractors Health and Safety Plan (HSP) & SOP to manage COVID-19 risks in place</p> <p>Use of personal protective equipment</p>	<p>Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		Supervision Consultant		
	Blockage of access due to earth works and stockpiling of excavated material	<p>A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.</p> <p>A traffic diversion plan should be formulated by the Contractor and shall be approved by the Supervision Consultant.</p>	Traffic diversion plan	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
Construction of Dam, new canal , and irrigation structures	Water availability for construction works	<p>BID should make arrangements to supply water during construction for drinking as well as construction purposes</p> <p>Alternately the contractor shall procure water bowsers and store water on site for drinking and construction purposes</p>	Permit of water supply Contract agreement with water suppliers	Irrigation Department Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
	Noise pollution	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and lubrication of the construction vehicle and equipment</p> <p>Use of PPEs by the workers</p> <p>Avoid night time activity</p>	<p>Monitoring compliance to NEQS Annexure 5. for noise (SRO 72 (KE) / 2009)</p> <p>The sampling shall be done twice on monthly basis at 7m distance from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged)</p>	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
	Air pollution	Proper engine tuning of machinery/ equipment to meet NEQS of Pakistan limits shall be ensured. NEQS for	Monitoring shall be done on stack of machinery and equipment. The parameters	Construction Contractor Monitoring by

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>ambient air quality is attached as Annexure 5.</p> <p>Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.</p>	<p>required to be monitored are SO_x, CO, NO_x. particulate matter (PM_{2.5}, PM₁₀). Evidence of measurement records.</p>	Supervision Consultant and reporting to ESMMC.
	Health and safety issues	<p>The contractor will prepare Sitespecific EMP (SSEMP), Contractors Health and Safety Plan (HSP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant/BID*²⁴</p> <p>Health & safety plan & SOP to manage COVID-19 risks should be prepared by contractor and get it approved by Supervision Consultant</p>	<p>Contractors Health and Safety Plan (HSP) and SOP to manage COVID-19 risks in place in place Use of personal protective equipment</p>	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
	Blockage of access due to construction works	<p>A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.</p> <p>A traffic diversion plan should be formulated by the contractor and shall be approved by the Supervision Consultant.</p>	Traffic diversion plan	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
Additional Scope Construction activities at	Air pollution	<p>Proper engine tuning of machinery/equipment to meet NEQS of Pakistan limits shall be ensured. NEQS for ambient air quality is attached as Annexure 5.</p>	<p>Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored</p>	Construction Contractor Monitoring by Supervision Consultant and

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
Dam, Spillway and Dyke ²²		Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.	are SOx, CO, NOx. particulate matter (PM2.5, PM10). Evidence of measurement records.	reporting to ESMMC.
	Health and safety issues	The contractor will prepare Sitespecific EMP (SSEMP), Contractors Health and Safety Plan (HSP) and a Standard Operational Procedure (SOP) to manage COVID-19 risks. These plans will be approved by Supervision consultant/BID* ²⁴ Health & safety plan & SOP to manage COVID-19 risks should be prepared by contractor and get it approved by Supervision Consultant	Contractors Health and Safety Plan (HSP) and SOP to manage COVID-19 risks in place in place Use of personal protective equipment	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.
Construction of Road Pavement	Dust or other pollutants from stored materials and spoil heaps	The material being transported or stored at the stockpiles will be kept covered where necessary to avoid dust emissions.	Daily and Weekly Monitoring	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC
	Potential pollutants from construction machinery and vehicles	Proper engine tuning of machinery/equipment to meet NEQS of Pakistan limits shall be ensured. NEQS for ambient air quality is attached as Annexure 5.	Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are SOx, CO, NOx. particulate	Construction Contractor Monitoring by Supervision Consultant and reporting to ESMMC.

²² Additional Scope involves - Change in design of D/S slope of main dam embankment - Change in design of slope protection of main dam and Dyke
- Change in design of spillway structure and provision of plum

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
			matter (PM2.5, PM10). Evidence of measurement records.	
	Noise control from use of old or outdated machinery	<p>The contractor will strictly follow the NEQS for ambient noise.</p> <p>All necessary measures (such as noise barriers) will be taken to reduce the noise particularly near the communities.</p> <p>The personal protective equipment (PPE) will be provided to the construction workers and its usage will be made mandatory.</p> <p>Proper tuning of the vehicles will also be take place.</p>	Weekly	Construction Contractor
	Traffic Management	<p>Proper traffic management plan shall be formulated and announced before starting the construction plan to avoid traffic jams/public inconvenience;</p> <p>Plan the adequate signage, lightning devices, barriers, yellow tape during construction to manage traffic at construction sites; and</p> <p>Plan the timing for the movement of construction materials carrying vehicles to minimize traffic load and avoid the inconvenience to the local residents.</p>	Weekly	Monitoring by Supervision Consultant and reporting to ESMMC.
	Health and Safety on	Use of proper equipment, proper operation of equipment, minimizing	Daily	Construction Contractor

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
	Construction Sites	risks to all parties e.g. helmets, masks overall and presence of First Aid.		
	Social disruption	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	Daily	Monitoring by Supervision Consultant and reporting to ESMMC.
C. Operation & Maintenance Phase				
Unavailability or improper distribution of irrigation water in the area	Social issues	<p>Agreements between different communities/tribes and farmer organizations will lead to undisputed water distribution.</p> <p>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.</p> <p>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</p>	Agreement between parties Training records	Irrigation Department Water user association and farmer organizations

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>system among farmers, water user association and department is assured.</p> <p>Farmers in downstream areas should be compensated in case they lose their water rights.</p> <p>Discourage spate agriculture.</p>		
Breaching of Dam, Canal and Structures	Fatal accidents System sustainability	<p>BID should ensure the design review during operation phase by panel experts</p> <p>BID to monitor the system regularly.</p> <p>Include Capacity building of the communities in the O&M activities.</p> <p>Liaise with the communities to identify potential weaknesses in the system that could cause breaches.</p> <p>A training program should be executed by BID for locals with special emphasis on evacuation at emergency conditions.</p> <p>Emergency response plan for Dam and canal breach shall be followed, which is attached as Annexure 16 of this report</p>	Monitoring reports Visual Inspection	Irrigation Department ESMMC
Use of irrigation water for drinking purposes	Health issues	<p>Train local community on safe drinking water</p> <p>Coordinate with Local Government to</p>	WHO/ GOP Drinking Water Standards	Local Government

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>install small filter plants at suitable locations for potable water</p> <p>Put warning and information signs about dangers of using irrigation water for potable purposes</p> <p>Local Government to assure potable Water quality as per WHO/ GOP standards.</p> <p>Turbidity and free residual chlorine tests shall be regularly performed.</p> <p>Arsenic will be tested as per WHO/GOP standards.</p> <p>Keep continuous check on the site by employing security professional to check and shun the water usage (for potable purposes) by local public.</p>		
Ground water contamination in command area	In case of improper drainage ground water will be contaminated	<p>Periodic maintenance of drainage structures; and</p> <p>Ground water monitoring wells should be established in command area to monitor the salinity of ground water.</p>	TDS limits of ground water shall not exceed TDS limits of supplied irrigation water or ambient ground water TDS.	Irrigation Department
Disposal of waste (connection of waste streams) in the canal	Health issues	Proper monitoring of canals alignment and disconnect all identified waste streams	Visual inspection Monitoring and training records	Irrigation Department

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>Arrange awareness programs for the local public to educate them about the harms caused by disposal of waste into canals;</p> <p>Labelled sign boards to avoid entry of waste disposal;</p>		
Enhanced / Induced Use of Fertilizers and Pesticides	<p>Banned fertilizer and pesticides will cause health issues</p> <p>Contamination of fresh water through surface runoff</p>	<p>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</p> <p>Ammonium Nitrate (AN) and Calcium Ammonium Nitrate (CAN) fertilizers will not be allowed</p> <p>Use of restricted pesticides identified by WHO shall not be allowed</p> <p>Proper drainage system</p>	<p>Visual inspection</p> <p>Monitoring records</p> <p>Market survey for availability of AN and CAN fertilizers</p>	Agriculture Department
Increase of agricultural lands	Loss of pastoral lands	<p>One aspect that will need to be monitored is that additional area under cultivation should be used for crops suitable to the overall climatic conditions of the area and farmers should follow the pattern as given in Agriculture Report of this Project; and.</p> <p>Increase in the cultivated area will also</p>	Monitoring records	<p>Agriculture Department</p> <p>Forestry Department</p> <p>Wildlife Department</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		<p>mean reduction in pastoral lands. However, the livestock would still benefit by using farm residue and mostly by availability of fodder crops. The Irrigation department (Project Proponent) will work with the Agriculture department to ensure that stall feeding practices take root for livestock, so that the remaining pastoral lands are available for the wild animals.</p>		
<p>Periodic cleaning and maintenance of the system</p>	<p>Solid waste generation</p>	<p>The proposed project is an integrated irrigation program. The proponent will also facilitate it to become an integrated community development program through formal structure made by BID and through the community engagement. Timely and correct sharing of information will enable other line departments to implement their own development schemes in the area;</p> <p>The BID will develop and implement a proactive maintenance plan for the proposed project, with predefined periodicity;</p> <p>Ensure proper disposal of waste at designated landfill/disposal sites; and Efficiency of the system will be at its best by adopting proper maintenance activities such as silt removal and bed scratching at periodic intervals..</p>	<p>Periodic cleaning records Visual inspection</p>	<p>Irrigation Department Water User Association</p>

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
Community Participation for management and operation of the irrigation system	Social issues System sustainability	Ensure community participation in management and operation of the irrigation system; by implantiing O & M manual for Farmers' management of Irrigation System prepared as a separate document for Sri Toi Irrigation Project; Training of related communities; and Interaction of FAO with the rest of community is recommended throughout the Project implementation. Moreover, any change in the design or structure or operation if incurred, it must be done in consultation with the local public.	Training records Community participation records	Irrigation Department Water User Association
Disruption to Wildlife	Conservation issues	Design has already provided cattle drinking troughs at different intervals and pedestrian bridge for canal crossing approximately at 500 m interval. BID to ensure the proper maintenance of aforementioned structures. Watershed management activities on the catchment and stream bank will be afforested. Agricultural advisory services will be started to grow organic vegetables and crops. Biological control of pests will be adopted through agriculture department support. As dam will be constructed, with the coordination of Forest and wild life and	Monitoring and maintenance records	Irrigation Department Wildlife Department

Activity	Potential Impact	Mitigation Measures	Implementation Indicators	Party(ies) Responsible for Implementation
		conservation organization, environmental awareness regarding hunting control will be raised.		
Safety	Drowning issues	<p>A training program will be organized by BID at community level for safety practices adoption and ensure the community participation. This program should be instigated through the local schools to warn of these dangers to children. By adopting the aforementioned training on safety, the impact would be finally of low significance.</p> <p>Team members of HSE shall be deputed for the prohibiting swimming in dam, spillway or dykes. Warning signs should be posted for personnel working or visiting the site to follow the instructions..</p>	Training records Community participation records	Irrigation Department
Risk due to Natural Hazard i.e. Flooding	System sustainability	Emergency Response Plan for Flood Protection Bund will be followed which is attached as Annexure 18 of this report.	Emergency Response Plan	Irrigation Department

8.9 Environmental Monitoring Plan

529. Importance of “monitoring” cannot be over-emphasized since it provides timely and useful information to the project management, implementation agencies and the policy decision makers. Conceptually, “monitoring” means to check and assess, on a regular basis, the status of the project activities and realization of various developmental targets during operation and maintenance. It helps in timely identification / analysis and removal of the bottlenecks and expediting actions. In fact, project monitoring is a tool to serve the interests of the project planners, executors and operation managers, as they share common concern for timely corrective measures.

8.9.1 Monitoring Strategy

530. Under the proposed monitoring strategy, it is recommended that ESMMC (BID) should be responsible for all the monitoring activities. All the findings and results in the form of an annual monitoring report will be finally passed on BEPA Officers. The monitoring program has been designed carefully considering the identified impacts (**Chapter-7**) and some additions or deletions may be taken up in this program after learning lessons from one-year operation of the project through Change Record Register. **Table 54** provides environmental monitoring schedule for construction and operational stages of Sri Toi Project.

Table 54: Environmental Monitoring Plan

Sr. No.	Description	Monitoring Location	Monitoring Parameters	Frequency of Measurement	Executor
1.	a) Surface Water b) Ground water	<ul style="list-style-type: none"> Just downstream slope of main dam embankment proposed Sri Toi Water Dam (and from Sri Toi river close to Dyke) - 2 samples Project area dug well/tubewell (nearby to construction area) – 1 sample 	<ul style="list-style-type: none"> pH Temperature Electrical Conductivity(EC) Dissolved Oxygen (DO) Turbidity Total Dissolved Solids (TDS) Total Suspended Solids, (TSS), CaCo₃, hardness, Potassium, Nitrate, Nitrite (as NO₂), Phosphate, Arsenic, Total Coliform, Faecal Coliform etc 	<ul style="list-style-type: none"> One time (before start of construction activities) Quarterly (construction) Bi-annually (operation) 	Contractor BID
2.	Ambint Air Quality	<ul style="list-style-type: none"> Dam reservoir site/ construction area(dam embankment , dyke, spillway etc) Batching plant Labor Camp sites; Borrow areas; 	<ul style="list-style-type: none"> NO_x, SO_x, CO and Particulate matter (PM₁₀). 	<ul style="list-style-type: none"> One time (before start of construction activities) (duration: 24 Hour monitoring) Quarterly (construction) (duration: 24 Hour monitoring) 	Contractor BID
3.	Soil Erosion	Construction sites (main dam embankment , dyke, spillway) , campsite, access roads, borrow area.	Visual observations for street or rill/gully erosion.	During routine monitoring of entire project activities especially after	Contractor

Sr. No.	Description	Monitoring Location	Monitoring Parameters	Frequency of Measurement	Executor
				rains.Parameters: Soil texture, pH, EC, Available Phosphorus and SAR..	
4.	Dust Emissions	<ul style="list-style-type: none"> Camp sites; Borrow areas; Construction sites (main dam embankment , dyke, spillway)	<ul style="list-style-type: none"> Visual checks 	<ul style="list-style-type: none"> Weekly (construction) where construction is in progress 	Contractor
5.	Noise Pollution	Construction site, camp site, access roads, communities within 500 m of construction site.	<ul style="list-style-type: none"> Noise measurement 	<ul style="list-style-type: none"> One time (before start of construction activities) Once a week throughout the Construction phase. Quarterly (construction) (duration: 24 Hour monitoring) 	Contractor BID
6.	Visual check for vegetation loss	Construction site(main dam embankment , dyke, spillway), campsite, access roads, borrow area.	Type and number of tree species uprooted.	At the beginning of construction activities	Contractor
7.	Solid Wastes	On camp site and Construction site(main dam embankment , dyke, spillway).	Any sign of soil or water contamination;	Daily during whole Construction phase	Contractor

8.10 Planning for Implementation of EMP

8.10.1 NOC and Other Approvals

EPA Approval Process

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

8.10.2 Stakeholder Coordination

532. 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.

533. 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.

534. The related institutional arrangements should also be in place for continuous consultation throughout the process of planning and implementation.

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

8.10.3 Trainings

536. 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.

537. 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 55**.

Table 55: Personnel Training Program

Training Provided by	Contents	Trainees	Duration
Training consultant organizations specializing in environmental management and monitoring Training Consultant will be Supervision Consultant	Short seminars and courses on: Environmental laws and regulations, daily monitoring and supervision	<ul style="list-style-type: none"> • Irrigation staff • Contractor project staff • Project implementation staff 	1 day
Training consultants/ organizations specializing in social management and monitoring	Short seminars and courses on: Social awareness	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Contractor's staff 	2 days

8.10.4 Communication & Documentation

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

Data Recording and Maintenance

539. 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. Checklist of Mitigation Measure Record as **Annexure 22**. Tracking system will be developed to file the implementation of mitigation measures on a weekly basis.

□ Database

540. The database may include the following information:

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

□ Meetings

541. 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.

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

□ Social Complaint Register

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

□ Photographic Records

544. 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.

8.11 Grievance Redressal Mechanism

545. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation. APs will be fully informed of their rights and of the procedures for addressing complaints whether verbally or in writing during consultation, survey, and time of compensation. A detailed project specific GRM is in Annexure 9.

8.12 Environmental Management Cost

546. The budget presented in **Table 56** and **Table 57** will include estimates for the cost of mitigation measures, staff employed for implementation of the EMP, tree plantation, and technical assistance.

Table 56: Cost for Contractor

Sr. #	Description	Unit Cost in PKR/Month*	Unit Cost in USD/Month**
1	Laboratory Analysis Cost	125,000	458
2	Contractor Environmental Engineer (each contractor)	80,000	293
3	Health & safety measures to manage COVID-19	3000,000 for whole project period	10989
4	baseline prior construction on air, water and noise parameters	400,000 (Once)	1465
5	Solid Waste Management	2,000,000 for remaining project period	7326
6	First Aid	500,000 additional for remaining project period	1836
7.	Water Sprinkling to suppress dust	1,000,000 for remaining project period	3663

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

Where one USD=273 PKR

Table 57: Cost for Proponent

Sr. #	Description	Unit Cost in PKR*	Unit Cost in USD
A	During Construction Period		
1	Supervision Consultant/Environmental Officer	150,000/Month	550
2	Third Party Monitoring	500,000/Quarter	1832
3	Training on EMP	100,000/day	366
		Total	
B	During Operation & Maintenance Period (for initial three years)		
1	Laboratory Analysis Cost	50,000/Six Months	183
2	Training & Community Engagement Cost	50,000/Month	183
3	Third Party Monitoring	300,000/ Six Months	1099

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

547. Contractor will do baseline monitoring of air, water and noise before starting civil works for establishing updated baseline.

8.13 Change Management

548. The EIA and the EMP have been drawn up during the Feasibility Stage of the project. However, these are dynamic documents and it is foreseen that during the detailed design stage the documents may be updated and the EMP will be refined. The refinement of the EMP will need to take account of the results of the monitoring of air, noise and water quality. In addition, any major changes in the design of the project will need to be reviewed in the light of possible environmental impacts and if necessary then any additional mitigation and enhancement programs be added to the EMP. During the construction phase of the project, monitoring will need to be accompanied by a rapid feedback decision taking system that allows any corrective action to be taken if things are not as predicted. The whole environmental management system is a dynamic process that has to be responsive and also anticipate conditions.

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

- At the detailed design phase, the EMP should be updated and refined to take into consideration changes in the design. This work will be carried out by Consultants who will also be responsible for the updating the EIA report;
- Once a Main Contractor has been appointed then a meeting will need to be held between the proponent of the project, the Supervisory Consultants and the contractor to clearly define the environmental management responsibilities of each party. The detailed nature of the EMP will need to be discussed and agreed, including a matrix of items and

responsibilities related to the timing of the construction works and the contracts;

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

9 CONCLUSIONS AND RECOMMENDATIONS

551. This section presents the major conclusions and key recommendations of the EIA study.

9.1 Findings

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

553. There are some further considerations for the planning stages such as submission of EIA report to BEPA for grant of No Objection Certificate for the proposed Sri Toi Water Storage Dam and Irrigation Project under Balochistan Environmental Protection Act 2012.

554. Land Acquisition and Resettlement (LAR-Planning) will be involved and forms the subject of a separate study report under this project. Reader is directed to LARP prepared separately under this proposed project.

555. Construction of Sri Toi dam 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.

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

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

558. 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.

559. **Changes in the flora and fauna of the area:** The construction of Sri Toi dam and the resultant agriculture crop cultivation over an area of 9,951 acres will bring very drastic changes in the flora and fauna of the area. Water storage in the dam body will attract water birds especially those migrating from Siberia to warm area during winter. Depending upon the size of the water body, it serves the purpose of a wetland. Similarly, the natural vegetation present in the command area and the faunal population dependent upon the flora, will also be removed for bringing the area under cultivation. Therefore, the agriculture and fodder crops introduced

in the area will not only change the vegetation structure but will also attract new fauna. Bringing command area under-cultivation is thus going to completely change the vegetation and related faunal species, which may have beneficial impacts upon the overall ecosystem.

560. ***In the post-BWRDP scenario, surface water availability in the basin will be around 457 MCM. With the proposed Sri Toi water storage dam and irrigation system the net withdrawal will be around 41.72 MCM; therefore, balance water available will be around 415.28 MCM. This is sufficient for maintaining environmental flows and continue to contribute inflows to the Gomal Zam Dam without causing any ecological problems.***

561. **Change in the water table:** Water for crop production and drinking purposes is extracted from the ground. -Tube wells, diesel operated engines and Karez system are used by the community members for this purpose. Due to relatively good rainfall in the area and better porosity in the soils, a large portion of the run off infiltrates and percolates in the ground. It is because of this very reason that the water table in this part of the province has not been depleted to the extent as in the arid and hyper-arid areas. The availability of irrigation water to crops will help in maintaining and rise of water table. In future it is expected that water storage in the dam will not only help in raising the water table in the project area but the adjacent areas will also get benefitted in terms of water availability. Recharge of water table in the proposed command and adjacent area would greatly reduce the risk during years of below average rainfalls and droughts through pumping ground water for crop cultivation.

562. The adverse 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 EIA report.

563. Adverse environmental impacts during the construction phase are related with 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 (especially for unskilled jobs) to avoid cultural conflicts.

564. **Increase in the population:** Implementation of project and cultivation of 9,951 acres of land with agriculture and horticultural crops will attract a large number of individuals to the area for performing different functions in the area. Following the golden rule of division of Labor, the area will prove an empty niche for individuals related to a number of trades/skills ranging from tenancy to masons and motor mechanics, who will come and engage in their related trades to earn livelihoods. Demography of the area will change drastically resulting in a large population which will start exerting pressure on the available resources. Taking into account the increase in population, who will need all the basic necessities of life, it is important that the town planning should also be given due attention with the passage of time to avoid

pollution and other such environmental problems/issues. In case the growing population pressure in the area is not attended properly, it will give rise to many issues ranging from the need for basic necessities of life to conflicts on resources. Population increase is thus very important factor that needs to be taken care of from the very beginning otherwise it may nullify the benefits of projects.

9.2 Recommendations

9.2.1 Physical

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

566. The arid climatic conditions at the proposed project area and frequent drought cycles in Balochistan, requires that the farmers cultivate low delta crops especially in the horticulture sector such as grapes, almonds, pomegranate and olives.

567. Based on the adaptation measures suggested in the Climate Change Study, the following adaptation measures were included in the design of sub-projects:

- Provision of control gates/breast wall arrangements in the intake structures to have better control on diverted flows during excessive rainfall/flood events expected due to Climate Change.
- Increase in the capacities of surface irrigation network to provide additional flows to the farmers in the command area so that they can increase the cropping intensity and leading to enhanced income at the farm level. This adaptation measure was adopted in all the sub-projects.
- Design of spillways for possible maximum floods to manage the risks of extreme flood events.
- Adoption of land use practices which can also survive under both the wet and dry conditions like forest plants, shrubs and forages. Shortage of fuelwood is common in most of the areas and province imports fuelwood from other provinces. This is also a gender support adaptation, as women are solely responsible for the collection of fuelwood. This is the most important adaptation, as farmers are most vulnerable to the extreme events instead of structures, so that adaptations in land use would ultimately reduce the risks of flood and droughts on the livelihood of farming community.

568. Soil and water are the most precious assets a farmer has at the farm level. Both of these are considered as the key element in all the production systems related to farming/agriculture.

569. Water rights are equally distributed among the agriculturists according to the land holdings. The FOs in the sub-project areas have not been actively and need to be

strengthened. The Agriculture Extension Department in Balochistan can play a vital role in enhancing the cropping intensity of the proposed sub-project area with timely knowledge of best agricultural practices.

9.2.2 Biological

570. The district also falls in the route of migratory birds but there is no designated protected area in the district. Among wildlife, Cranes are highly important, as these are hunted and trapped in large numbers in the district. Since, there exists no protected area in the district; therefore, the protection of resident wildlife and safe resting grounds for migratory birds are not available at present.

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

572. Sri Toi like the whole district geography is typical of a mountain eco-system represents a typical pastoral dependence and rain fed agriculture. The habitat of the project area and its surroundings are broadly categorized as Hills, Foothills, plains and stream beds. Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover, mainly comprising of shrubs, no tree species was recorded during the field visit.

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

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

575. Baseline faunal survey recorded the occurrence of a total Seven mammal species, of which confirmed the occurrence of 3 species fox, wolf and Hyena through direct evidences like (pug marks, pelts, faces, territory marking signs and interviews with local residents. The Balochistan Black Bear, Suleiman Markhor and Afghan Urial, which was reported to occur in the past, are now apparently extinct. Cape hare was found very common in the entire area during survey. A total 07 Cape hare were counted during the survey. For the determination of population status of carnivores, nights walks were arranged. In the plains the survey team used vehicle and search lights. After seeing the eyes of carnivores in high powerful lights, noted the eye colors and consulted the literatures. In foothills, used search light in same way.

One Indian gray wolf, 2 red fox, 3 Asiatic jackals and one Indian Crested Porcupine were sighted. While indirect observations were made on the droppings, foot prints of several carnivore species such as striped hyena, Jungle cat, afghan hedgehog, Caracal and Indian gray wolf. Skin of Panther observed in a house, using for prayers.

576. Direct sight techniques like ground nests searching and stand watch techniques were used for this survey. 16 species of birds observed in the area. Chakoor and Seese partridges were found very common throughout the area. The birds were mostly observed near water points. 2 small flocks of Chakoor and see partridges were observed in the area. Hunters to trap eagles were observed on three different locations with hunting materials.

577. The survey team observed lizards in six different locations. At one location hunted Afghan Tortoise shell was observed. Many snake species are reported from the area. Due to hibernation period, no snake species observed in the present survey while 2 lizard species observed in the survey, Clif rcer (*Coluber rhodoracus*) and Agama (*Agama spp.*) are available in everywhere.

578. There are no notified protected areas present in the project vicinity. Approximately more than 200 km south of the project area is Tor Ghar Community Game Reserve in District Qila Saifullah game reserve.

9.2.3 Social

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

9.2.4 Agriculture

580. Farm forestry should be promoted at Sri Toi area which can bring three-fold benefits for the farmers. Trees would not only fetch good revenues for the farmers but would also add to soil fertility on the farm level. Further some of the trees would also help in providing fodder to the livestock, while fruit of few trees such as mulberry and fig would supplement family nutrition.

581. Agro-silvo-pastoral system an integrated approach in which where majority of farmers have small land holdings for crop production along with livestock and trees on the same piece of land; maximizes the productivity of land. Project area has a good potential to support models of Agro-silvo-pastoral systems.

582. Farmers of the area have low knowledge on modern agriculture practices hence they need capacity building. For capacity building of farmers, informal methods have proved more

effective than the formal class room lectures. Similarly, the practical demonstration of practices, tools, varieties etc. have shown better efficiency in terms of learning and application of these techniques. For the capacity building of farmers of the proposed command area, the modality of Farmer Field School (FFS) should be used.

583. **Farmer's Field School an important technique for capacity building of farmers:** Farmers of the area though have got some knowledge on the various agriculture practices, still for introduction of new varieties, tools and technologies they need some kind of capacity building/exposure. For this purpose, it would be much better that for capacity building of farmers of the proposed command area, the modality of Farmer Field School (FFS) should be used. FFS can help in dissemination of information on new technologies, varieties etc. FFS once organized can be used by the different agencies, NGO, companies dealing with the agriculture crop production for capacity building, promotion of products etc.

584. **Proper demarcation and preparation of land:** At present the proposed project area is lying in the form of a barren piece of land. The area belongs to Ahmed Khel sub-tribe of Mandokhel tribe and has not been put to settlement so far. The first step in bringing the area under cultivation is to conduct the settlement of the entire area. The settlement should follow the preparation and levelling of land for agricultural crop production. For land levelling proper techniques should be employed to allow for proper flow and drainage of water. Preparation and levelling of land should be followed by lay out for canals and distributaries, this will contribute to an efficient irrigation system, which is a pre-requisite for good agricultural crop production.

9.3 Conclusions

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

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

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

587. **“Some activities under this project have been identified to cause low to moderate environmental negative impacts and their mitigation measures have been prescribed. Proper and timely execution of these measures will reverse most of the negative impacts in the long term. Overall, the project causes higher positive impacts under the physical, ecological and socio-economic criterions and should be approved for implementation.”**

ANNEXURES

Annexure 1: REA (Rapid Environmental Assessment (REA) checklist for Irrigation)

Country/Project Title:

Pakistan/Balochistan Water Resources Development Project

Sector Division:

Zhob River – Core Sub Project [Sri Toi Dam Subproject (Central Core Earth Fill Dam).

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Sitting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area ²³	T		Project design will provide measures to ensure the minimum flow required.
Wetland		T	
Mangrove		T	
Estuarine		T	
Buffer zone of protected area		T	
Special area for protecting biodiversity ²⁴	T		Project design will provide measures to ensure the minimum flow required.
B. Potential Environmental Impacts Will the Project cause			
loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?	T		
conflicts in water supply rights and related social conflicts? ²⁵	T		EMP will provide measures to avoid conflicts by adopting local and traditional water rights mechanism already exists in the area.
impediments to movements of people and animals?	T		Project design shall include facilities for easy access of people and animals.
potential ecological problems due to increased soil erosion and siltation,	T		

²³ Zhob River ends in Gomal Zam River which is also a wetland and a protected status for wildlife sanctuary.

²⁴ Zhob River starts from Qila Saifullah specifically near Muslim Bagh which is famous for Apples and passes through whole Qila Saifullah and Zhob where they have stands of Wild Olives and Chilghoza which have conservation significance as it is threaten habitat.

²⁵ Already Gomal Zam Dam is taking water from Zhob River which may cause conflict.

SCREENING QUESTIONS	Yes	No	REMARKS
leading to decreased stream capacity?			
Insufficient drainage leading to salinity intrusion?		T	
over pumping of groundwater, leading to salinization and ground subsidence?		T	
impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?	T		
dislocation or involuntary resettlement of people?	T		
potential social conflicts arising from land tenure and land use issues?	T		
soil erosion before compaction and lining of canals?	T		
noise from construction equipment?	T		Noise control measures to be specified in the EMP. Impacts are transient.
dust?	T		Dust control measures to be specified in the EMP. Impacts are transient.
labor-related social problems especially if workers from different areas are hired?	T		Control measures to be specified in the EMP. Impacts are transient.
waterlogging and soil salinization due to inadequate drainage and farm management?	T		Project design shall ensure proper drainage design.
leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	T		
reduction of downstream water supply during peak seasons?	T		
soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	T		
soil erosion (furrow, surface)?	T		
scouring of canals?	T		
logging of canals by sediments?	T		
clogging of canals by weeds?	T		
seawater intrusion into downstream freshwater systems?		T	
introduction of increase in incidence of waterborne or water related diseases?	T		

Annexure 2: Pictorial Profile



Meeting at Forest Department, Quetta



Praying with Local Community at Dam Site near Hazrat Killi



Meeting with Stake holders at Dam Site near Hazrat Killi



Dam Site Option 2 Pondage Area

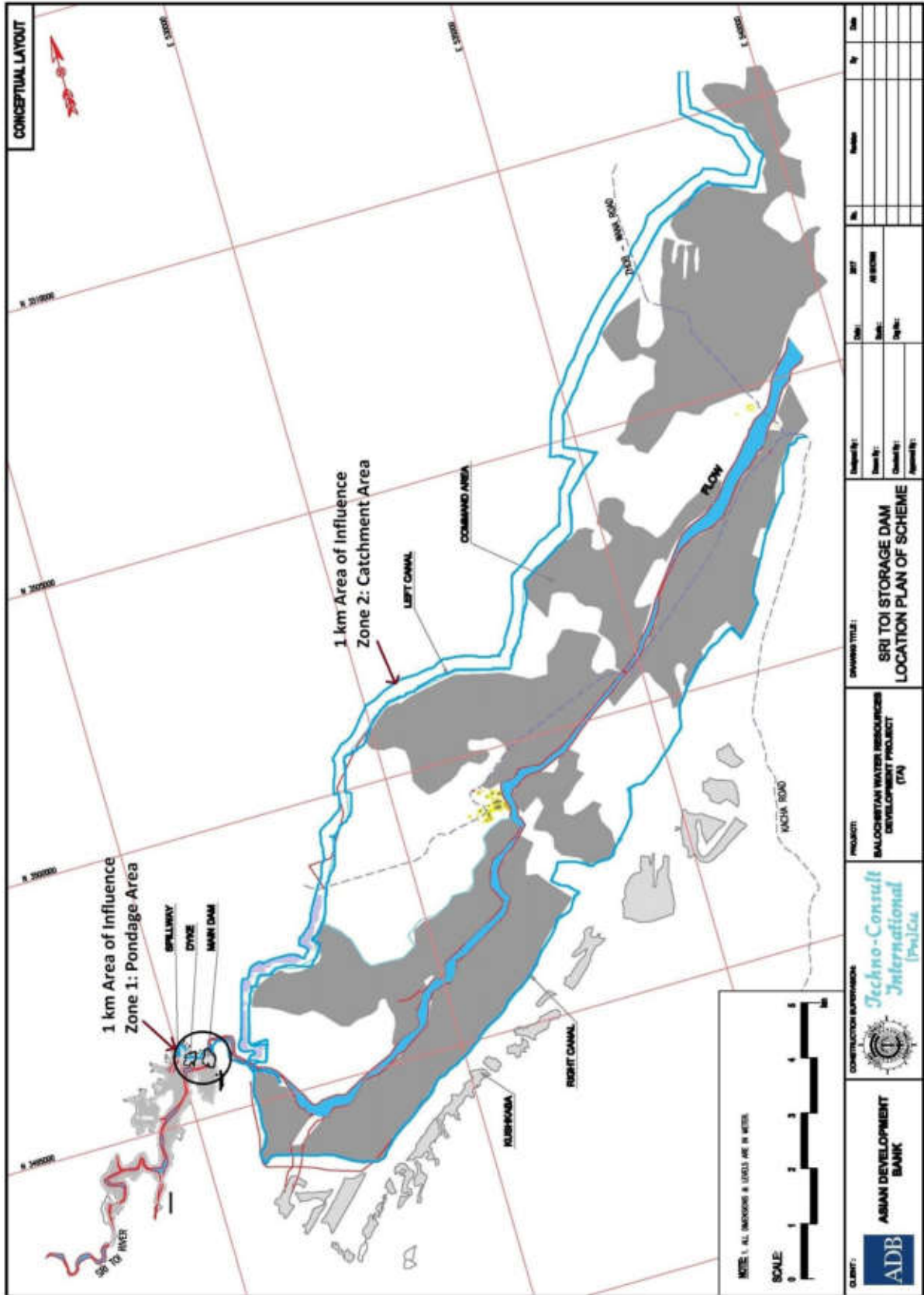


Dam Site Option 1 Pondage Area

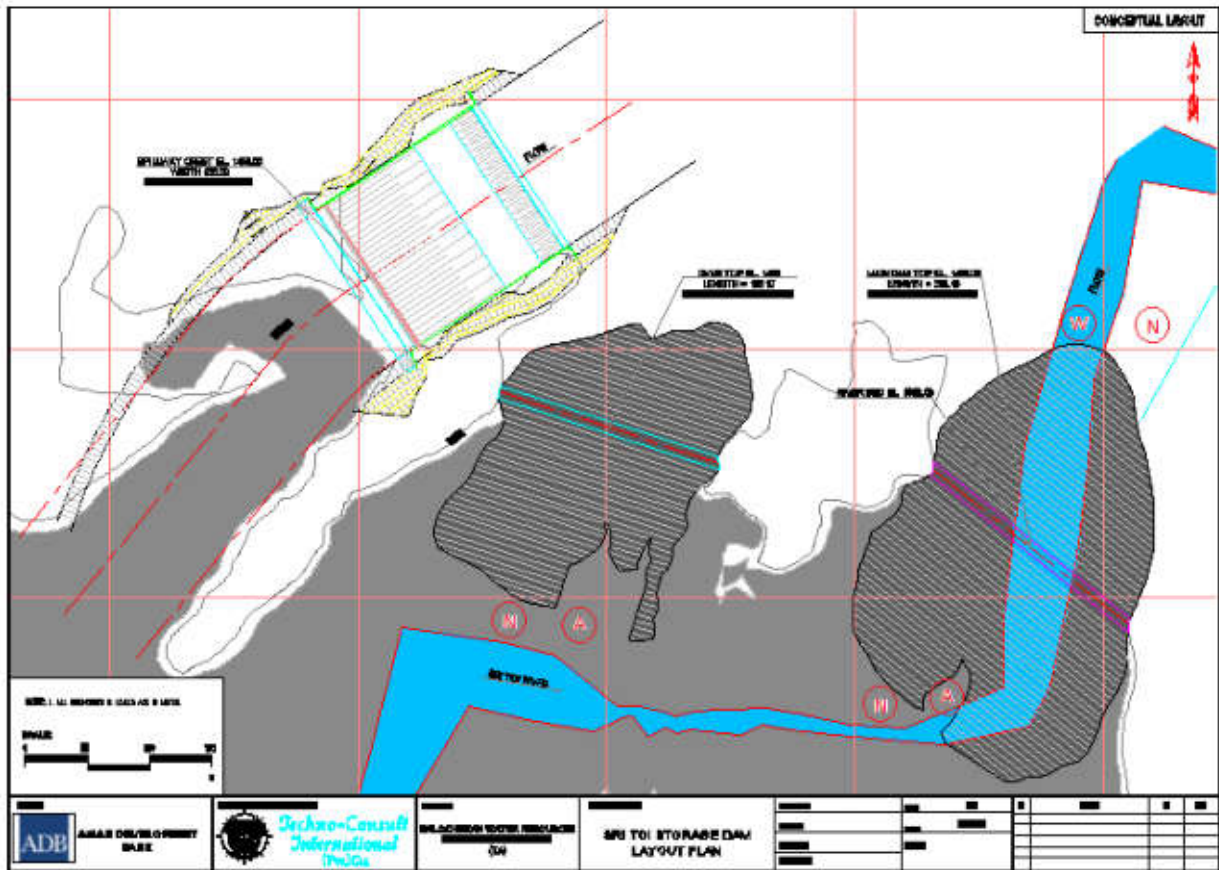


Meeting with Stakeholders at Malik Baaz Mohammad Residence

Annexure 3: Topographic Regimes



Annexure 4: Environmental Sampling Points



LEGENDS
for Sampling Points

(A) = Air; (W) = Water; (N) = Noise;

Annexure 5: National Environmental Quality Standards (NEQS)

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of Measurement
		Effective from 1 st January 2009	Effective from 1 st January 2012	
Sulphur Dioxide (SO ²)	Annual Average*	80µg/m ³	80µg/m ³	-Ultraviolet Fluorescence method
	24 hours**	120µg/m ³	120µg/m ³	
Oxides of Nitrogen as (NO)	Annual Average*	40µg/m ³	40µg/m ³	-Gas Phase Chemiluminescence
	24 hours**	40µg/m ³	40µg/m ³	
Oxides of Nitrogen as (NO ²)	Annual Average*	40µg/m ³	40µg/m ³	-Gas Phase Chemiluminescence
	24 hours**	80µg/m ³	80µg/m ³	
O ³	1 hour	180µg/m ³	130µg/m ³	-Non dispersive UV Absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µg/m ³	360µg/m ³	-High Volume Sampling, (Average flow rate not less than1.1m ³ /minute).
	24 hours**	550µg/m ³	500µg/m ³	
Respirable Particulate Matter.PM ₁₀	Annual Average*	200µg/m ³	120µg/m ³	-β Ray absorption method
	24 hours**	250µg/m ³	150µg/m ³	
Respirable Particulate Matter.PM _{2.5}	Annual Average*	25µg/m ³	15µg/m ³	-β Ray absorption method
	24 hours**	40µg/m ³	35µg/m ³	
	1 hour	25µg/m ³	15µg/m ³	
Lead(Pb)	Annual Average*	1.5µg/m ³	1 µg/m ³	-ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m ³	1.5µg/m ³	
Carbon Monoxide(CO)	8 hours**	5 mg/m ³	5mg/m ³	-Non Dispersive Infra Red (NDIR) method
	1 hour	10mg/m ³	10mg/m ³	
* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.				
**24 hourly/ 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but Not on two consecutive days.				

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

S. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
1	Smoke	Smoke opacity not to exceed	40%or2 Ring-lemann Scale	40%or2 Ring-lemann Scale or equivalent smoke number
2	Particulate matter ⁽¹⁾	(a) Boilers and furnaces:		
		(i) Oil fired	300	300
		(ii)Coal fired	500	500
		(iii)Cement Kilns	200	300
		(b)Grinding, crushing, clinker coolers and related processes, metallurgical processes, Converters, blast furnaces and cupolas.	500	500
3	Hydrogen Chloride	Any	400	400
4	Chlorine	Any	150	150
5	Hydrogen Fluoride	Any	150	150
6	Hydrogen Sulphide	Any	10	10
7	Sulphur Oxides ⁽²⁾ ⁽³⁾	Sulfuric acid/Sulphonic acid plants	400	5000
		Other plants except Power plants operating on oil and coal	400	1700
8	Carbon Monoxide	Any	800	800
9	Lead	Any	50	50
10	Mercury	Any	10	10
11	Cadmium	Any	20	20
12	Arsenic	Any	20	20
13	Copper	Any	50	50
14	Antimony	Any	20	20
15	Zinc	Any	200	200
16	Oxides of Nitrogen ⁽³⁾	Nitric acid manufacturing unit	400	3000

S. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
		Other plants except power plants operating on oil or coal:		
		Gas fired	400	400
		Oil fired	-----	600
		Coal fired	-----	1200

Explanations:

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

A. Sulphur Dioxide

Sulphur Dioxide Background levels Micro-gram per cubic meter ug/m³ Standards

Background Air Quality (SO ₂ Basis)	Annual Average	Max.24 hours Interval	Criterion I Max. SO ₂ Emission (Tons per Day per plant)	Criterion II Max. Allowable ground level increment to ambient (ug/m ³)
(One Year Average)				
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100ug/m³ linear interpolations should be used.

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

B. Nitrogen Oxide

Ambient air concentrations of nitrogen oxides, expressed as NO₂ should not be exceed the following:-

Annual Arithmetic Mean 100ug/m³ (0.05ppm)

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

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

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

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

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(asCl ⁻)	1000mg/L
10.	Fluoride (as F ⁻)	20mg/L
11.	Cyanide (asCN ⁻)	2mg/L
12.	An-ionic detergents ⁽²⁾ (as MBAS) ⁽⁵⁾	20mg/L
13.	Sulphate(SO ₄ ⁻)	600mg/L
14.	Sulphide (S ²⁻)	1.0mg/L
15.	Ammonia (NH ₃)	40mg/L
16.	Pesticides, herbicides, fungicides and	0.15mg/L
17.	insecticides Cadmium ⁽⁴⁾	0.1mg/L
18.	Chromium (4) (trivalent and hexavalent)	1.0 mg/L
19.	Copper ⁽⁴⁾	1.0mg/L
20.	Lead ⁽⁴⁾	0.5mg/L
21.	Mercury ⁽⁴⁾	0.01mg/L
22.	Selenium ⁽⁴⁾	0.5mg/L
23.	Nickel ⁽⁴⁾	1.0mg/L
24.	Silver ⁽⁴⁾	1.0mg/L
25.	Total toxic metals	2.0 mg/L
26.	Zinc	5.0mg/L
27.	Arsenic	1.0mg/L
28.	Barium	1.5mg/L
29.	Iron	2.0mg/L
30.	Manganese	1.5mg/L
31.	Boron	6.0mg/L
32.	Chlorine	1.0mg/L

Explanations:

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

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MOTOR VEHICLE
EXHAUST AND NOISE**

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

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Drinking Water Standards

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

Annexure 6: Pakistan Environmental Protection Act, 1997

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

The text of the Environmental Protection Act 1997 is as follows:

Act No. XXXIV of 1997

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

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

1) Short Title, Extent and Commencement

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

2) Definitions

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

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

- (a) impairment of, or damage to, human health and safety or to biodiversity or property;
- (b) pollution; and
- (c) any adverse environmental effect as may be specified in the regulation.

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

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

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

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

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

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

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

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

(x) "**environment**" means-

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

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

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

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

(xiv) "**Exclusive Economic Zone**" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

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

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

(xvii) "**Government Agency**" includes-

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

(xviii) "hazardous substance" means-

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3) Establishment of the Pakistan Environmental Protection Council-

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

(i) Prime Minister or such other person as the Prime **Chairperson**

Minister may nominate in this behalf.

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

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

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

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

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

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

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

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

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

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

4) Function and Powers of the Council

(1) The Council shall-

- (a) co-ordinate and supervise enforcement of the provisions of this Act;
- (b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;
- (c) approve the National Environmental Quality Standards;
- (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- (e) coordinate integration of the principles and concerns of sustainable development into national development plans and policies; and
- (f) consider the National Environment Report and give appropriate directions thereon.

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

5) Establishment of the Pakistan Environmental Protection Agency

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

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

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

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

(4) The powers and function of the Federal Agency shall be exercised and performed by the

Director General.

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

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

6) Functions of the Federal Agency

(1) The Federal Agency shall-

- (a) administer and implement the provisions of this Act and the rules and regulations made thereunder;
- (b) prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;
- (c) take all necessary measures for the implementation of the national environmental policies approved by the Council;
- (d) prepare and publish an annual National Environment Report on the state of the environment;
- (e) prepare or revise, and establish the National Environment Quality Standards with approval of the Council; Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure;
- (f) ensure enforcement of the National Environmental Quality Standards;
- (g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette, in consultation with the Provincial Agency concerned; Provided that
 - (i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;
 - (ii) where standards are less stringent than the National Environmental Quality Standards, prior approval of the Council shall be obtained;
 - (iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;
- (h) co-ordinate environmental policies and programmes nationally and internationally;
- (i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- (j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
- (k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation, for the purposes of this Act;
- (l) identify the needs for, and initiate legislation in various sectors of the environment;
- (m) render advice and assistance in environmental matters, including such information and data available with it as may be required for carrying out the purposes of this Act;
- (n) Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;
- (o) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
- (p) provide information and guidance to the public on environmental matters;
- (q) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
- (r) promote public education and awareness of environmental issues through mass media and other means, including seminars and workshops;
- (s) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
- (t) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;

- (u) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
- (v) perform any function which the Council may assign to it.

(2) The Federal Agency may-

- (a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;
- (b) request any person to furnish any information or data relevant to its functions;
- (c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
- (d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including:
 - (i) incentives, prizes, awards, subsidies, tax exemptions, rebates and depreciation allowances; and
 - (ii) taxes, duties, cesses and other levies;
- (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
- (f) provide or arrange, in accordance with such procedures as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7) Powers of the Federal Agency

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

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations made thereunder;
- (d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
- (g) enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;
- (h) take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
- (i) arrange for test and analysis of the samples at a certified laboratory;

- (j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time;
- (k) Provided that the power under clauses (f), (h), (i) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate; and
- (l) establish a National Environmental Coordination Committee comprising the Director-General as its chairman and the Director-Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter-provincial co-ordination in environmental policies;

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

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

(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the

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

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

(4) The powers and functions of the Provincial Agency shall be exercised and performed by the

Director-General.

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

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

9) Establishment of the Provincial Sustainable Development Funds

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

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

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

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

- (a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of environment; and
- (b) any other purpose which in the opinion of the Board will help achieve environmental objectives and the purpose of this Act.

10) Management of the Provincial Sustainable Development Fund

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

- i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department. **Chairperson**
- (ii) such officers of the Provincial Governments not exceeding six as the Provincial Government may appoint, including Secretaries in charge of the Finance, Industries and Environment Departments. **Members**
- (iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non-governmental organizations, and major donors. **Members**
- (iv) Director-General of the Provincial Agency. **Member/Secretary**

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

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

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

11) Prohibition of Certain Discharges or Emissions

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

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

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

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

12) Initial Environmental Examination and Environmental Impact Assessment

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

(2) The Federal Agency shall;

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

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

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

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

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

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

(7) The Federal Agency shall maintain separate Registers for initial environmental examination and environmental impact assessment projects, which shall contain brief

particulars of each project and a summary of decisions taken thereon, and which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

13) Prohibition of Import of Hazardous Waste

No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.

14) Handling of Hazardous Substances

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

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

or

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

15) Regulation of Motor Vehicles

(1) Subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the Federal Agency under sub-section (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16) Environmental Protection Order

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

- (a) immediate to stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;
- (b) installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;
- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency.

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

17) Penalties

(1) Whoever contravenes or fails to comply with the provisions of section 11, 12, 13, or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues: Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

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

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

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

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

- (a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;
- (b) sentence him to imprisonment for a term which may extend upto two years;
- (c) order the closure of the factory;
- (d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act; Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste.
- (e) order, such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and
- (f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorized by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of the is Act.

18) Offences by Bodies Corporate

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

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

Explanation:

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

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

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

20) Environmental Tribunals

(1) The Federal Government may, by notification in the official Gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the chairperson.

(5) An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution of, the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental

Tribunal shall be such as may be prescribed.

21) Jurisdiction and Powers of Environmental Tribunals

(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by:

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

(4) In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in the Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorized in this behalf by the Director-General of the Federal Agency or Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists of his having been involved in contravention punishable under sub-section (1) of section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal

Procedure, 1898 (Act V of 1898):

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

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

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22) Appeals to the Environmental Tribunal

(1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act and rules or regulations made thereunder may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23) Appeals from Orders of the Environmental Tribunal

(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24) Jurisdiction of Environmental Magistrates

(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An environmental Magistrate shall be competent to impose any punishment specified in sub-section (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by:

- (a) the Federal Agency, Provincial Agency, or Government Agency or local council; and
- (b) any aggrieved person.

25) Appeals from Orders of Environmental Magistrates

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

26) Power to Delegate

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

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

27) Power to give Directions

In the performance of their function under this Act:

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

28) Indemnity

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

29) Dues Recoverable as Arrears of Land Revenues

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

30) Act to Override Other Laws

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

31) Power to Make Rules

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

32) Power to Amend the Schedule

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

33) Power to Make Regulations

(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for:

- (a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;
- (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
- (c) appointment of officers, advisors, experts, consultants and employees;
- (d) levy of fees, rates and charged in respect of services rendered, actions taken and schemes implemented;
- (e) monitoring and measurement of discharges and emissions;
- (f) categorization of projects to which, and the manner in which, section 12 applies;

- (g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;
- (h) providing procedures for handling hazardous substances; and
- (i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34) Repeal, Savings and Succession

(1) The Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, order passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired, liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

(3) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE
(See Section 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), Paris, 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Aquaculture Centers in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio De Janiero, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janiero, 1992

Annexure 7: Pakistan EPA Review of IEE and EIA Regulations, 2000

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

1. Short title and commencement

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

(2) They shall come into force at once.

2. Definitions

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

(a) “Act” means the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997);

(b) “Director-General” means the Director-General of the Federal Agency;

(c) “EIA” means an environmental impact assessment as defined in section 2(xi);

(d) “IEE” means an initial environmental examination as defined in section 2(xxiv);
and

(e) “section” means a section of the Act.

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

3. Projects requiring an IEE

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

4. Projects requiring an EIA

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

5. Projects not requiring an IEE or EIA

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

Provided that the proponent shall file.

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

(b) for projects not listed in Schedules I and II in respect of which the Federal Agency has issued guidelines for construction and operation, an application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

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

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

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

6. Preparation of IEE and EIA

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

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

7. Review Fees

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

8. Filing of IEE and EIA

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

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

- (a) an application, in the form prescribed in Schedule IV; and
- (b) copy of receipt showing payment of the Review Fee.

9. Preliminary scrutiny

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

- (a) confirm that the IEE or EIA is complete for purposes of initiation of the review process; or
- (b) require the proponent to submit such additional information as may be specified; or
- (c) return the IEE or EIA to the proponent for revision, clearly listing the points requiring further study and discussion.

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

10. Public participation

- (1) In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.
- (2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.
- (3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.
- (4) The Federal Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.
- (5) All comments received by the Federal Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.
- (6) The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

- (1) The Federal Agency shall make every effort to carry out its review of the IEE within 45 days, and of the EIA within 90 days, of issue of confirmation of completeness under Regulation 9.
- (2) In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit views of the sectoral Advisory Committee, if any, constituted by the Federal Government under sub-section (6) of section 5.
- (3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.
- (4) The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

12. Decision

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

13. Conditions of approval

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

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

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

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

14. Confirmation of compliance

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

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

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

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

15. Deemed approval

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

16. Extension in review period

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

17. Validity period of approval

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

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

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

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

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

18. Entry and inspection

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

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

19. Monitoring

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

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

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

20. Cancellation of approval

(1) Notwithstanding anything contained in these Regulations, if, at any time, on the basis of information or report received or inspection carried out, the Federal Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA is incorrect, it shall issue notice to the proponent to show cause, within two weeks of receipt thereof, why the approval should not be cancelled.

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

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

(ii) cancel the approval.

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

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

21. Registers of IEE and EIA projects

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

22. Environmentally sensitive areas

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

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

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

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

23. Environmental Assessment Advisory Committee

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

- | | | |
|--|-----|----------|
| (a) Director EIA, Federal Agency | ... | Chairman |
| (b) One representative each of the Provincial Agencies | ... | Members |
| (c) One representative each of the Federal Planning Commission and the Provincial Planning and Development Departments | ... | Members |
| (d) Representatives of industry and non-Governmental organizations, and legal and other experts | ... | Members |

24. Other approvals

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

SCHEDULE I
(See Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries

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

B. Energy

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

C. Manufacturing and processing

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

D. Mining and mineral processing

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

E. Transport

1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metaled roads) with total cost less than Rs.50 million
2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs.50 million

G. Water supply and treatment

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

H. Waste disposal

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

I. Urban development and tourism

1. Housing schemes
2. Public facilities with significant off-site impacts (e.g. hospital wastes)
3. Urban development projects

J. Other projects

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

SCHEDULE II
(See Regulation 4)

List of projects requiring an EIA

A. Energy

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

B. Manufacturing and processing

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

C. Mining and mineral processing

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

D. Transport

1. Airports
2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs.50 million and above
3. Ports and harbor development for ships of 500 gross tons and above
4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment

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

G. Waste Disposal

1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism

1. Land use studies and urban plans (large cities)
2. Large-scale tourism development projects with total cost more than Rs.50 million

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

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

SCHEDULE III
(See Regulation 7)

IEE/EIA Review Fees

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

SCHEDULE IV
[See Regulation 8(2)(a)]

Application Form

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

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

Date: _____

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

SCHEDULE VI
[See Regulation 12]

Decision on EIA

- 1. Name and address of proponent _____

- 2. Description of project _____
- 3. Location of project _____
- 4. Date of filing of EIA _____

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

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

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

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

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

Dated _____

Tracking no. _____

Director-General
Federal Agency
(with official stamp/seal)

SCHEDULE VII
[See Regulation 13(2)]

Undertaking

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

Date: _____

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

Witnesses
(full names and addresses)

(1) _____

(2) _____

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

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

Annexure 8: Letter to DC Zhob for Assistance in Land Demarcation on Revenue Record for Sri Toi Dam Subproject Area



Office of the
PROJECT DIRECTOR
BALOCHISTAN WATER RESOURCES DEVELOPMENT SECTOR PROJECT

No. PD/BWRDSP/2020/996-1001

Quetta, the 30th December, 2020

To,

The Deputy Commissioner,
District Zhob,
Zhob.

SUBJECT: **REQUEST FOR ASSISTANCE IN LAND DEMARCATION ON REVENUE RECORD FOR RESERVOIR AND COMMAND AREA OF SIRI TOI DAM, DISTRICT ZHOB.**

The Government of Balochistan has received financing of US\$ 100 million from Asian Development Bank (ADB) for Balochistan Water Resources Development Sector Project (BWRDSP) vide Loan No. 3700-PAK. The Irrigation Department is the Executing Agency for the Loan. Almost half of the Loan proceeds are to be utilized for construction of Siri Toi Dam subproject in District Zhob. According to the Loan Agreement signed between the Government of Balochistan and ADB, a Land Acquisition & Resettlement Plan (LARP) is to be prepared as a prerequisite for the subject Project.

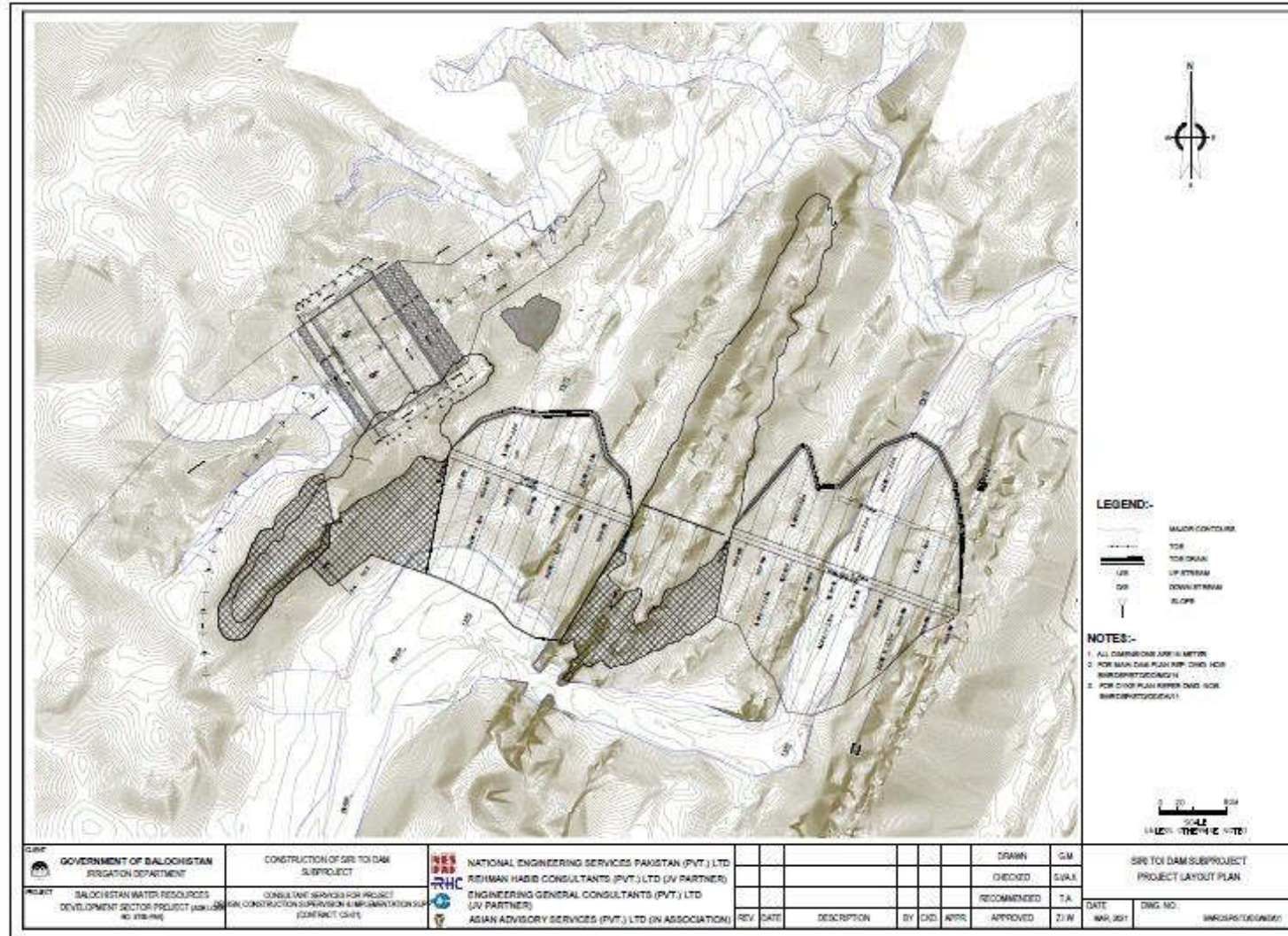
A Project Team of Irrigation Department and Consultant staff is stationed at Zhob to carryout land demarcation of reservoir and command area of Siri Toi Dam. The Team requires assistance of the Revenue Staff and District Administration to complete the LARP activities in time. The undersigned held a few meetings with the Senior Member, Board of Revenue in his office as well as discussed with your good self telephonically. It was assured by both the offices that all the necessary cooperation would be extended for this important Project.

It is requested to direct Mr. Abdul Rauf, Assistant Commissioner concerned to allow Mr. Mumtaz Ahmed, Patwari and Mr. Bashir Ahmed, Saddar Qanoongo, who are in possession of the relevant revenue / land record, to facilitate the Project Team and extend the required help up till completion of the LARP activity.

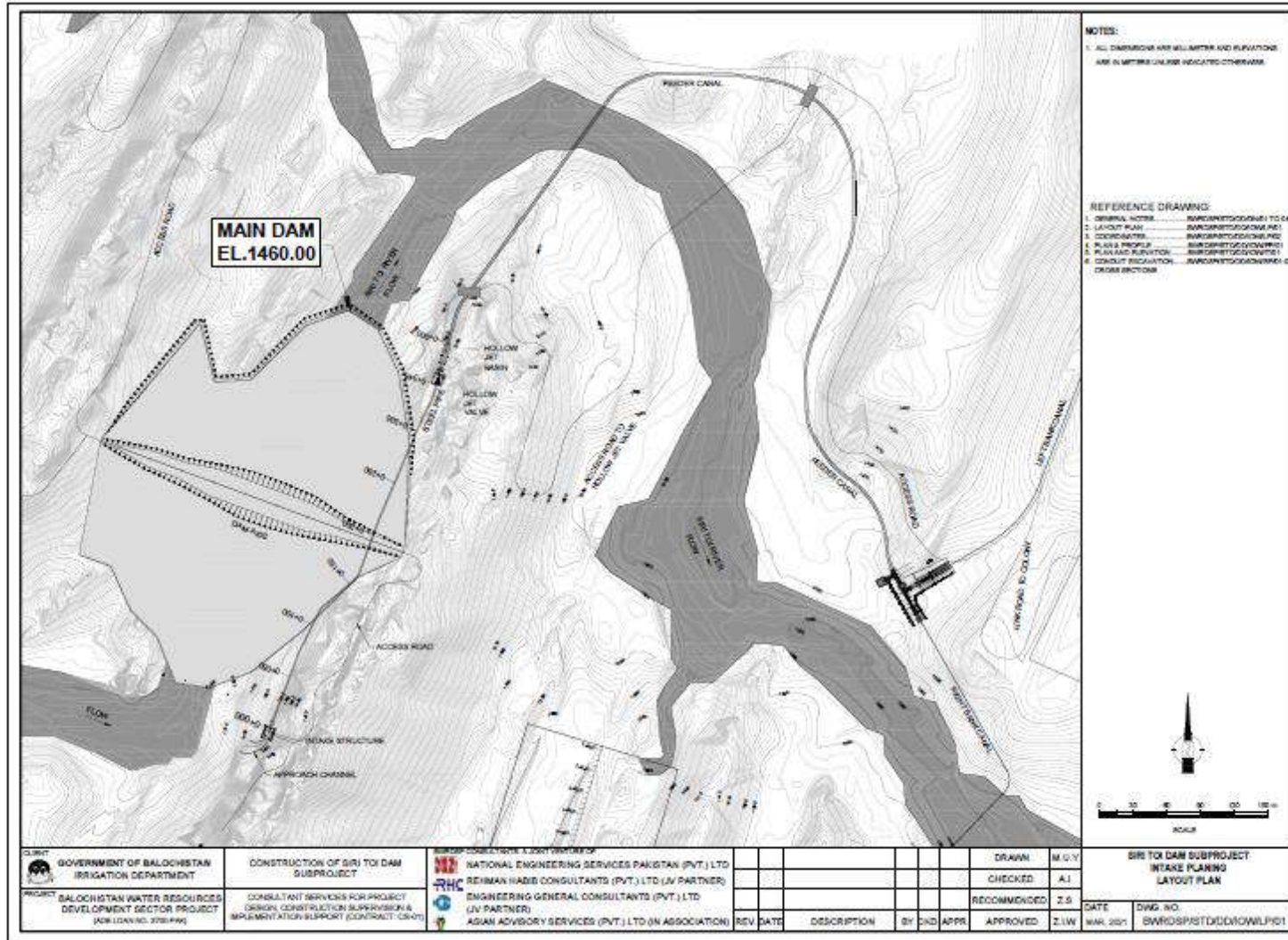
It is pertinent to mention that this Project is governed by a Loan Agreement between the Government & an International Financial Institution (ADB), with a sovereign guarantee from the State. Therefore, may kindly be accorded high priority.


PROJECT DIRECTOR

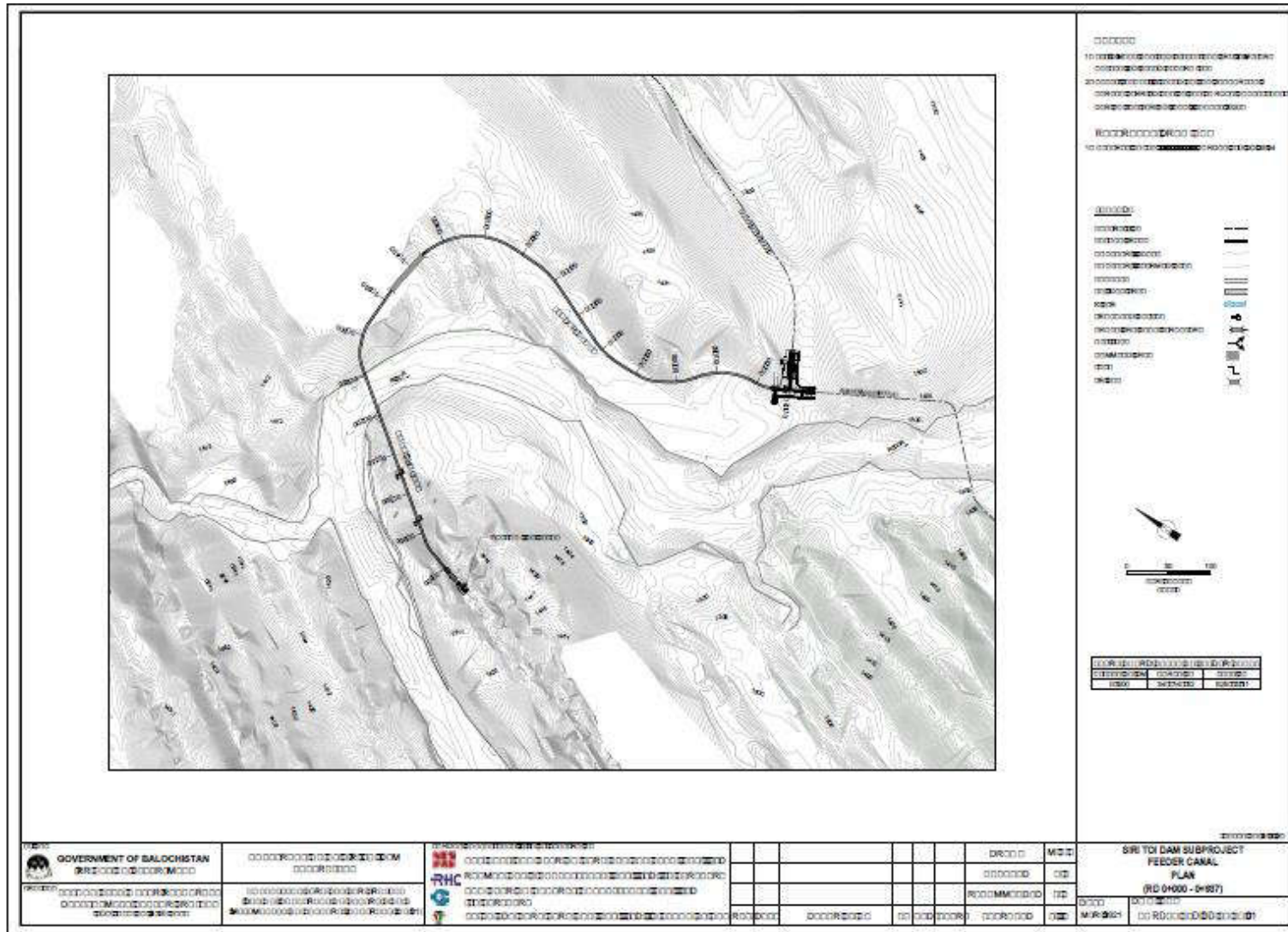
Annexure 9: Typical Section of the Proposed Project Components Project – Layout Plan



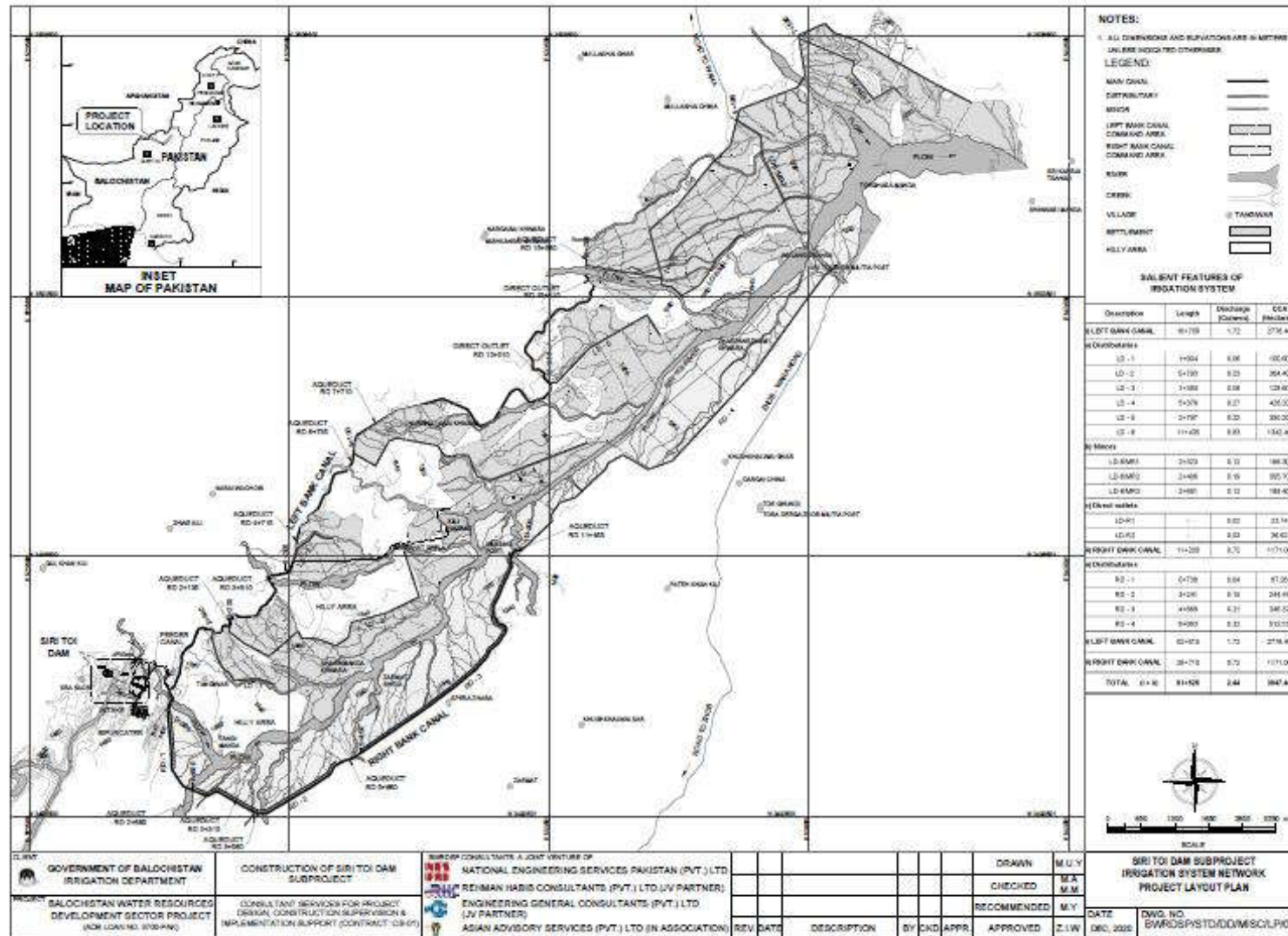
Layout Plan of Intake



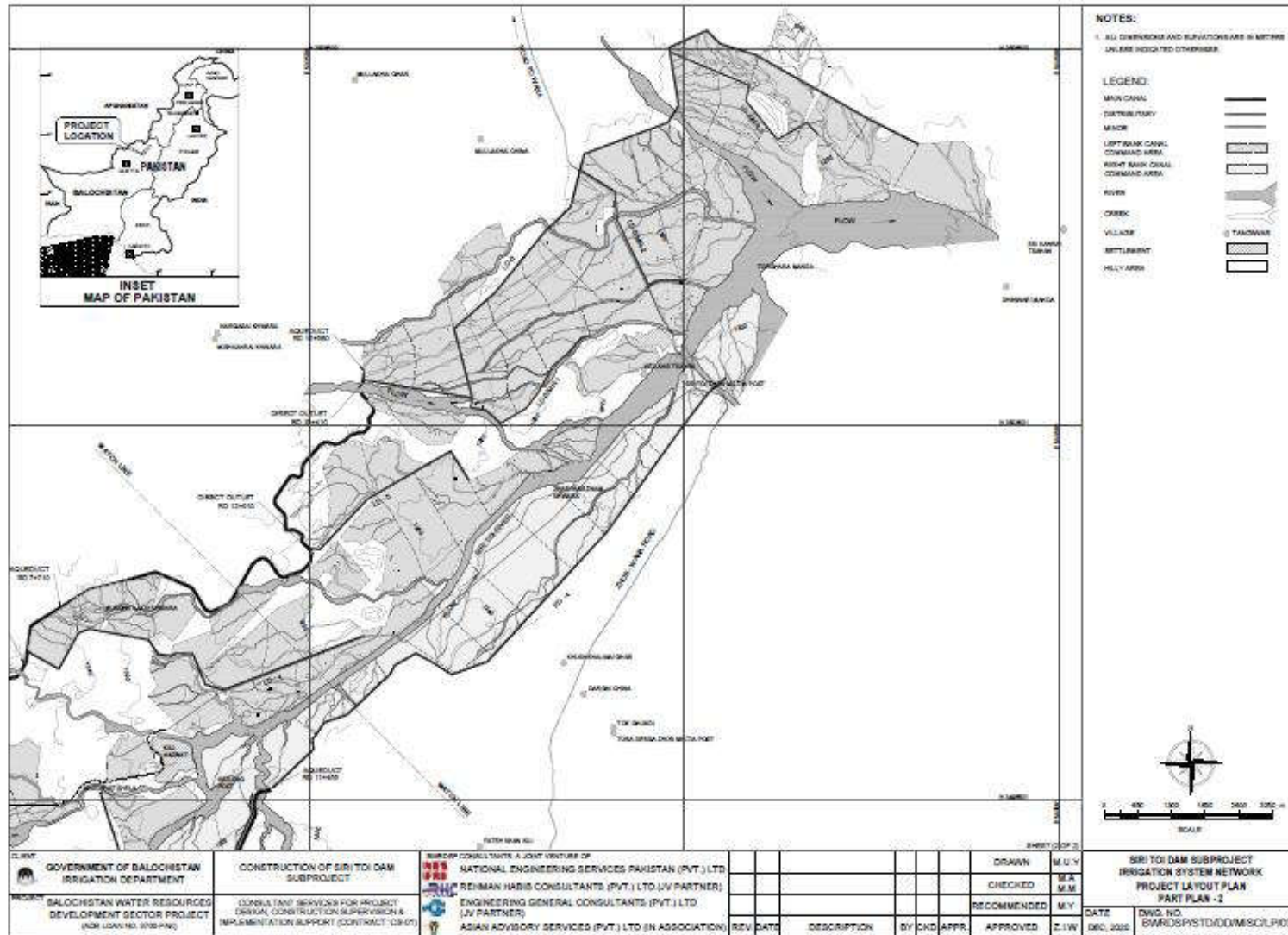
Feeder Chanel – Layout Plan



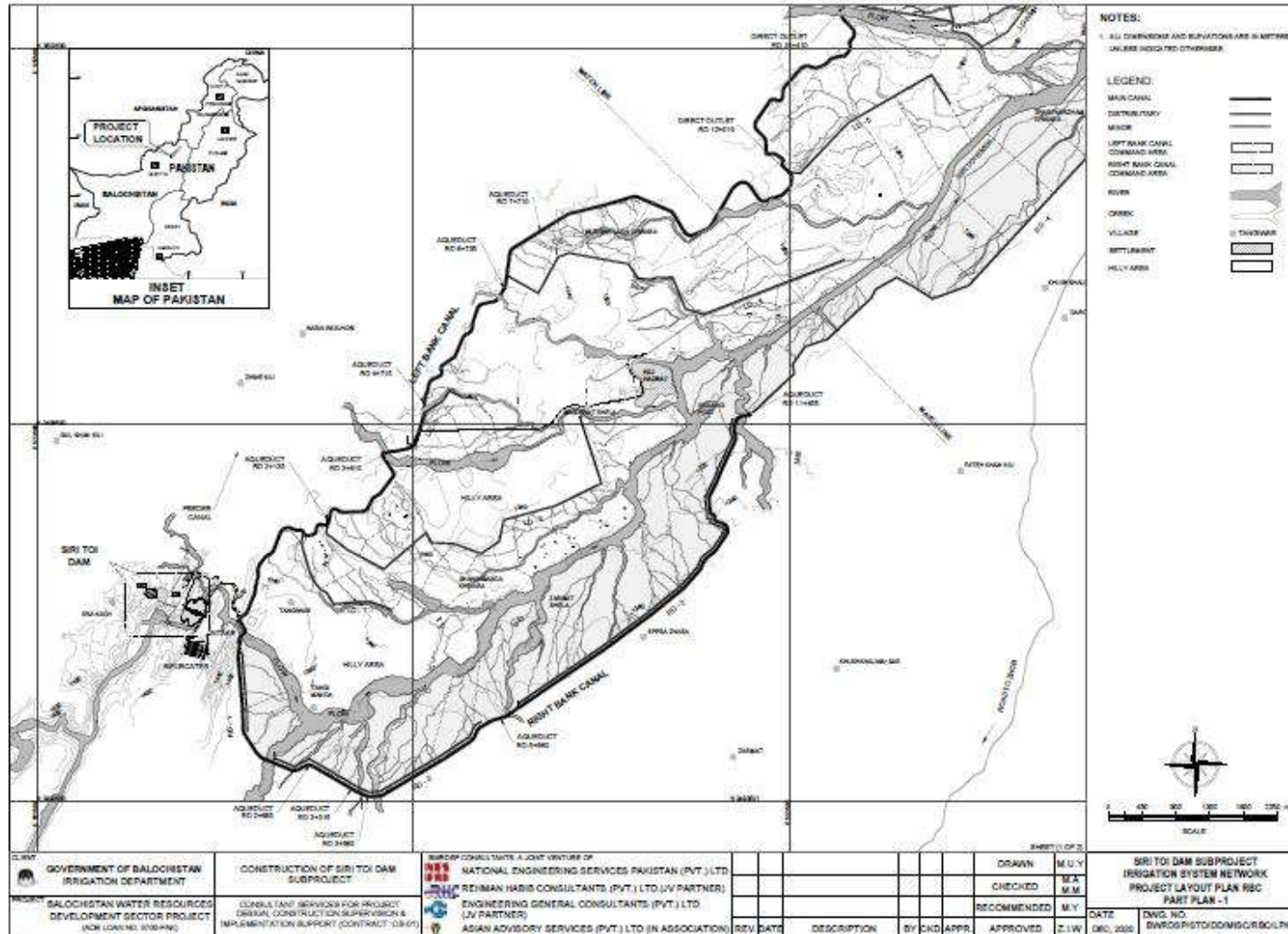
Irrigation System Network– Project Layout Plan



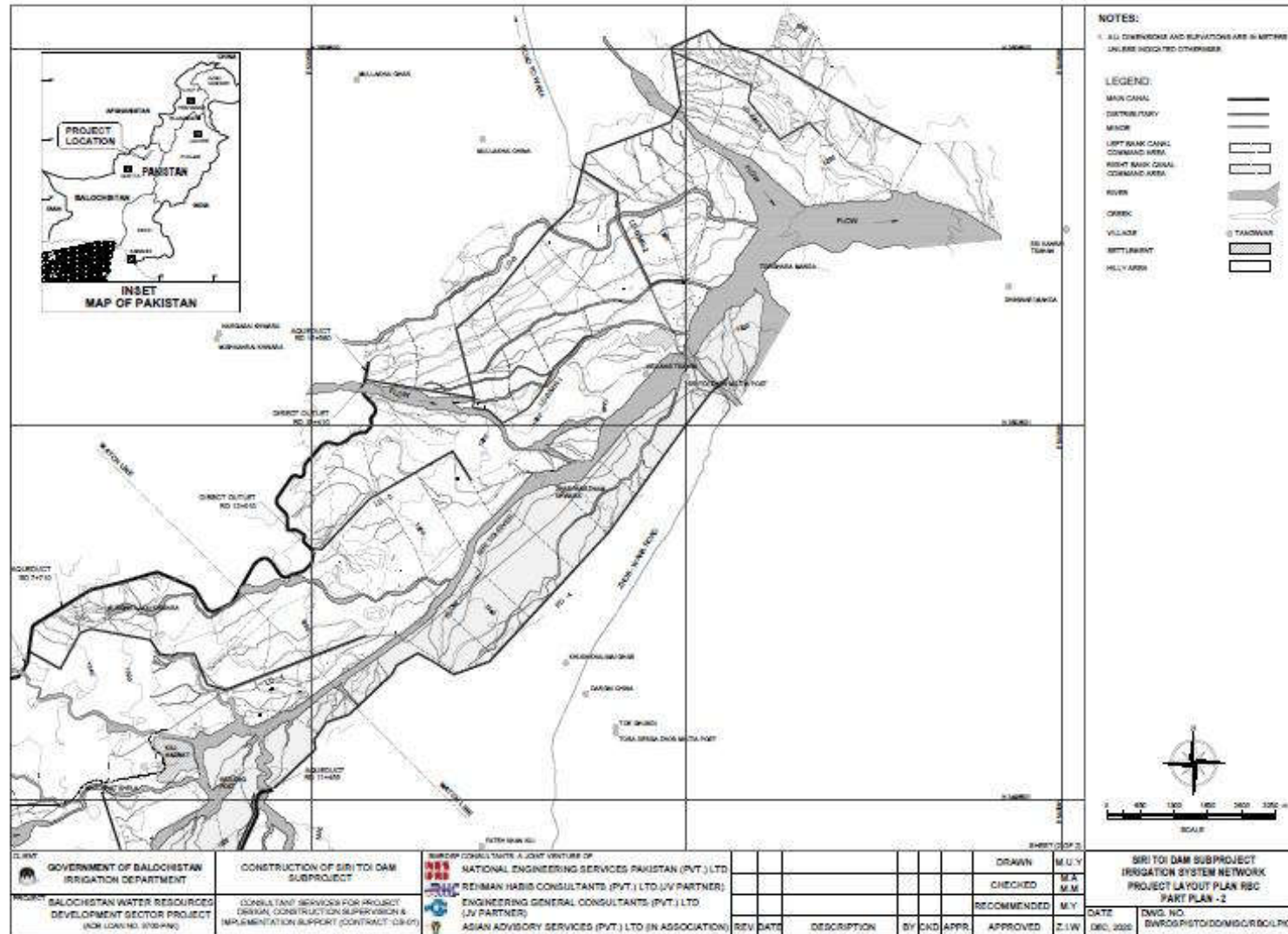
Irrigation System Network– Layout Plan (Part 2)



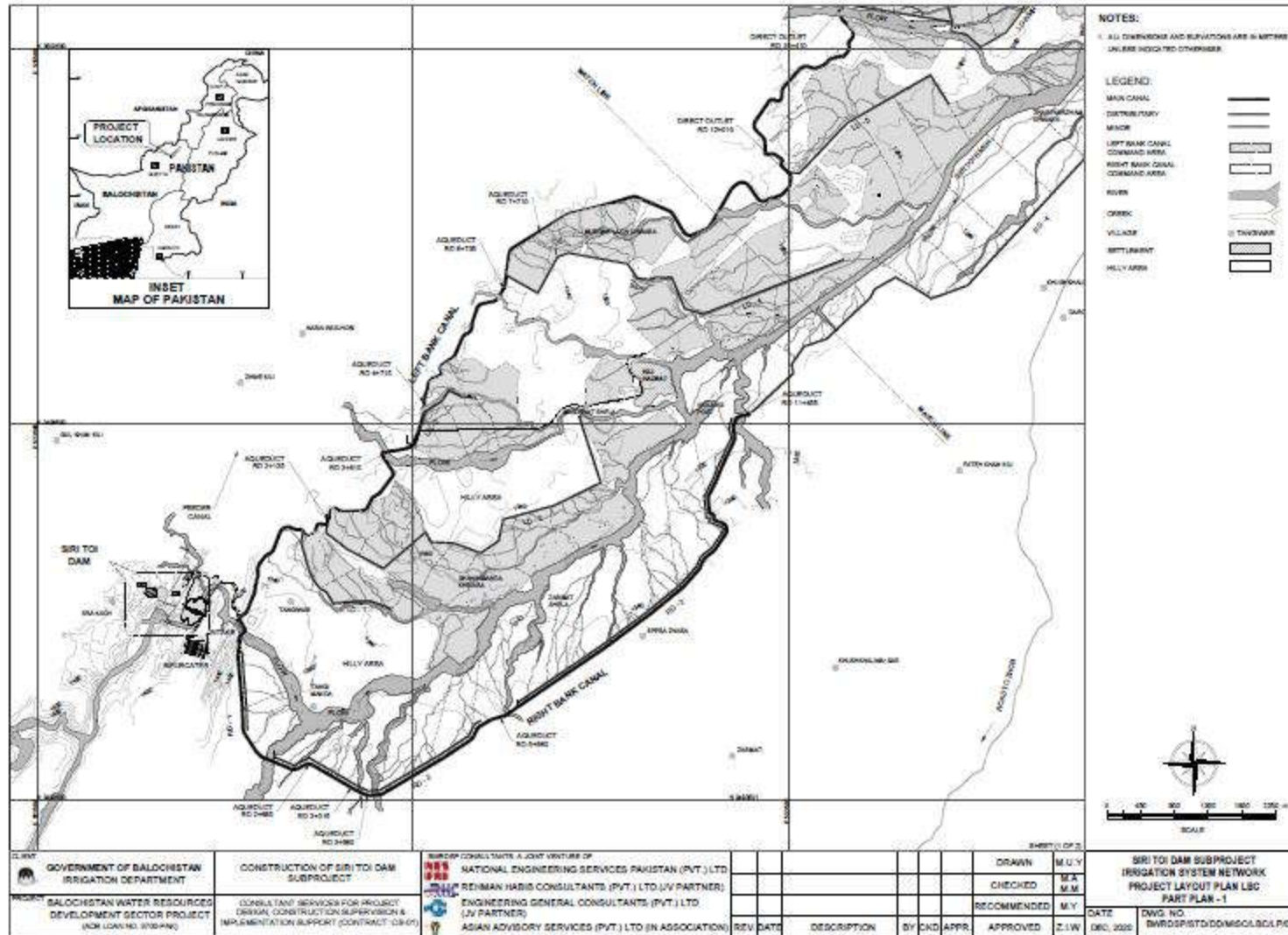
Irrigation System Network– Layout Plan (RBC-Part 1)



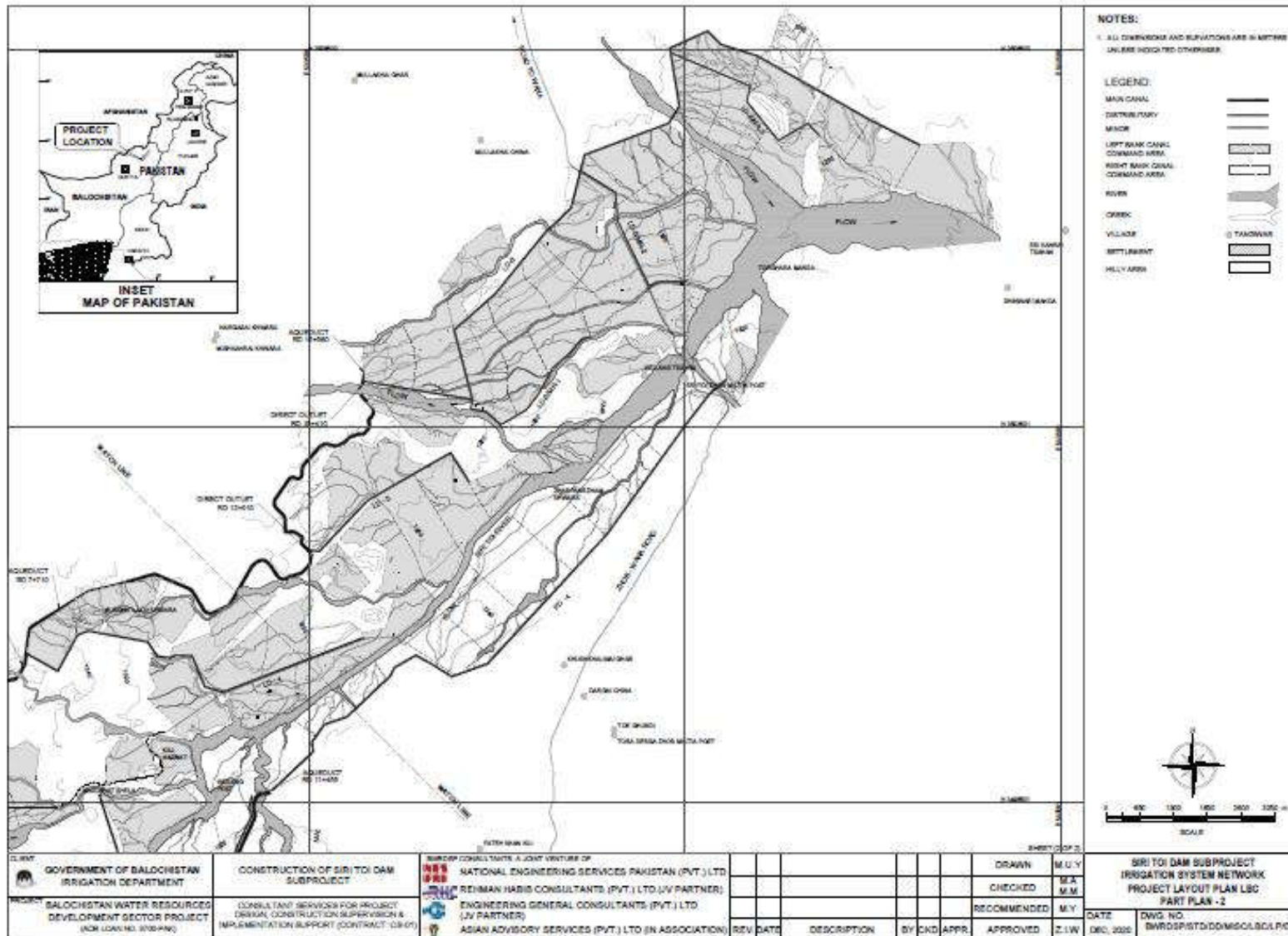
Irrigation System Network– Layout Plan (RBC-Part 2)



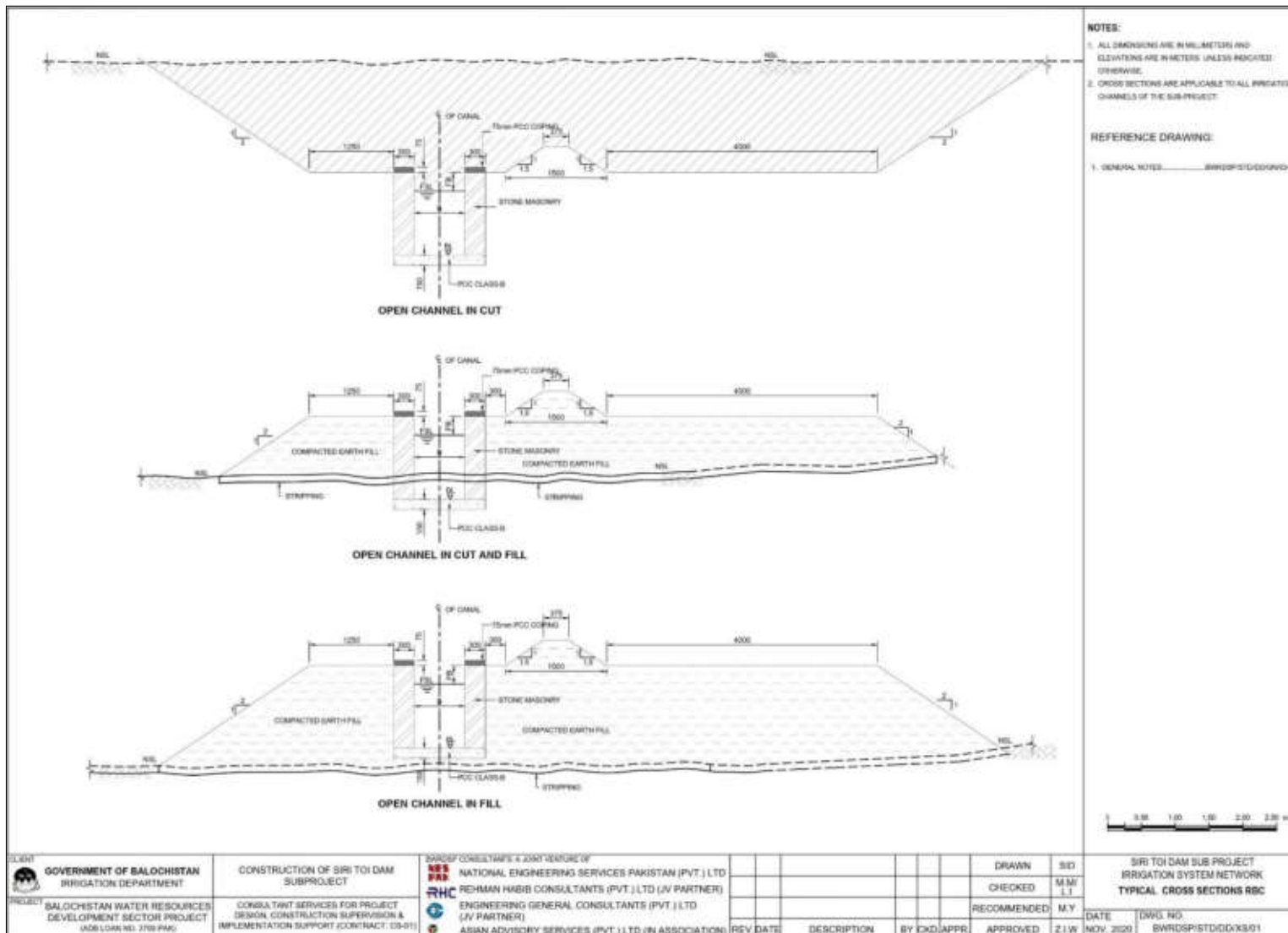
Irrigation System Network– Layout Plan (LBC-Part 1)



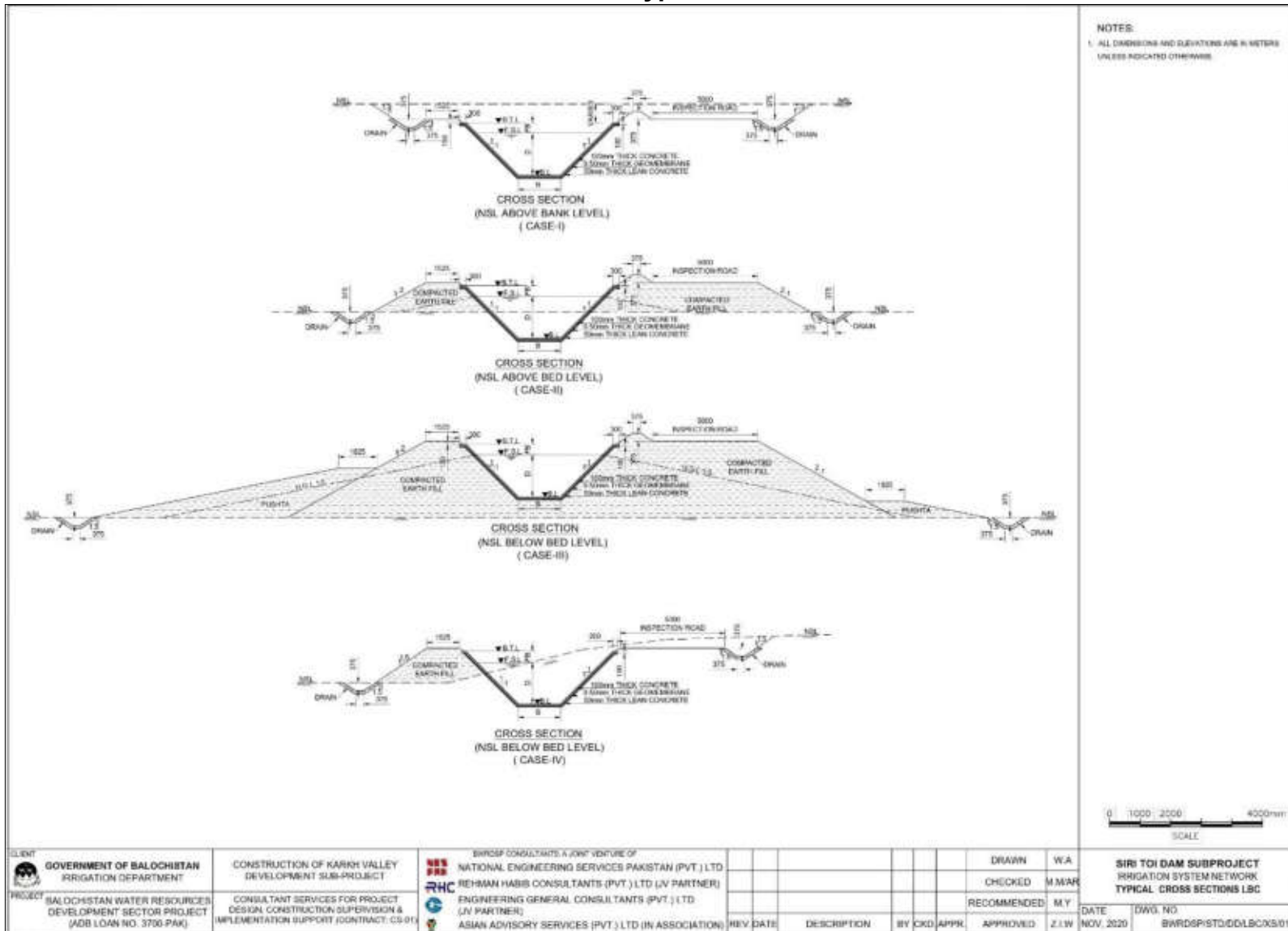
Irrigation System Network– Layout Plan (LBC-Part 2)



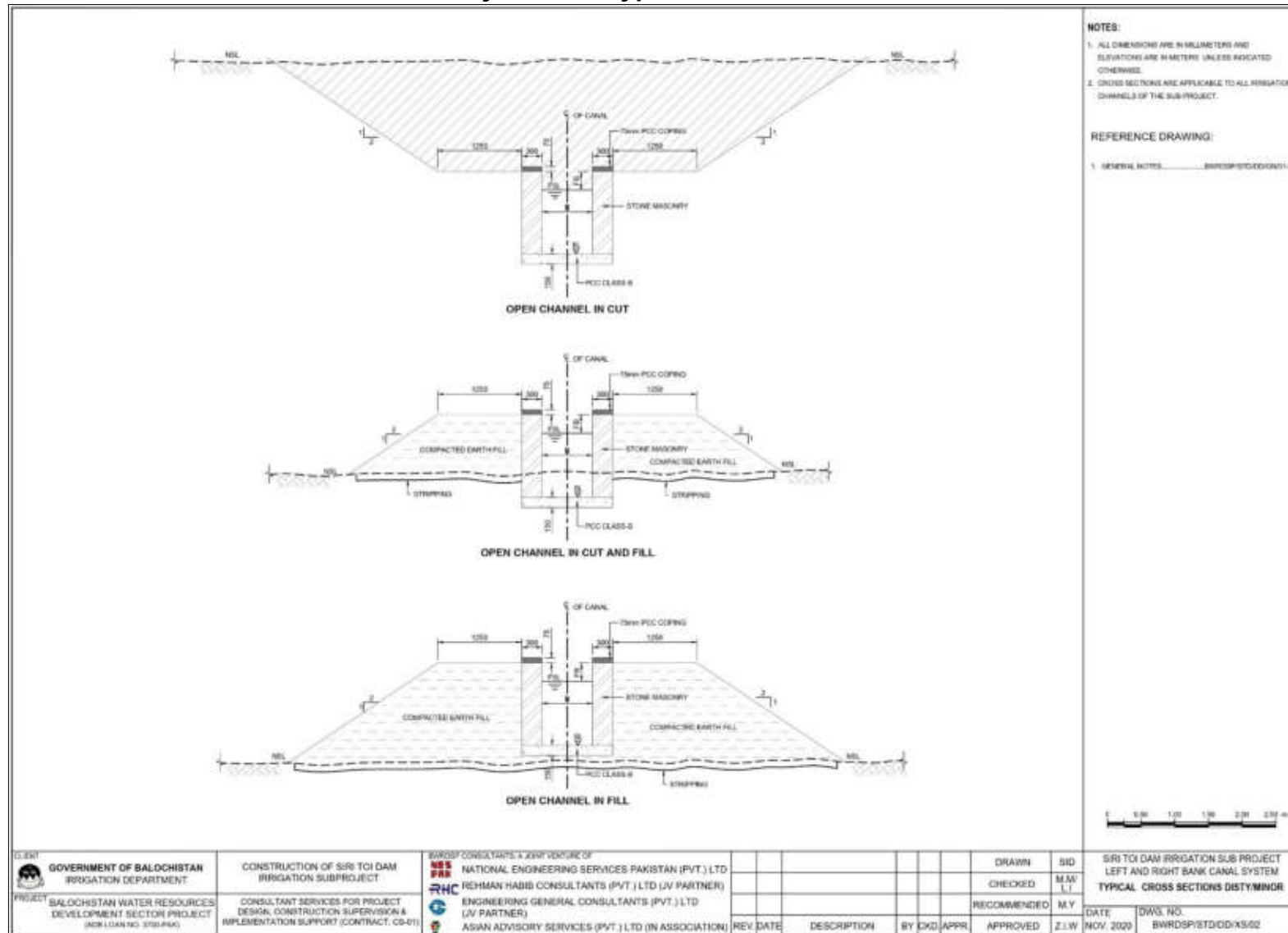
Right Bank Canal – Typical Cross Section



Left Bank Canal – Typical Cross Section



Disty/Minor – Typical Cross Section



Annexure 10: Camp Site Map



Annexure 11: A History of Recorded Earthquakes in Balochistan

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

Source: Data extracted from Meteorological Department – Quetta Station

Annexure 12: Explanation of MSK Intensity

Medvedev–Sponheuer–Karnik scale

The **Medvedev–Sponheuer–Karnik scale**, also known as the **MSK** or *MSK-64*, is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the [earthquake](#) occurrence.

The scale was first proposed by [Sergei Medvedev \(USSR\)](#), [Wilhelm Sponheuer \(East Germany\)](#), and [Vít Kárník \(Czechoslovakia\)](#) in 1964. It was based on the experiences being available in the early 1960s from the application of the [Modified Mercalli intensity scale](#) and the 1953 version of the [Medvedev scale](#), known also as the [GEOFIAN scale](#).^[1]

With minor modifications in the mid-1970s and early 1980s, the MSK scale became widely used in [Europe](#) and the [USSR](#). In early 1990s, the [European Seismological Commission \(ESC\)](#) used many of the principles formulated in the MSK in the development of the [European Macroseismic Scale](#), which is now a *de facto* standard for evaluation of seismic intensity in European countries. MSK-64 is still being used in [India](#), [Israel](#), [Russia](#), and throughout the [Commonwealth of Independent States](#).

The Medvedev–Sponheuer–Karnik scale is somewhat similar to the [Modified Mercalli \(MM\) scale](#) used in the [United States](#). The MSK scale has 12 intensity degrees expressed in [Roman numerals](#) (to prevent the use of decimals):

I. Not perceptible	Not felt, registered only by seismographs . No effect on objects. No damage to buildings.
II. Hardly perceptible	Felt only by individuals at rest. No effect on objects. No damage to buildings.
III. Weak	Felt indoors by a few. Hanging objects swing slightly. No damage to buildings.
IV. Largely observed	Felt indoors by many and felt outdoors only by very few. A few people are awakened. Moderate vibration. Observers feel a slight trembling or swaying of the building, room, bed, chair etc. China, glasses, windows and doors rattle. Hanging objects swing. Light furniture shakes visibly in a few cases. No damage to buildings.
V. Fairly strong	Felt indoors by most, outdoors by few. A few people are frightened and run outdoors. Many sleeping people awake. Observers feel a strong shaking or rocking of the whole building, room or furniture. Hanging objects swing considerably. China and glasses clatter together. Doors and windows swing open or shut. In a few cases window panes break. Liquids oscillate and may spill from fully filled containers. Animals indoors may become uneasy. Slight damage to a few poorly constructed buildings.
VI. Strong	Felt by most indoors and by many outdoors. A few persons lose their balance. Many people are frightened

	and run outdoors. Small objects may fall and furniture may be shifted. Dishes and glassware may break. Farm animals may be frightened. Visible damage to masonry structures, cracks in plaster. Isolated cracks on the ground.
VII. Very strong	Most people are frightened and try to run outdoors. Furniture is shifted and may be overturned. Objects fall from shelves. Water splashes from containers. Serious damage to older buildings, masonry chimneys collapse. Small landslides.
VIII. Damaging	Many people find it difficult to stand, even outdoors. Furniture may be overturned. Waves may be seen on very soft ground. Older structures partially collapse or sustain considerable damage. Large cracks and fissures opening up, rockfalls.
IX. Destructive	General panic. People may be forcibly thrown to the ground. Waves are seen on soft ground. Substandard structures collapse. Substantial damage to well-constructed structures. Underground pipelines ruptured. Ground fracturing, widespread landslides.
X. Devastating	Masonry buildings destroyed, infrastructure crippled. Massive landslides. Water bodies may be overtopped, causing flooding of the surrounding areas and formation of new water bodies.
XI. Catastrophic	Most buildings and structures collapse. Widespread ground disturbances, tsunamis.
XII. Very catastrophic	All surface and underground structures completely destroyed. Landscape generally changed, rivers change paths, tsunamis.

References:

https://en.wikipedia.org/wiki/Medvedev%E2%80%93Sponheuer%E2%80%93Karnik_scale

Annexure 13: Lab Results



PERAC RESEARCH & DEVELOPMENT FOUNDATION

TEST REPORT		Page 08 of 12	
Customer's Name	M/s NEC Consultant (Pvt) Ltd	Test Report No	2421G/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7007
Sample Description	Surface Water (Zhob River Wall Site # 1)	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	2041
D-1293	pH @ 25 °C	8.15
	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	Head R&ASD

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

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

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PERAC RESEARCH & DEVELOPMENT FOUNDATION



TEST REPORT		Page 09 of 12	
Customer's Name	M/s NEC Consultant (Pvt) Ltd	Test Report No	2421H/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7008
Sample Description	Surface Water (Zhob River Storage Area)	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	1917
D-1293	pH @ 25 °C	8.15
	Chemical	
By AA	Aluminum (Al), mg/L	Nil
By AA	Antimony (Sb), mg/L	Nil
By AA	Arsenic (As), mg/L	Nil
By AA	Barium (Ba), mg/L	Nil
By AA	Boron (B), mg/L	Nil
By AA	Cadmium (Cd), mg/L	Nil
By AA	Chromium (Cr), mg/L	Nil
By AA	Copper (Cu), mg/L	Nil
By AA	Lead (Pb), mg/L	Nil
By AA	Manganese (Mn), mg/L	Nil
By AA	Nickel (Ni), mg/L	Nil
APHA-320	Mercury (Hg), mg/L	Nil
By AA	Selenium (Se), mg/L	Nil
By AA	Zinc (Zn), mg/L	Nil

Prepared by	Section in charge (E)	Head R&ASD

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

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

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TEST REPORT			Page 10 of 12
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	7009
Sample Description	Surface Water (Zhob River Wall Side # 2)	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	1807
D-1293	pH @ 25 °C	8.30
	Chemical	
By AA	Aluminum (Al), mg/L	Nil
By AA	Antimony (Sb), mg/L	Nil
By AA	Arsenic (As), mg/L	Nil
By AA	Barium (Ba), mg/L	Nil
By AA	Boron (B), mg/L	Nil
By AA	Cadmium (Cd), mg/L	Nil
By AA	Chromium (Cr), mg/L	Nil
By AA	Copper (Cu), mg/L	Nil
By AA	Lead (Pb), mg/L	Nil
By AA	Manganese (Mn), mg/L	Nil
By AA	Nickel (Ni), mg/L	Nil
APHA-320	Mercury (Hg), mg/L	Nil
By AA	Selenium (Se), mg/L	Nil
By AA	Zinc (Zn), mg/L	Nil

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

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

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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	2421J/2016-2017
Customer's Ref	E-mail	Reporting Date	08-06-2017
Date	05-05-2017	Sample Code	7010-7019
Sample Description	Noise Analysis	Sampling Date	16-05-2017

TEST RESULTS

Code #	LOCATION	Noise dB (A) By Analyzer
7010	Chutta	38
7011	Wandari	41
7012	Khadri	35
7013	Jhalaro	36.2
7014	Acharwand	37
7015	Sinjori	36
7016	Hatachi Khizran Infiltration Gallery	32
7017	Zhob River Wall Side 1	30.1
7018	Zhob River Storage Area	<28
7019	Zhob River Wall Side 2	<28
	NEQS Limits	85

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

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

Rev. No. 0	Dated: 21-01-2000	F-10-05
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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	Khadri	15
7023	Jhalaro	11
7024	Acharwand	Nil
7025	Sinjori	4
7026	Hatachi Khizran Infiltration Gallery	Nil
7027	Zhob River Wall Side 1	8 ✓
7028	Zhob River Storage Area	Nil ✓
7029	Zhob River Wall Side 2	12 ✓

Prepared by	Section in charge (E)	Head R&ASD

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

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

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

Annexure 14: Photographs of few Floral

Trees



Pinus gerardiana



Olea ferrugenea



Pistacia khinjik



Pistacia cabulica



Reptonia buxifolia



Fraxinus xanthoxyloides

Shrubs



Periploca aphylla



Datura fastuosa



Narium odorum



Achillea santolina



Allium sphaerocephalum



Artemisia meritima



Daphne oleoides



Eremurus aucheriana



Malcolmia africana



Othonnopsis intermedia



Plantago ovata



Reptonia buxifolia



Rhazya stricta



Scorzonera mollis



Sophora griffithii

Photographs of few faunal representatives



Hemiechinus auritus megalotis



Canis aureus



Lepus capensis



Capra falconeri



Vulpes cana



Hystrix indica



Ovis vignei



Martes foina

Birds



Passeridae



Emberiza citrinella



Fringillidae



Alectoris chukar



Ammoperdix griseogularis



Pteroclididae



Migratory Birds



Reptiles



Agrionemys horsfieldii



Macrovipera lebetina



Naja oxiana



Echis carinatus



Varanus griseu

Annexure 15: Blasting Management Plan

1.0 GENERAL

This document presents Blasting Management Plan (BMP) for construction of Sri Toi Dam. It outlines safety and operational procedures that must be followed in blasting events to ensure safe practices to accomplish the task.

1.1 Rationale for the Blasting Management Plan

The Blasting management plan is prepared in accordance with the following criteria:

1.1.1 Air Blast Overpressure Criteria

The air blast overpressure level from blasting operations carried out in or on the premises must not exceed at any residence or other noise sensitive receiver:

- (a) 115 dB (Linear Peak) for more than 5% of the total number of blasts during each reporting period; and
- (b) 120 dB (Linear Peak) at any time.

1.1.2 Ground Vibration Criteria

The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed at any residence or other noise sensitive receiver:

- (a) 2 mm/s for more than 5% of the total number of blasts carried out in or on the premises during each reporting period; and
- (b) Exceed 10 mm/s at any time.

1.2 Blasting/Vibration Management Plans

The blasting plan for project is given below that caters the following major considerations:

- (i) Control of blasting area
- (ii) Time schedule
- (iii) Training
- (iv) Announcement/Communication
- (v) Hazardous material handling and storage
- (vi) Waste disposal
- (vii) Post blast re-entry
- (viii) Health and safety

1.2.1 Control of blasting area

Three zones of responsibility are established around every blast to mitigate risks and control hazard. The blasting area shall be restricted into three different zones as follows:

- (i) Blast zone
- (ii) Exclusion zone
- (iii) Community zone

The blast zone is a 300m zone around the blast area that is controlled by the short firer. The exclusion zone is a 700m radius zone around the blast area that is controlled by the construction team. Prior to blasting it will ensure the exclusion zone has been cleared of people. A community zone has been established and represents all sensitive receivers as well as community interface outside of the exclusion zone.

Zones around the blasting area are defined in general and will be updated upon confirmation of the point of blasting, if any.

1.2.2 Time Schedule

The time schedule is devised taking into consideration the general population density of the area, the frequency of routine of the community round the blasting area. The most appropriate time for blasting is suggested is in afternoon between 12:00 pm to 3:00 pm.

1.2.3 Training

The personnel involved in blasting and related activities shall be trained to minimize and manage the possible hazards. The training shall include the following:

- (i) Safe blasting procedures
- (ii) Material handling
- (iii) Personnel protection
- (iv) Community and ecosystem protection
- (v) Communication with in the team and community

1.2.4 Announcement/communication

The size of the community zone has the potential increase with intensity of each blast and current weather conditions. The planned schedule of the blasting shall be announced to the community through media and announcements in mosques and madrassas/schools. Signage around the are shall be updated, and information shall be posted at least 24 hrs. prior to a blast, and notify emergency services in the locality. Prior to blasting firing shall be done to clear the area of any possible faunal species.

1.2.5 Hazardous material handling and storage

Safe handling of hazardous material shall be taken into consideration. The storage of hazardous material shall be on cemented floor with proper drainage and the access of unconcerned/untrained people shall be restricted. The blasting contractor shall provide and maintain, onsite, all required and necessary MSDS for inspection and use in the event of an emergency. Ensure that the site is secure for workers after blasting and any unexploded or misfired blasting material left over (fuse, detonator etc.) should be handled safely. The site shall be clear of the risk involving landslides or rock instability. The transporting, handling, storage and use of explosives, blasting agents, and blasting equipment shall be directed and supervised by a qualified blast officer.

1.2.6 Waste disposal

Waste involving explosives from the blasting site shall be safely handled, neutralized, and disposed of. An individual trained in the proper techniques for handling, neutralizing and disposing of the explosives in a safe manner shall be designated.

1.2.7 Post blast re-entry

Post blast re-entry shall be allowed only to the authorized person (Blast officer) after the smoke, fumes and dust have cleared. The baster-in-charge shall authorize the "All Clear" signal to be sounded, only after the area is deemed safe-to-enter.

1.2.8 Health and safety

The activities of blasting shall adhere to the considerations minimizing risks of health and safety of the workers, community and the ecosystem. Following shall be considered to the minimum:

- Any access closures and evacuations occur within the zone of exclusion.
- Blast monitoring stations are operational.
- Required levels of ground vibration are not exceeded.
- Required levels of noise are not exceeded.
- Required levels of air blast are not exceeded.
- No fly rock is emitted beyond zone of exclusion.
- No visible emissions of dust/fumes from site.
- Interruptions to road are minimized.
- A safe area is evacuated around all blasts.
- All blasts are monitored.
- No damage occurs to people, property, livestock or power lines if any.
- Personal Protective Equipment shall be provided ad worn by the personnel involved in blasting operations.
- First aid kit shall be available at easily accessible location.
- The team shall be able to handle emergency situations and the possible emergency services shall be notified in advance.
- All complaints are recorded and responded to in a timely and professional manner.
- The Blast Record shall be maintained containing all the information required to re-create the blast site, locate blast holes and shot/loading details.

1.3 Implementation of BMP

The blasting management plan shall be thoroughly inspected for proper implementation by Deputy Commissioner Zhob, Contractor and must be monitored by ADB representative.

1.4 Conclusion

The blasting management plan presents the protocol for the management of various impacts resulting from blasting activities. It ensures the compliance with regulatory requirements; minimize hazards to surrounding residents, property, livestock and other infrastructures, respond to the emergencies and complaints in a timely and professional manner.

Annexure 16: Emergency Response Plan for Breach of Dam and Canal Bank

A. EMERGENCY RESPONSE PLAN FOR BREACH OF DAM

**DAM EMERGENCY PLAN
SRI TOI WATER STORAGE DAM AND IRRIGATION SYSTEM
SRI TOI, ZHOB**

1. Dam Emergency Plan

The purpose of this Dam Emergency Plan (DEP) is to reduce the risk of human life loss and injury and minimize property damage during an unusual or emergency event at Sri Toi Dam.

This DEP has been prepared with the intent of coping and responding to the disaster in case of dam failure or breaching.

2. Basic Dam Description

Dam Name:	Sri Toi Water Storage Dam
Dam Location	Union Council of Mir Ali Khel, tehsil and district Zhob, about 62 km north-east of Zhob on Sri Toi river
Dam Type:	Earthfilled
Height:	70 m
Spillway	2,782 m ³ /sec capacity
Storage Volume:	36 Million m ³
Coordinates (i.e. lat/long or UTM):	Latitude = 31° 35' 52" North, Longitude = 69° 15' 58" East Mean altitude = 1350 m above mean sea level

3. Disaster Risk Management

Disasters can be divided into four major phases:

1. Non-Disaster Phase
2. Pre-Disaster Phase
3. During-Disaster Phase
4. Post-disaster phase

PRE-DISASTER PHASE

1. Use Guidance notes provide as **Annexure A** of this document, to quality of emergency.
2. In the event of any emergency / disaster, inform the relevant following departments:

Level	Agency	Contact Person Details (to be filled)
National Level:	National Disaster Management Commission(NDMC)	
	National Disaster Management Authority (NDMA)	
Provincia I Level	Provincial Disaster Management Commission (PDMC)	
	Provincial Disaster Management Authority (PDMA)	
	Balochistan Irrigation and Power Department	
	Chief minister secretariat	
District Level:	District Disaster Management Authority (DDMC)	
	Administration such as Commissioner, DC, AC Zhob	
Dam Level	Dam Operators	Emergency Contact details

3. District Disaster Management Authority (DDMC) and District Administration, Zhob to prepare Evacuation Plan for events such as Dam failure including evacuation area and route. They should have an idea of the population that will need to be evacuated.
4. District Disaster Management Authority (DDMC) and District Administration, Zhob should also initiate capacity building and train local community for such events.

DISASTER PHASE

The following are the basic emergency planning and response roles and responsibilities for the key agencies involved when an emergency occurs.

1. BID to undertake appropriate remedial actions as given in Annexure B of this document.
2. BID to break the news on national, regional TV and radio.
3. Issue immediate evacuation warnings to people in the vicinity of the dam likely to be affected,
4. BID to provide updates of the situation to the press and local emergency authority to assist them in making timely and accurate decisions regarding warnings and evacuations.
5. District Disaster Management Authority support and coordinate the overall emergency response activities within its geographical or functional jurisdiction.

POST DISASTER PHASE

1. District administration to undertake DEP exercises as appropriate.

2. District Disaster Management Authority to provide leadership to assure the DEP is reviewed and updated annually and copies of the revised DEP are distributed to all who received copies of the original DEP including the records for the local emergency authorities.
3. District Disaster Management Authority will decide when to terminate the emergency.

Appendix A: Guidance for Determining the Emergency

Event	Situation
Earth spillway flow	Reservoir water surface elevation at spillway crest or spillway is flowing with no active erosion
	Spillway flowing with active gully erosion
	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise
	Spillway flowing with an advancing headcut that is threatening the control section
	Spillway flow that is flooding people downstream
Embankment overtopping	Reservoir level is 1 foot below the top of the dam
	Water from the reservoir is flowing over the top of the dam
Seepage	New seepage areas in or near the dam
	New seepage areas with cloudy discharge or increasing flow rate
	Seepage with discharge greater than 10 gallons per minute
Sinkholes	Observation of new sinkhole in reservoir area or on embankment 2
	Rapidly enlarging sinkhole
Embankment cracking	New cracks in the embankment greater than ¼-inch wide without seepage
	Cracks in the embankment with seepage
Embankment movement	Visual movement/slippage of the embankment slope
	Sudden or rapidly proceeding slides of the embankment slopes
Instruments	Instrumentation readings beyond predetermined values
Earthquake	Measurable earthquake felt or reported on or within 50 kilometers of the dam Earthquake resulting in uncontrolled release of water from the dam
	Earthquake resulting in visible damage to the dam or appurtenances
	Earthquake resulting in uncontrolled release of water from the dam
Security threat	Verified bomb threat that, if carried out, could result in damage to the dam Damage to dam or appurtenances with no impacts to the functioning of the dam 1
	Detonated bomb that has resulted in damage to the dam or appurtenances
Sabotage/ vandalism	Damage to dam or appurtenance with no impacts to dam function
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam
	Damage to dam or appurtenances that has resulted in seepage flow
	Damage to dam or appurtenances that has resulted in uncontrolled water release

Appendix B: Emergency Remedial Actions

The following emergency remedial actions should be considered and Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam.

Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions.

Close monitoring of the dam must be maintained to confirm the success of any remedial action taken at the dam.

Embankment overtopping

1. If the water level in the reservoir is no longer rising, place sandbags along the low areas of the top of the dam to control wave action, reduce the likelihood of flow concentration during minor overtopping, and to safely direct more water through the spillway.
2. Cover the weak areas of the top of the dam and downstream slope with riprap, sandbags, plastic sheets, or other materials to provide erosion-resistant protection.

Seepage and sinkholes

1. Open the low-level outlet gate to lower the reservoir level as rapidly as possible to a level that stops or decreases the seepage to a non-erosive velocity. If the gate is damaged or blocked, pumping or siphoning may be required.
Continue lowering the water level until the seepage stops.
2. If the entrance to the seepage origination point is observed in the reservoir (possible whirlpool) and is accessible, attempt to reduce the flow by plugging the entrance with readily available materials such as hay bales, bentonite, soil or rockfill, or plastic sheeting.
3. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.
4. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

Embankment movement

1. Open outlet(s) and lower the reservoir to a safe level at a rate commensurate with the urgency and severity of the condition of the slide or slump. If the gate is damaged or blocked, pumping or siphoning may be required.
2. Repair settlement of the crest by placing sandbags or earth and rockfill materials in the damaged area to restore freeboard.
3. Stabilize slides by placing a soil or rockfill buttress against the toe of the slide.

Earthquake

1. Immediately conduct a general overall visual inspection of the dam.
2. Perform a field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.
3. Drain the reservoir, if required.

Adverse or unusual conditions that can cause the failure of a dam are typically related to aging or design and construction oversights. Extreme weather events that exceed the original designed conditions can cause significant flow through the spillway or overtopping of the embankment. However, accidental or intentional damage to the dam may also result in emergency conditions. The conditions have been grouped to identify the most likely

emergency-level condition. The groupings are provided as guidance only. Not all emergency conditions may be listed, and the dam operator is urged to use conservative judgment in determining whether a specific condition should be defined as an emergency situation at the dam.

Pre-existing conditions on this dam: There has been a small seepage area near the downstream toe on the north side of the release channel. This was first noticed in the 1990s, but has not changed since that time.

Earth Spillway Flows

Potential dam failure situation; rapidly developing:

1. Significant erosion or headcutting of the spillway is occurring, but the rate does not appear to threaten an imminent breach of the spillway crest that would result in an uncontrolled release of the reservoir.
2. Flow through the earth spillway is or is expected to cause flooding that could threaten people, homes, and/or roads downstream from the dam.

Urgent; dam failure appears imminent or is in progress

1. Significant erosion or headcutting of the spillway is occurring at a rapid rate, and a breach of the control section appears imminent.
2. Flow through the earth spillway is causing flooding that is threatening people, homes, and/or roads downstream from the dam.

Embankment Overtopping

Potential dam failure situation; rapidly developing:

1. The reservoir level is within 1 foot from the top of the dam.

Urgent; dam failure appears imminent or is in progress:

1. The reservoir level has exceeded the top of the dam, and flow is occurring over the embankment.

Seepage and Sinkholes

Potential dam failure situation; rapidly developing:

1. Cloudy seepage or soil deposits are observed at seepage exit points or from internal drain outlet pipes.
2. New or increased areas of wet or muddy soils are present on the downstream slope, abutment, and/or foundation of the dam, and there is an easily detectable and unusual increase in volume of downstream seepage.
3. Significant new or enlarging sinkhole(s) near the dam or settlement of the dam is observed.
4. Reservoir level is falling without apparent cause.
5. The following known dam defects are or will soon be inundated by a rise in the reservoir:
 - Sinkhole(s) located on the upstream slope, crest, abutment, and/or foundation of the dam; or
 - Transverse cracks extending through the dam, abutments, or foundation.

Urgent; dam failure appears imminent or is in progress:

1. Rapidly increasing cloudy seepage or soil deposits at seepage exit points to the extent that failure appears imminent or is in progress.

2. Rapid increase in volume of downstream seepage to the extent that failure appears imminent or is in progress.
3. Water flowing out of holes in the downstream slope, abutment, and/or foundation of the dam to the extent that failure appears imminent or is in progress.
4. Whirlpools or other evidence exists indicating that the reservoir is draining rapidly through the dam or foundation.
5. Rapidly enlarging sinkhole(s) are forming on the dam or abutments to the extent that failure appears imminent or is in progress.
6. Rapidly increasing flow through crack(s) eroding materials to the extent that failure appears imminent or is in progress.

Embankment Movement and Cracking

Potential dam failure situation; rapidly developing:

1. Settlement of the crest, slopes, abutments and/or foundation of the dam that may eventually result in breaching of the dam.
2. Significant increase in length, width, or offset of cracks in the crest, slopes, abutments, and/or foundation of the dam that may eventually result in breaching of the dam.

Urgent; dam failure appears imminent or is in progress:

1. Sudden or rapidly proceeding slides, settlement, or cracking of the embankment crest, slopes, abutments, and/or foundation, and breaching of the dam appears imminent or is in progress.

B. EMERGENCY RESPONSE PLAN FOR BREACH OF CANAL BANK

Flood-fighting measures are emergency measure deployed in the event when flood protection / control structures and flood proofing measures have failed or rendered ineffective with a sole objective of mitigating flood impacts

Reasons of Flooding:

- Failure of dykes, flood walls and embankments;
- Reduced capacity of river channels, flood ways, and flood bypass channels;
- Failure of weirs and barrages with consequent devastating flood waves;
- Failure of land drainage systems causing flooding of agriculture land; and
- Failure of urban drainage systems causing flooding within protected urban area.

Emergency Responses for flood-fighting in a typical case of failure of flood protection / control structures include the following:

- Closing of gaps in flood walls by sand bags or other available methods;
- Protection of river banks by sand bags, stone, or other available methods;
- Counteracting piping which is the main cause of collapse of embankment and dykes etc.;
- Protection of bridge piers, weirs, barrages and dams against erosion by rockfill, sand bags and other available methods;
- Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;
- Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;
- Removing obstacles from active or potential flood ways, relief and flood bypass channels; and
- Protection of structures exposed to strong wind wash action.

Annexure 17: The list of Restricted Pesticides

Table 1. Extremely Hazardous (Class Ia) Technical grade Active Ingredients in Pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
dicarb [ISO]	116-06-3	2757	C	5	I-S	1	0.93	DS 53; EHC 121; HSG 64; IARC 53; ICSC 94; JMPR 1993, 1996a
difacoum [ISO]	56073-10-0	3027	CO	5	R	1	0.3	DS 57; EHC 175; HSG 93
radiolone [ISO]	28772-56-7	3027	CO	5	R	1	1.12	DS 88; EHC 175; HSG 94
methalin [ISO]	63333-35-7	2588		5	R	1	2	
calcium cyanide [C]	592-01-8	1575		5	FM	2	39	Adjusted classification; see note 1; ICSC 407
tafol [ISO]	2425-06-1			5	F	5	5000	Adjusted classification; see note 2; HSG 49; IARC 53; ICSC 119; JMPR 1978, 1986a; see note 3
prothoxyfos [ISO]	54593-83-8	3018	OP	L	I	1	1.8	Extremely hazardous by skin contact (LD ₅₀ = 12.5 mg/kg); ICSC 1681
ormephos [ISO]	24934-91-6	3018	OP	L	I	2	7	ICSC 1682
prophacinone [ISO]	3691-35-8	2588		5	R	1	3.1	DS 62; EHC 175
fenacoum [ISO]	56073-07-5	3027	CO	5	R	1	1.8	EHC 175; HSG 95
methialone [ISO]	104653-34-1	2588		5	R	1	0.56	EHC 175
prophacinone [ISO]	82-66-6	2588		5	R	1	2.3	EHC 175
chlorfoton [ISO]	298-04-4	3018	OP	L	I	1	2.6	DS 68; JMPR 1992, 1997a; ICSC 1408
chlorfoton [ISO]	2104-64-5	2783	OP	5	I	2	14	See note 4; ICSC 753
prophos [ISO]	13194-48-4	3018	OP	L	I-S	2	D26	DS 70; JMPR 2000; ICSC 1660; [Oral LD ₅₀ = 33 mg/kg]
coumafen	90035-08-8	3027		5	R	1	0.25	EHC 175; ICSC 1267
1,2-dichlorobenzene [ISO]	118-74-1	2729	OC	5	FST	5	D10000	Adjusted classification (notes 3 and 5); IARC 79; ICSC 895; EHC 195
mercuric chloride [ISO]	7487-94-7	1624	HG	5	F-S	1	1	See note 3; ICSC 979
vinphos [ISO]	26718-65-0	3018	OP	L	I	1	D4	DS 14; ICSC 924; JMPR 1998b; [Oral LD ₅₀ = 3.7 mg/kg]
methion [ISO]	56-38-2	3018	OP	L	I	2	13	See note 3; DS 6; HSG 74; IARC 30, Suppl. 7; ICSC 6; JMPR 1996b
methion-methyl [ISO]	298-00-0	3018	OP	L	I	2	14	See note 3; DS 7; EHC 145; HSG 75; ICSC 626; JMPR 1985c, 1996b

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Phenylmercury acetate [ISO]	62-38-4	1674	HG	S	FST	2	24	Adjusted classification; see notes 3 and 6; ICSC 540
Phorate [ISO]	298-02-2	3018	OP	L	I	1	2	DS 75; JMPR 1997b, 2005; ICSC 1060
Phosphamidon	13171-21-6	3018	OP	L	I	2	7	See note 3; DS 74; ICSC 189; JMPR 1987b
Sodium fluoroacetate [C]	62-74-8	2629		S	R	1	0.2	DS 16; ICSC 484
Sulfotep [ISO]	3689-24-5	1704	OP	L	I	1	5	ICSC 985
Tebupirimfos [ISO*]	96182-53-5	3018	OP	L	I	1	1.3	Extremely hazardous by skin contact (LD 9.4 mg/kg in rats)
Terbufos [ISO]	13071-79-9	3018	OP	L	I-S	1	c2	JMPR 1991, 2004

EHC = Environmental Health Criteria Monograph; DS = Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of

Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ia

1. Calcium cyanide is in Class Ia as it reacts with moisture to produce hydrogen cyanide gas. The gas is not classified under the WHO system (see Table 8).
2. Captafol is carcinogenic in both rats and mice.
3. The international trade of captafol, hexachlorobenzene, mercury compounds, parathion, parathion-methyl, and phosphamidon is regulated by the Rotterdam convention on Prior Informed Consent (see <http://www.pic.int/>), which entered into force on 24 February 2004. See Table 7, p. 51
4. EPN has been reported as causing delayed neurotoxicity in hens.
5. Hexachlorobenzene has caused a serious outbreak of porphyria in humans. The use and production of hexachlorobenzene is severely restricted by the Stockholm convention on persistent organic pollutants, which entered into force on 17 May, 2004. See <http://www.pops.int/>
6. Phenylmercury acetate is highly toxic to mammals and very small doses have produced renal lesions: teratogenic in the rat.

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION
See Pages 7 & 8, and the Appendix

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Acrolein [C]	107-02-8	1092		L	H	2	29	EHC 127; HSG 67; IARC 63; ICSC 90
Allyl alcohol [C]	107-18-6	1098		L	H	3	64	Highly irritant to skin and eyes; ICSC 95; <i>Adjusted classification (see note 3)</i>
Azinphos-ethyl [ISO]	2642-71-9	2783	OP	S	I	2	12	DS 72; JMPR 1974
Azinphos-methyl [ISO]	86-50-0	2783	OP	S	I	2	16	DS 59; ICSC 826; JMPR 1992, 2009b
Blasticidin-S	2079-00-7	2588		S	F	2	16	
Butocarboxim [ISO]	34681-10-2	2992	C	L	I	3	158	JMPR 1986a; <i>Adjusted classification (see note 3)</i>
Butoxycarboxim [ISO]	34681-23-7	2992	C	L	I	3	D288	<i>Adjusted classification (see note 3)</i>
Cadusafos [ISO]	95465-99-9	3018	OP	L	N,I	2	37	JMPR 1992
Calcium arsenate [C]	7778-44-1	1573	AS	S	I	2	20	EHC 18, 224; IARC 84; ICSC 765; JMPR 1969
Carbofuran [ISO]	1563-66-2	2757	C	S	I	2	8	DS 56; ICSC 122; JMPR 1997b, 2003b, 2009a; <i>See note 2.</i>
Chlorfenvinphos [ISO]	470-90-6	3018	OP	L	I	2	31	ICSC 1305; JMPR 1995b
3-Chloro-1,2-propanediol [C]	96-24-2	2689		L	R	3	112	<i>Adjusted classification (see notes 1 and 3)</i>
Coumaphos [ISO]	56-72-4	2783	OP	S	AC,MT	2	7.1	ICSC 422; JMPR 1991
Coumatetralyl [ISO]	5836-29-3	3027	CO	S	R	2	16	
Cyfluthrin [ISO]	68359-37-5		PY	S	I	2	c15	JMPR 2008; <i>See note 9, p. 8</i>
Beta-cyfluthrin [ISO]	68359-37-5		PY	S	I	2	c11	JMPR 2008; <i>See note 9, p. 8</i>
Zeta-cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c86	<i>See note 9, p. 8; HSG 22; ICSC 246; JMPR 2008; Adjusted classification (see note 3)</i>
Demeton-S-methyl [ISO]	919-86-8	3018	OP	L	I	2	40	DS 61, EHC 197; ICSC 705; JMPR 1990
Dichlorvos [ISO]	62-73-7	3018	OP	L	I	3	56	Volatile, DS 2; EHC 79; HSG 18; IARC 20, 53; ICSC 690; JMPR 1994; <i>Adjusted classification (see note 3)</i>
Dicrotophos [ISO]	141-66-2	3018	OP	L	I	2	22	ICSC 872
Dinoterb [ISO]	1420-07-1	2779	NP	S	H	2	25	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
DNOC [ISO]	534-52-1	2779	NP	S	I-S,H	2	25	JMPR 1965a; EHC 220; ICSC 462. See note 2.
Edifenphos [ISO]	17109-49-8	3018	OP	L	F	3	150	JMPR 1982. <i>Adjusted classification (see note 3)</i>
Ethiofencarb [ISO]	29973-13-5	2992	C	L	I	3	200	JMPR 1983. <i>Adjusted classification (see note 3)</i>
Famphur	52-85-7	2783	OP	S	I	2	48	
Fenamiphos [ISO]	22224-92-6	2783	OP	S	N	2	15	DS 92; ICSC 483; JMPR 1998b, 2003b
Flucythrinate [ISO]	70124-77-5	3352	PY	L	I	3	c67	JMPR 1986b; see note 9, p.8; <i>Adjusted classification (see note 3)</i>
Fluoroacetamide [C]	640-19-7	2588		S	R	2	13	ICSC 1434. See note 2
Formetanate [ISO]	22259-30-9	2757	C	S	AC	2	21	
Furathiocarb	65907-30-4	2992	C	L	I-S	2	42	
Heptenophos [ISO]	23560-59-0	3018	OP	L	I	3	96	<i>Adjusted classification (see note 3)</i>
Isoxathion [ISO]	18854-04-8	3018	OP	L	I	3	112	<i>Adjusted classification (see note 3)</i>
Lead arsenate [C]	7784-40-9	1617	AS	S	L	2	c10	EHC 18, 224; IARC 84; ICSC 911; JMPR 1969
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	2	36	JMPR 1987a
Mercuric oxide [ISO]	21908-53-2	1641	HG	S	O	2	18	ICSC 981; CICAD 50. See note 2
Methamidophos [ISO]	10265-92-6	2783	OP	S	I	2	30	HSG 79; ICSC 176; JMPR 1991, 2003b; See note 2
Methidathion [ISO]	950-37-8	3018	OP	L	I	2	25	JMPR 1998b; ICSC 1659
Methiocarb [ISO]	2032-65-7	2757	C	S	I	2	20	JMPR 1999
Methomyl [ISO]	16752-77-5	2757	C	S	I	2	17	DS 55, EHC 178; HSG 97; ICSC 177, JMPR 1989, 2002
Monocrotophos [ISO]	6923-22-4	2783	OP	S	I	2	14	See note 2; HSG 80; ICSC 181; JMPR 1996b
Nicotine [ISO]	54-11-5	1654		L		1	D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	2	50	JMPR 1997a
Oxamyl [ISO]	23135-22-0	2757	C	S	I	2	6	DS 54; JMPR 1986b, 2003b
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	3	65	JMPR 1990, 2003b; <i>Adjusted classification (see note 3)</i>
Paris green [C]	12002-03-8	1585	AS	S	L	2	22	Copper-arsenic complex
Pentachlorophenol [ISO]	87-86-5	3155		S	I,F,H	2	D80	See note 2; Irritant to skin; EHC 71; HSG 19; IARC 20, 53; ICSC 69

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Propetamphos [ISO]	31218-83-4	3018	OP	L	I	3	106	Adjusted classification (see note 3)
Sodium arsenite [C]	7784-46-5	1557	AS	S	R	2	10	EHC 224; IARC 84; ICSC 1603
Sodium cyanide [C]	143-33-9	1689		S	R	2	6	ICSC 1118; CICAD 61
Strychnine [C]	57-24-9	1692		S	R	2	16	ICSC 197
Tefluthrin	79538-32-2	3349	PY	S	I-S	2	c22	See note 9, p. 8
Thallium sulfate [C]	7446-18-6	1707		S	R	2	11	DS 10, EHC 182; ICSC 336
Thiofanox [ISO]	39196-18-4	2757	C	S	I-S	2	8	
Thiometon [ISO]	640-15-3	3018	OP	Oil	I	3	120	DS 67; ICSC 580; JMPR 1980; Adjusted classification (see note 3)
Triazophos [ISO]	24017-47-8	3018	OP	L	I	3	82	JMPR 1994, 2003b; Adjusted classification (see note 3)
Vamidotion [ISO]	2275-23-2	3018	OP	L	I	3	103	JMPR 1989; ICSC 758; Adjusted classification (see note 3)
Warfarin [ISO]	81-81-2	3027	CO	S	R	2	10	DS 35, EHC 175; HSG 96; ICSC 821
Zinc phosphide [C]	1314-84-7	1714		S	R	2	45	DS 24, EHC 73; ICSC 602

EHC = Environmental Health Criteria Monograph; DS= Pesticide Data Sheet; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ib

1. 3-Chloro-1,2-propanediol in nonlethal dosage is a sterilant for male rats. This compound is also known as alpha chlorhydrin.
2. The international trade of carbofuran, DNOC, fluoroacetamide, mercury compounds, methamidophos, monocrotophos and pentachlorophenol is regulated by the Rotterdam convention on Prior Informed Consent (see <http://www.pic.int/>), which entered into force on 24 February 2004. See Table 7, p. 51.
3. As a precautionary measure, the classification of certain liquid pesticides has been adjusted to avoid those pesticides being assigned to a less hazardous Class in the process of aligning the WHO Classification with the GHS. Details of how the WHO Classification has been aligned with the GHS Acute Toxicity Hazard Categories are described in the introductory notes for Part II.

THE FINAL CLASSIFICATION OF ANY PRODUCT
DEPENDS ON ITS FORMULATION
See Pages 7 & 8, and the Appendix

Table 3. Moderately Hazardous (Class II) Technical Trade Active Ingredients in Pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Acephate [ISO]	30560-19-1		OP	S	I	4	945	JMPR 1991, 2003b, 2006b; ICSC 748
Acifluorfen [ISO]	50594-66-6			S	H	4	1370	Strong irritant to eyes
Alachlor [ISO]	15972-60-8	2588		S	H	4	930	See note 1; DS 86; IARC 19, 36, 63; ICSC 371
Alanycarb [ISO]	83130-01-2		C	S	I	4	330	
Allethrin [ISO]	584-79-2		PY	Oil	I	4	c685	See note 9, page 8; EHC 87; HSG 24; ICSC 212; JMPR 1965a
Ametryn [ISO]	834-12-8		T	S	H	4	110	
Amitraz [ISO]	33089-61-1			S	AC	4	800	ICSC 98; JMPR 1999
Anilofos [ISO]	64249-01-0		OP	S	H	4	472	
Azaconazole	60207-31-0			S	F	4	308	
Azamethiphos [ISO]	35575-96-3		OP	S	I	4	1010	
Azocyclotin [ISO]	41083-11-8	2786	OT	S	AC	3	80	JMPR 1990, 1995b, 2006b
Bendiocarb [ISO]	22781-23-3	2757	C	S	I	3	55	DS 52
Benfuracarb [ISO]	82560-54-1	2992	C	L	I	3	205	
Bensulide [ISO]	741-58-2	2902		L	H	3	270	ICSC 383
Bensultap [ISO]	17606-31-4			S	I	4	1100	
Bentazone [ISO]	25057-89-0			S	H	4	1100	HSG 48; ICSC 828; JMPR 1999, 2005
Bifenthrin	82657-04-3	3349	PY	S	I	3	c55	JMPR 1993
Bilanafos [ISO]	71048-99-2			S	H	3	268	
Bioallethrin [C]	584-79-2		PY	L	I	4	c700	See note 2; note 9, p. 8; ICSC 227
Bromoxynil [ISO]	1689-84-5	2588		S	H	3	190	
Bromuconazole	116255-48-2			S	F	4	365	ICSC 1264
Bronopol	52-51-7			S	B	3	254	ICSC 415
Butamifos [ISO]	36335-67-8		OP	L	H	4	630	
Butralin [ISO]	33629-47-9			S	H	4	1049	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Butoxydim [ISO]	138164-12-2			S	H	4	1635	
Butylamine [ISO]	13952-84-6	1992		L	F	4	380	Irritant to skin; ICSC 401; JMPR 1982, 1985b
Carbaryl [ISO]	63-25-2	2757	C	S	I	3	c300	DS 3; EHC 153; HSG 78; IARC 12, Suppl.7; ICSC 121; JMPR
Carbosulfan [ISO]	55285-14-8	2992	C	L	I	3	250	JMPR 1987a, 2004
Cartap [ISO]	15263-53-3			S	I	4	325	EHC 76; JMPR 1996a
Chloralose [C]	15879-93-3			S	R	4	400	
Chlordane [ISO]	57-74-9	2996	OC	L	I	4	460	See notes 3 and 4; DS 36; EHC 34; HSG 13; IARC 79; ICSC 740; JMPR 1995a
Chlorfenapyr [ISO]	122453-73-0			S	I,MT	4	441	
Chlormequat (chloride) [ISO]	999-81-5			S	PGR	4	670	ICSC 781; JMPR 2000
Chloroacetic acid [C]	79-11-8	1751		S	H	4	650	Irritant to skin and eyes; data refer to sodium salt; ICSC 235
Chlorphonium chloride [ISO]	115-78-6	2588		S	PGR	3	178	Irritant to skin and eyes
Chlorpyrifos [ISO]	2921-88-2	2783	OP	S	I	3	135	DS 18; ICSC 851; JMPR 2000
Clomazone [ISO]	81777-89-1			L	H	4	1369	
Copper hydroxide [C]	20427-59-2		CU	S	F	4	1000	
Copper oxychloride [C]	1332-40-7		CU	S	F	4	1440	
Copper sulfate [C]	7758-98-7		CU	S	F	3	300	ICSC 751
4-CPA [ISO]	122-88-3		PAA	S	PGR	4	850	
Cuprous oxide [C]	1317-39-1		CU	S	F	4	470	ICSC 421, EHC 200
Cyanazine [ISO]	21725-46-2		T	S	H	3	288	ICSC 391
Cyanophos [ISO]	2636-26-2		OP	L	I	4	610	
Cyhalothrin [ISO]	68085-85-8	3352	PY	Oil	Ix	3	c144	See note 9, p. 8; EHC 99; HSG 38; ICSC 858; JMPR 1985c; JECFA 2000b
Cyhexatin [ISO]	13121-70-5		OT	S	AC	3	265	EHC 15; JMPR 1995b, 2006b
Cymoxanil [ISO]	57966-95-7			S	F	4	1196	

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD ₅₀ mg/kg	Remarks
Cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c250	See note 9, p. 8; DS 58; EHC 82; HSG 22; ICSC 246; JECFA 1996
Alpha-cypermethrin [ISO]	67375-30-8	3349	PY	S	I	3	c79	See note 9, p 8; EHC 142; JECFA 1996; <i>JMPR 2008</i>
Cyphenothrin [(1R)-isomers] [ISO]	39515-40-7	3352	PY	L	I	4	318	
Cyproconazole	94361-06-5			S	F	4	1020	
2,4-D [ISO]	94-75-7	3345	PAA	S	H	4	375	DS 37; EHC 29, 84; HSG 5; IARC 41, Suppl. 7; ICSC 33; JMPR
Dazomet [ISO]	533-74-4			S	F-S	4	640	Irritant to skin and eyes; ICSC 786
2,4-DB	94-82-6			S	H	4	700	
DDT [ISO]	50-29-3	2761	OC	S	I	3	113	See notes 3 and 4; DS 21; EHC 9, 83; IARC 53; ICSC 34; JMPR
Deltamethrin [ISO]	52918-63-5	3349	PY	S	I	3	c135	See note 9, p. 8; DS 50; EHC 97; HSG 30; IARC 53; ICSC 247; <i>JMPR 2001</i>
Diazinon [ISO]	333-41-5	3018	OP	L	I	4	300	DS 45, EHC 198; ICSC 137; <i>JMPR 1994, 2002, 2008</i>
Dicamba [ISO]	1918-00-9			S	H	4	1707	ICSC 139
Dichlorobenzene [C]	106-46-7			S	FM	4	500-5000	Mixture of isomers: ortho (3) 95-50-1, meta (3) 541-73-1, para (2B)
Dichlorophen [ISO]	97-23-4		OC	S	F	4	1250	
Dichlorprop [ISO]	7547-66-2			S	H	4	800	ICSC 38
Diclofop [ISO]	40483-25-2			S	H	4	565	
Dicofol [ISO]	115-32-2		OC	S	AC	4	c690	DS 81; IARC 30; ICSC 752; <i>JMPR 1993</i>
Difenoconazole [ISO]	119446-68-3			S	F	4	1453	<i>JMPR 2009b</i>
Difenzoquat [ISO]	43222-48-6	2588		S	H	4	470	
Dimepiperate [ISO]	61432-55-1		TC	S	H	4	946	
Dimethachlor [ISO]	50563-36-5			S	H	4	1600	
Dimethipin [ISO]	55290-64-7			S	H	4	1180	<i>JMPR 2000, 2005</i>

Annexure 18: Emergency Response Plan for Flood Protection Bund

Flood-fighting measures are emergency measure deployed in the event when flood protection / control structures and flood proofing measures have failed or rendered ineffective with a sole objective of mitigating flood impacts

Reasons of Flooding:

- Failure of flood walls and embankments;
- Failure of land drainage systems causing flooding of agriculture land; and

Emergency Responses for flood-fighting in a typical case of failure of flood protection / control structures include the following:

- Closing of gaps in flood walls by sand bags or other available methods;
- Protection of river banks by sand bags, stone, or other available methods;
- Counteracting piping which is the main cause of collapse of embankment and dykes etc.;
- Construction of temporary non-structural protection measures to prevent the propagation of flood on non-protected land;
- Cutting of embankment, dykes etc. in order to allow flooding of less important areas, and thus to save other more important areas;
- Removing obstacles from active or potential flood ways, relief and flood bypass channels; and
- Protection of structures exposed to strong wind wash action.

Annexure 19: Approval Forms and Monitoring Sheets

Construction Contractor

Consultant

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Preliminary Approval Form for Campsite, Workshop, and Equipment Yard

Land Type _____	
Land Use	<input type="checkbox"/> Agricultural <input type="checkbox"/> Barren
Area of Campsite (Acres)	
Area of Workshop/Equipment Yard (Acres)	
Minimum Distance of Campsite from Nearest Settlement (Meters)	Upwind----- Downwind-----
Minimum Distance of Workshop/Equipment Yard from Nearest Settlement (Meters)	Upwind----- Downwind-----
Location, Campsite, Workshop/ Equipment Yard _____	
Provisional Approval of Location Granted	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Submission	
Date of Approval	
_____ PROJECT MANAGER (CONTRACTOR)	_____ RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Construction Contractor

Consultant

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Final Approval Form of Campsite, Workshop, and Equipment Yard

Type of Land Possession	<input type="checkbox"/> Rented <input type="checkbox"/> Purchased <input type="checkbox"/> Leased
Agreement of Possession Attached	<input type="checkbox"/> Yes <input type="checkbox"/> No
Preliminary Approval Form Attached	<input type="checkbox"/> Yes <input type="checkbox"/> No
Final Approval of Location Granted	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Submission	
Date of Approval	
<hr/> PROJECT MANAGER (CONTRACTOR)	<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Construction Contractor

Consultant

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Preliminary Approval Form of Borrow Pit Site

Land Use	<input type="checkbox"/> Agricultural <input type="checkbox"/> Barren
Area (Acres)	
Location Map Attached	<input type="checkbox"/> Yes <input type="checkbox"/> No
Provisional Approval of Location Granted	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Submission	
Date of Approval	
<hr/> PROJECT MANAGER (CONTRACTOR)	<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Construction Contractor

Consultant

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Final Approval Form of Borrow Pit Site

Type of Land Possession	<input type="checkbox"/> Rented <input type="checkbox"/> Purchased <input type="checkbox"/> Leased
Agreement of Possession Attached	<input type="checkbox"/> Yes <input type="checkbox"/> No
Preliminary Approval Form Attached	<input type="checkbox"/> Yes <input type="checkbox"/> No
Final Approval of Location Granted	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Submission	
Date of Approval	
<hr/> PROJECT MANAGER (CONTRACTOR)	<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Daily Dust Monitoring Form (Construction Site)

Date: _____

Construction Contractor

Consultant

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Practice	Yes	No	In Case of Non - Conformance	
			Duration (hrs)	Remarks/Reasons
Speed of vehicles/equipment within the limits (less than 20 km/hr)				
Spraying of water done twice on unpaved tracks				
Haul trucks carrying sand or aggregate covered with tarpaulin				
Cover silos openings during operation				
Monitored by:			<hr style="width: 80%; margin: 0 auto;"/> <p>SITE ENGINEER</p>	

Request for Removal of Shrubs and Trees (If Required)

Construction Contractor

Consultant

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Need Reported to Project Manager by:	Name & Designation:
Reported to Project Manager on	Date:
Location of Vegetation to be Removed	
Reported by Project Manager to Resident Engineer	Date:
Approval Granted by Resident Engineer	<input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Submission	
Date of Approval	
<hr/> PROJECT MANAGER (CONTRACTOR)	<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Approval Form for Solid Waste Disposal Site and Impervious Liner

Construction Contractor

Consultant

Land Type	<input type="checkbox"/> Government <input type="checkbox"/> Private
Land Use	<input type="checkbox"/> Agricultural <input type="checkbox"/> Depression Area <input type="checkbox"/> Barren
Area of Disposal Site (Acres)	-----
Minimum Distance of Disposal Site from Nearest Settlement (Meters)	Upwind-----
	Downwind-----
Minimum Distance of Disposal Site from Campsite (Meters)	Upwind-----
	Downwind-----
Specification of Impervious Liner	
Selected Liner Approved	<input type="checkbox"/> Yes
	<input type="checkbox"/> No
Selected Site Approved	<input type="checkbox"/> Yes
Date of Submission	<input type="checkbox"/> No
Date of Approval	
<hr/> PROJECT MANAGER (CONTRACTOR)	<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Form for Recording of Air Quality

#	Date	Location	Parameter	Results	Test Report Number	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
<hr/> PROJECT MANAGER (CONTRACTOR)				<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)		

Form for Recording of Air Quality @ Stack Machinery/Equipment

#	Date	Location	Parameter	Results	Test Report Number	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
<hr/> PROJECT MANAGER (CONTRACTOR)				<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)		

Form for Recording Noise at Construction Site

#	Date	Location	Results	Test Report Number	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
<hr/> PROJECT MANAGER (CONTRACTOR)			<hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT)		

Annexure 20: Waste Management Plan for Construction Waste & Campsite Waste during Construction Phase

This document outlines the plan for management of solid waste during the construction phase:

The **Waste Management Program** should be based on the following hierarchy:

- Source segregation
- Source reduction
- Recycling, reuse and recovery
- Disposal

The following activities are to be carried out:

- Establishment of campsite and machinery/ equipment Yard
- Construction works

The following activities are expected to play a role in the generation of solid waste:

- Land degradation due to solid waste disposal of camp site
- Contamination of water by solid waste
- Soil erosion and contamination
- Site overburden

Proposed actions

- Disposal of construction waste shall be done at a properly designated landfill/disposal sites.
- If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping.
- Prior to dumping the construction contractor should get the NOC from local authorities for disposal of solid waste and provide details for future land use.
- An impervious liner shall be laid to waste sites before the dumping of solid waste.
- The impervious liner shall be approved by the supervision consultant.
- After the dumping of solid waste, the depression should be covered by scarified material.
- The approval for impervious liner shall be granted by supervision consultant.
- Good housekeeping practices within the camp site shall be adopted to minimize waste generation.

Annexure 21: Chance Find Procedure

Project routing does not envisage any archaeological site. However, in case of any chance find, the **Construction Contractor** will immediately report through **Chief Resident Engineer** of Supervision Consultant to **Deputy Commissioner (DC)** or his nominated representative, to take suitable further actions to preserve such antiques or sensitive remains; and contact the “**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan**” for further action.

Representative of the “**Culture, Tourism & Archives Department, (Archaeology Directorate) Government of Balochistan**” will visit the site and observed the significance of the antique, artifact & Cultural (religious) properties and significance of the project. The site visit report will be prepared and given to the **concerned official** of the **Archaeology Directorate**.

In case any artifact, antiques and sensitive remains are discovered, *Chance Find Procedures* should be adopted by Construction Contractors as follows;

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial archaeological department;
- The suggestion of the local communities and the concerned authorities will be suitable incorporated during taking the preventive measures to conserve the antique, artifact and Cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the Construction Contractor must immediately report the discovery to the **Chief Resident Engineer** of Supervision Engineer for onwards communication to **Deputy Commissioner (DC)**;
- Once authorization has been given by the responsible authorities (Archaeological Department), the Construction Contractor will be informed when works can resume.

Annexure 22: Checklist of Mitigation Measure Record Keeping

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
Construction of Dam, Main Canal, Left Canal & Right Canal and Irrigation Structures				
A. Implementation & Construction Phase				
A1. Implementation and Contractor Mobilization Phase				
Social Disturbance due to Poor Expectation Management	Social issues	The project proponent should make formal arrangement for continued communication and engagement with local stakeholders, through the BID during construction activities. BID will formally keep in record all the issues and rational expectations desired by the local public in a register, to ensure that they are duly addressed and fulfilled by the end of the Project.		
Public Utilities	Social issues	Incorporate technical design features to minimize effects on public utilities and all public utilities likely to be affected by the proposed project need to be relocated well ahead of the commencement of construction work and Contractor to obtain NOCs from concerned Departments		
Continued stakeholder engagement	Social issues	Proponents to establish an environmental & social cell responsible for stakeholder engagement and timely information dissemination		
Construction contractor mobilization and establishment of campsite and	Communicable Diseases	Arrange to run an active campaign, in the labor camp, to make people aware of the cause, mode of transmission and		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
machinery/ equipment Yard		<p>consequences of HIV/AIDS;</p> <p>Strengthen the existing local health & medical services for the benefit of labor as well as the surrounding villages;</p> <p>Ensure cleanliness and hygienic conditions at labor camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by Health Department; and</p> <p>Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents.</p>		
	Security and Safety Risks	<p>Frequent consultation with local community leaders should be carried out to ensure that any social frictions are identified and resolved before they become inflamed.</p> <p>Control of public access to the site along with regulations aimed at safeguarding workers.</p> <p>Liaise with local communities and initiate and support a public awareness program, particularly targeted at children, about the risks and dangers of large construction sites</p>		
	Lifestyle and Culture	Timely and full public consultation and		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>announcement of mobilizing equipment;</p> <p>Establishment of formal links with affected communities; Seek assistance from and cooperation with local NGOs; Familiarize outside laborer's on local etiquettes;</p> <p>Local labor should be employed for construction works. A dedicated quota of 50% of unskilled labor should be allocated for the nearby villages; and</p> <p>Water supply and sanitation facilities, Contractor's workforces should exacerbate the existing shortages and environmental hazards; contractor should primarily seek their own sources of water in due distance (min. 1 km) from local user's wells.</p>		
	<p>Changes in land use pattern Influx of external work force Social conflicts</p>	<p>Select campsite in view of the cultural norms of the area to avoid undue interference of the Construction contractor's staff with the local residents. Approval of campsite will be taken as per attached approval form in Annexure 19.</p> <p>Give priority employment to local residents. The land shall be rented for the camp site and equipment yard.</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
	Workshop facilities may spread oils & chemicals	<p>Disposal of used oil and chemical waste in accordance with MSDS.</p> <p>Efficient Use of Chemicals.</p> <p>Good housekeeping practices at workshop areas.</p> <p>Mixing of waste into fresh water sources shall not be allowed.</p>		
	Deterioration of air quality due to machinery & equipment	<p>Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits for air quality Annexure 5</p> <p>Water should be sprinkled where needed and appropriate, particularly if the campsite is near the communities;</p> <p>During windy conditions stockpiles of fine material will be wetted or covered with plastic;</p> <p>PPEs such as dust masks will be made available to the construction workers at the site to avoid potential health hazards;</p> <p>Idling of delivery trucks or other equipment will not be permitted during periods of unloading or when they are not in active use;</p> <p>In no case, loose earth will be allowed to pile up along the approach roads;</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>All vehicles and other equipment's used during construction will be properly and regularly tuned and maintained;</p> <p>All permanently deployed vehicles exhausts will be monitored against NEQS; and</p> <p>The possibility of excessive dust generation may be reduced by adopting the best construction practices, precautions such as periodic watering, covering of construction material and usage of low emission equipment's during construction.</p> <p>Although blasting is planned currently in any project activity, however at any latter stage during construction, blasting may be required for quarrying or any other activity. A blasting management plan has been attached as Annexure 15. Which need to be implemented by construction contractor.</p>		
	Noise	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and lubrication of the construction vehicle and equipment.</p> <p>Use of PPEs by the workers</p> <p>Avoid night time activity</p>		
	Land degradation	Ensure proper disposal of camp site waste at		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
	due to solid waste disposal of camp site	<p>designated disposal sites according to waste management plan attached as Annexure 20.</p> <p>An impervious liner shall be laid to waste sites before the dumping of solid waste. The approval for impervious liner shall be granted by Supervision Consultant on a form attached in Annexure 19.</p> <p>Good housekeeping practices within the camp site.</p> <p>Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed.</p> <p>Construction work will not be carried out during heavy monsoon rains;</p> <p>Clearance waste and construction debris should be sent to designated disposal site while waste from equipment cleaning and maintenance should be segregated and stored in color coded containers, these can be resold or reprocessed. No accumulation of solid waste at site shall be allowed;</p> <p>Avoid Vehicular traffic on unpaved roads as far as possible;</p> <p>Vehicles and equipment shall not be repaired in the field;</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>If unavoidable, impervious sheathing shall be used to avoid soil and water contamination; Solid waste should be disposed of at designated places and contractor to obtain NOC from district governments for disposal of any material in existing disposal points; and</p> <p>Contractor to prepare a primary and secondary solid waste collection system within the premises of contractor camps and get approved by BID.</p>		
	Water contamination	Proper sewerage disposal arrangements to be provided such as septic tank and soaking pits for camps.		
	Loss of vegetation	<p>The construction crew shall use LPG as cooking fuel. Use of fuel wood shall not be allowed.</p> <p>Although as per impact assessment Sri Toi specifically represents dry arid alpine terrain, with marginal vegetation cover-mainly comprising of shrubs. No tree species were recorded during the transect survey. The construction activity will be no negative impact on the flora of the project area. However, if any possibility of such practice may arise following mitigation measure shall be adopted:</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>Tree cutting to be done only when absolutely necessary, with prior approval as perform given in Annexure 19.</p> <p>Compensatory tree plantation in consultation with Forest department. Removal of one (01) tree should be compensated by plantation of ten (10) trees as per Forest (Amendment) Act 2010.</p>		
	Health and Safety issues	<p>Protective fencing around the camps.</p> <p>Firefighting equipment at the camps.</p> <p>Firefighting training to the camp staff.</p> <p>First aid facility should be in place.</p> <p>An ambulance should be available at site for 24 hrs. Safety precautions shall be taken to transport, handle and store hazardous substances.</p> <p>Contractor to prepare OHS plan and get it approved by Supervision Consultant.</p>		
Transportation of construction material	Soil erosion and contamination	<p>Avoid vehicular traffic on unpaved roads as far as possible.</p> <p>Vehicles and equipment shall not be repaired in the field and all the repairing work will be done at designated workshop facilities.</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>Construction material should be covered while transportation.</p> <p>If unavoidable, impervious sheathing shall be used to avoid soil and water contamination.</p>		
	Air pollution	<p>Minimize operation of vehicles and machinery close to the water channels, water reservoir.</p> <p>Vehicles shall be kept in good working condition and properly tuned, in order to minimize the exhaust emissions</p>		
	Noise pollution	<p>Vehicles to have exhaust mufflers (silencers)</p> <p>Nighttime traffic shall be avoided near the communities.</p> <p>Inform local population beforehand if nighttime traffic is unavoidable.</p>		
	Health and Safety issues	<p>Road signage fixed at appropriate locations</p> <p>Train all drivers on defensive driving</p> <p>Low vehicle speeds 15 km/hr near / within the communities.</p>		
A2. Construction Phase				
Excavation, backfilling and compaction works	Soil erosion	<p>Prepare material borrowing and disposal plan</p> <p>Avoid cultivation fields for borrowing material to the extent possible</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>Obtain written consent of the land owner for material (soil) borrowing</p> <p>Keep photographic record (before, during, after) for borrow and disposal areas.</p> <p>Leveling of borrow sites.</p>		
	Water availability for construction works	<p>BID should make arrangements to supply water during construction for drinking as well as construction purposes</p> <p>Alternately the contractor shall procure water bowsers and store water on site for drinking and construction purposes</p>		
	Site overburden	<p>Consider wind direction while selecting sites for stock piles.</p> <p>Keep Stockpiles of overburden covered.</p> <p>Ensure proper disposal of construction waste at designated disposal sites.</p> <p>Take approval for selection of solid waste disposal site if landfill is not available from Supervision Consultant on the form attached in Annexure 19.</p> <p>An impervious liner shall be laid to waste sites before the dumping of solid waste. The approval for impervious liner shall be granted by supervision consultant on a form attached in Annexure 19.</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>It will be ensured that no soil is left unconsolidated after completion of work; Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites;</p> <p>Monitoring during the project execution will ensure compliance to the above mitigation measures and their adequacy;</p> <p>Prepare material borrowing and disposal plan by the contractor.</p>		
	Borrow pit	<p>Possible wasteland or natural areas with a high elevation will be demarcated and used for borrowing earth material.</p> <p>Strip and stockpile the top 300 mm of the plough layer for redressing the land where the use of agriculture land is unavoidable.</p> <p>Where deep ditching is to be carried out, the top 1 m layer of ditching area will be stripped and stockpiled. The ditch will be initially filled with scrap material from construction and then leveled with the stockpiled topsoil.</p> <p>Ditches or borrow pits that cannot be fully rehabilitated will be landscaped.</p> <p>Land owners will be compensated according to the terms of lease</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		<p>agreement.</p> <p>The approval forms are attached as Annexure 19.</p>		
	Damage to infrastructure	All damaged infrastructure shall be restored to original or better condition.		
	Sites of Historical, Cultural, Archeological or Religious Significance	<p>Proponent and the Supervision Consultant to ensure that the construction staff is educated about the location and importance of the cultural sites that exist in the Project Area.</p> <p>Contractor to ensure that these sites are not affected by the construction related activities. These aspects will be included in the trainings to be conducted for the contractor's staff.</p> <p>Stop the work immediately in case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance. Chance Find Procedure, attached as Annexure 21. and Antiquities Act 1975 should be followed.</p> <p>No disturbance to Graveyards during the construction activities.</p>		
	Noise pollution	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and lubrication of the construction vehicle and equipment</p> <p>Use of PPEs by the workers</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		Avoid night time activity		
	Air pollution	<p>Proper engine tuning of machinery/ equipment to meet National Environmental Quality Standards of Pakistan limits shall be ensured. NEQS for ambient air quality is attached as Annexure 5.</p> <p>Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.</p>		
	Health and Safety issues	<p>Demarcation tapes to be installed around the construction site to avoid any unauthorized entry</p> <p>Personal protective equipment should be made available at site and the usage of the PPEs should be ensured.</p> <p>Health & safety plan and SOP to manage COVID-19 risks should be prepared by contractor and get it approved by Supervision Consultant</p>		
	Blocked of access due to earth works and stockpiling of excavated material	<p>A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.</p> <p>A traffic diversion plan should be formulated by the Contractor and shall be approved by the Supervision Consultant.</p>		
Construction of	Water	BID should make		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
Dam, new canal and irrigation structures	availability for construction works	<p>arrangements to supply water during construction for drinking as well as construction purposes</p> <p>Alternately the contractor shall procure water bowsers and store water on site for drinking and construction purposes</p>		
	Noise pollution	<p>Noise reduction devices on high noise equipment</p> <p>Regular inspection, maintenance and lubrication of the construction vehicle and equipment</p> <p>Use of PPEs by the workers</p> <p>Avoid night time activity</p>		
	Air pollution	<p>Proper engine tuning of machinery/ equipment to meet NEQS of Pakistan limits shall be ensured. NEQS for ambient air quality is attached as Annexure 5.</p> <p>Water should be sprinkled where needed and appropriate, particularly at work sites near the communities.</p>		
	Health and safety issues	<p>Demarcation tapes to be installed around the construction site to avoid any unauthorized entry</p> <p>Personal protective equipment should be made available at site and the usage of the PPEs should be ensured.</p> <p>Health & safety plan & SOP to manage COVID-19 risks</p>		

Activity	Potential Impact	Mitigation Measures	Implementation of Mitigation Measures	
			Yes	NO
		should be prepared by contractor and get it approved by Supervision Consultant		
	Blocked of access due to construction works	<p>A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.</p> <p>A traffic diversion plan should be formulated by the contractor and shall be approved by the Supervision Consultant.</p>		

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Annexure 24: Baseline Faunal Survey Report of Sri Toi Dam Area BWRDP - Sri Toi Irrigation Project in Zhob River Basin

1. FAUNA SURVEY OF SRI TOI DAM AREA

The project area is host of several species of mammals, birds and reptiles, wherever suitable habitats are found. The wild animals include the wolf, jackal, hyena, fox, and porcupine, all of which are common throughout the District. Leopards are occasionally found in the high hills of the Suleiman and the Toba Kakari ranges. Wild pigs are met with along the Zhob river. The southern slopes of the Shin-ghar Range, north of the Zhob valley, form a great breeding ground of straight-horned Markhor and wild sheep. Fox and jackal are common. Game birds chakor and sisi are in the higher altitudes, and partridge, pigeon, sandgrouse, quail, and bustard are met with in the plains. Among other birds, the dove, hoopoe starling, and wagtail are the most common. The lammergeyer and large black vulture are common everywhere in the higher ranges. Among reptiles, snakes occur widespread (Zhob district Gazetteer 1907). The project area is an important flyway of migratory birds especially cranes. Each year thousands of birds fly through this way because of wetlands and perineal streams however decline observed (Khan, B. 2011).

The survey was carried out in November 5-10, 2017 in representative central and peripheral areas from Sri Toi dam area. Extensive survey carried out in all ranges and conducted while walking predefined travel routes and from observation points. Drop off points, base camp locations and observation points were documented using GPS technology. Ungulates were observed with aid of 8X and 10X binoculars. Due to different habitat types and tough terrains, different direct and indirect methods were applied including; fix point/vantage surveys, Track counts. For diurnal large mammal such as Suleiman Markhor, direct observation method and for nocturnal large mammals like Common leopard, Red fox and Indian Wolf, indirect observation methods such as, observing pug marks, fecal material, territory marking signs etc. were applied. Interviews of local hunters, nomadic communities, local communities and sheep herders were also recorded. The invertebrate of the Sri Toi stream have not been investigated in any detail. No anurans have been collected.



2. WILDLIFE SURVEY RESULTS

1. Through interviews, direct sightings and evidences, we recorded the occurrence of a total Seven mammal species (**Table 1**), of which we confirmed the occurrence of 3 species fox, wolf and Hyena through direct evidences like (pug marks, pelts, faces, territory marking signs and interviews with local residents. The Balochistan Black Bear, Suleiman Markhor and Afghan Urial, which was reported to occur in the past, are now apparently extinct.

3. SMALL MAMMALS

2. Cape hare was found very common in the entire area during survey. A total 07 Cape hare were counted during the survey.

4. CARNIVORES

3. For the determination of population status of carnivores, nights walks were arranged. In the plains the survey team used vehicle and search lights. After seeing the eyes of carnivores in high powerful lights, noted the eye colors and consulted the literatures. In foothills, used search light in same way. One Indian gray wolf, 2 red fox, 3 Asiatic jackals and one Indian Crested Porcupine were sighted. While indirect observations were made on the droppings, foot prints of several carnivore species such as stripped hyena, Jungle cat, afghan hedgehog, Caracal and Indian gray wolf. Skin of Panther observed in a house, using for prayers.

5. RESIDENT AND MIGRATORY BIRDS

4. Direct sight techniques like ground nests searching and stand watch techniques were used for this survey. 16 species of birds observed in the area (**Table-2**). Chakoor and Seesee partridges were found very common throughout the area. The birds were mostly observed near water points. 2 small flocks of Chakoor and see see partridges were observed in the area. Hunters to trap eagles were observed on three different locations with hunting materials.

6. REPTILES

5. The survey team observed lizards in six different locations. At one location hunted Afghan Tortoise shell was observed. Many snake species are reported from the area. Due to hibernation period, no snake species observed in the present survey while 2 lizard species observed in the survey, Clif rcer (*Coluber rhodoracus*) and Agama (*Agama spp.*) are available in everywhere.



7. IMPACTS OF DAM ON ECOSYSTEM AND ASSOCIATED BIODIVERSITY

6. The area used to possess good population of wildlife especially the flagship species of Straight-horned Markhor (*Capra falconeri megaceros*) and Afghan Urial (*Ovis vignei cycloceros*) but war in neighboring Afghanistan led to increased availability of ammunition and automatic arms leading to indiscriminate hunting of these species. By early eighties the populations were reduced to mere fragments and both the species were at the verge of extinction. The endangered mammals vaped out from the area few decades earlier and the proposed dam has no adverse effect on fauna of the area. However, degradation of natural habitats and human influence effects on revitalization of species in their habitats. The environmental consequences of large dams are numerous and varied, positive and negative includes direct impacts to the biological, chemical and physical properties of stream and adjacent environments.

8. POSITIVE IMPACTS OF DAM

- The dam area falls in migratory bird's flyway and act rest place of midway.
- Fisheries development activities inside and in adjacent areas will address food security issues and play role in poverty alleviation.
- Water table of the area will have enhanced,
- Livelihoods improvement of the associated communities will be enhanced through agricultural expansion
- Flood control benefits; it decreases and remove the flood effects.
- Land improvement benefits; are the extra benefits that will occur after an increase in the soil productivity because of drainage and land improvement precautions.
- Dam will play an important role in energy conservation and control ground water utilization which is additional support to current environmental situation of Balochistan.
- There will be opportunities of watershed management, agroforestry and social forestry will support carbon sinking and increase forest cover in the area. The alternate forestry will eliminate forest cutting for fuelwood and timber.

9. NEGATIVE IMPACTS

- The dam traps sediments, which are critical for maintaining physical processes and habitats downstream of the dam (include the maintenance of productive deltas, barrier islands, fertile floodplains and coastal wetlands).
- Agriculture expansion will disturb habitat and use of chemical sprays will affect biodiversity.
- Discharge of toxic matters (pesticides, toxic metals etc.) and their condensation in food chain may affect sensitive animals immediately; all living organisms may expire when the stream becomes unable to recover itself.
- Hunting of migratory birds because of wetland may affect their population.

10. DAM EFFECTS MITIGATION

7. No doubt, the dam has many benefits and need of time to overcome on water issues and food security but mitigation efforts to counter dam effects on environment is also necessary. Mitigation measures reduce the undesirable effects of a dam by modification of its structure or operation, or through changes to the management of the catchment within which the dam is situated. Following measures will be adopting to minimize the impacts to be carried out in dam;

- Watershed management activities on the catchment and stream bank will be afforested.
- Agricultural advisory services will be started to grow organic vegetables and crops,
- Biological control of pests will be adopted through agriculture department support,
- As dam will be constructed, with the coordination of Forest and wild life and conservation organization, environmental awareness regarding hunting control will be raised.

Table 1: List of Mammal Species in Sri Toi Area

S. No.	Common Name	Zoological name	Local Name
1	Suleiman Markhor	<i>Capra falconeri jerordeni</i>	Ghar sanay
2	Common leopard	<i>Panthera pardus</i>	Prang
3	Fox	<i>Vulpes vulpes</i>	Gedara
4	Wolf	<i>Canis lupus</i>	Leva
5	Afghan Urial	<i>Ovis orientalis vignei</i>	Sezha
6	Asiatic steppe wild cat	<i>Felis silvestris</i>	Spilmai Gedara
7	Hyena	<i>Hyaena hyaena</i>	Kazhabal

Table 2: List of birds sighted during survey

Common Name	Scientific Name
Chukar	<i>Alectoris chukar</i>
See-see Partridge	<i>Ammoperdix griseogularis</i>
Eurasian Griffon	<i>Gyps fulvus</i>
Eurasian Sparrowhawk	<i>Accipiter nisus</i>
Demoiselle Crane	<i>Anthropoides virgo</i>
Rock Pigeon	<i>disambiguation</i>
Eurasian Collared Dove	<i>Streptopelia decaocto</i>
Spotted Sandgrouse	<i>Pterocles senegallus</i>
Common Buzzard	<i>Buteo buteo</i>
Common Swift	<i>Apus apus</i>
Common Kingfisher	<i>Alcedo atthis</i>
Green Bee-eater	<i>Merops orientalis</i>

Hoopoe	<i>Upupa epops</i>
Crested Lark	<i>Galerida cristata</i>
Common Rock Thrush	<i>Monticola saxatilis</i>
Rock Bunting	<i>Emberiza cia</i>

Table 3: People Who Contributed

S. No.	Name	Profession
1	Saeedullah Khan	Sociologist
2.	Muzaffar Khan	Field Biologist
3.	Mayen Khan	Zoologist
4.	Naqeebullah Khan	Field Coordinator

Figure 1: Glimpses of Field



Annexure 25: BEPA NOC

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/2020/7689-92/

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 Zhob River Basin**

Location of Project: District Zhob

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.
14. The proponent shall ensure that the farmers of tail shall not be affected due to the project operation. Proper share of the water should be made available without any deviation.
15. The proponent shall redress the objection / concerns of neighbors/ stakeholder on priority basis (if any at any stage).
Maximum skilled and unskilled jobs after fulfilling the eligibility criteria shall be given to the local community.
The proponent shall ensure availability of downstream E-Flow during construction and operational phases of the project as per design and maintain record thereof.
16. 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.



7689-92
27/11/20

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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.

7689-92
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 Zhob.
4. Office / Master file.


DIRECTOR GENERAL



Date: 11 April 2020
Document Code:11-01
Version: 01

Annexure 26: Guidelines

Health & Safety of Building & Construction Workers during COVID-19 Outbreak

Objective

To provide guidelines for the workers involved in building and construction work during the current epidemic of COVID-19.

Rationale

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.

Building construction involves earth work, procurement of materials and supplies and their storage, construction work done by masons, blacksmiths, electricians, carpenters, plumbers, painters, supervisors, managers and security personnel. These guidelines provide the safety measure to be implemented at the construction site having a dusty environment, continuous flow of different materials and make-shift type of arrangements for storage, food and sanitation calls for implementation of safety precautions at the very basic level of personal hygiene only.

Advice for Site Managers:

Without prejudice to the following, all possible and prescribed actions shall be taken at the project site, as should facilitate the health of all life present at the site.

- Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants.
- Workers should not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site
- Ensure the availability of the thermal gun at the entry and exit of the construction site and no worker should be allowed without getting his/her temperature checked.
- Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage.
- Develop the employee roster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours.



- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Non-essential work trainings must be postponed avoiding gathering of people.
- Ensure the physical distance by creating more than one route of entry and exit to the site.
- Instruct the workers to inform the construction manager (or authorities) if
 - They develop any symptoms of cough, flu or fever.
 - They have been exposed to someone suspected or confirmed with COVID 19.
 - They have met someone who has a travel history of COVID 19 endemic country
 - They have travelled in last couple of days or plan to travel soon
- All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby healthcare facility with arrangements for quick transportation of workers in case of an emergency.
- Persuade the workers to inform the authorities for their safety and of other if they observe any signs and symptoms in a colleague
- Do not allow any worker at the construction site who has the symptoms
- Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers shall be requested and required to wash their hands as frequently as practicable and shall also be advised not to touch their face with their hands during work.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Only sanitize-able dinning surfaces shall be used, which must be cleaned before each service.
Food must be heated to a temperature to no less than 70° C before consumption and shall preferably be served in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- In the wake of current restrictions on transportations site mangers will ensure safe transport arrangements for worker which should not be crowded and should have social distancing in



place during the entire process from pickups till drops at destination

- In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms
- A supply of safe drinking water must be made available at the project site and maintained.

Advice for Construction Workers:

- All possible and prescribed measures shall be taken to ensure your and others health
- Enter your contact details in the register maintained at the site, in case a follow up or tracing and tracking of contacts is required at a later stage.
- Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Workers should wash their hands as frequently as practicable and shall not to touch their face with their hands during work.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Sick worker should immediately inform the site manager and must get medical advice from nearby health centre.
- Only sanitize able dinning surfaces shall be used. Food must be heated to a temperature to no less than 70° C before consumption and shall preferably be in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- Do not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.
- Use safe transport arrangements which should not be crowded and should have social distancing in place during the entire process from pickups till drops at destination.
- In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms.

Deliveries or Other Contractors Visiting the Site

- Non-essential visits to the construction sites should be cancelled or postponed.

- Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and should be given clear instructions for precautions to be taken while on site.
- Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors.
- Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries.
- Instruct the visiting truck drivers to remain in their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers.

Note: The above recommendations are being regularly reviewed by the Ministry of National Health Services, Regulations & Coordination and will be updated based on the international & national recommendations and best practices.

The Ministry acknowledges the contribution of Irfan Mirza, Syeda Shehirbano Akhtar and HSA/ HPSIU/ NIH team to compile these guidelines.

For more information, please contact:

HSA/ HPSIU/ NIH, PM National Health Complex, Islamabad

<http://covid.gov.pk/>

<http://nhsrco.gov.pk/>

<https://www.facebook.com/NHSRCOOfficial>

<http://www.hsa.edu.pk/>

<https://twitter.com/nhsrcoofficial>

<https://www.nih.org.pk/>

https://www.youtube.com/channel/UCdYuzeSP4Ug1f_ZZK

Annexure 27: Grievance Redress Mechanism

1.1 Project Background

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

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

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

1.2 Sector Loan Subprojects

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

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

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

No.	Subproject Name	River Basin
1	Ahmed Zai Perennial and Flood Irrigation Scheme (PIS+FIS)	Zhob River Basin
2	Sabakzai Dam Command Area Development	Zhob River Basin
3	Siri Toi Dam	Zhob River Basin
4	Killi Sardar Akhter Perennial Irrigation Scheme (PIS)	Zhob River Basin
5	Farmers Managed PIS/FIS Scheme Improvement	Zhob River Basin

INTERNAL. This information is accessible to ADB Management and staff. It may be shared outside ADB with appropriate permission.

6	Churri Infiltration Gallery	Mula River
7	Pashta Khana and Garambowad PIS	Mula River

INTERNAL. This information is accessible to ADB Management and staff. It may be shared outside ADB with appropriate permission.

8	Karkh Valley Development Scheme	Mula River
9	Kharzan Hatachi Infiltration Gallery	Mula River
10	Manyalo, Raiko and Rind Ali PIS	Mula River
11	Farmer's Managed PIS/FIS Scheme Improvement	Mula River

Note: Highlighted are the core subprojects

1.3 Grievance Redress Mechanism (GRM)

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

1.4 Principles

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

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

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

1.5 Objectives

The objectives of the GRM are to:

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

1.6 Structure of Grievance Redress Mechanism

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

1.6.1 Displaced Person Committees (DPCs)

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

The DPC will act as coordinator among the PMO/PIO, the DPs and local community for coordination and information dissemination to keep them informed about day to day development on the project, particularly about the grievance resolution progress. The Senior Sociologist (PMO/PIO), Social/Community Organizer

& Environment Specialist of supervision consultant (Design team) will coordinate with the affected persons for constitution of DPC at the village level comprising of at least five members with one as committee convener. The DPC at village level will provide a platform for DPs to raise and discuss their concerns, resolve petty issues at the village level with PMO/PIO assistance, and coordinate with project executors to communicate the issues and concerns regarding social & environmental issues unresolved at DPC. The project safeguards and engineering staff will coordinate with DPs and village level committees to review

and resolve the issue or concern related to LAR planning or implementation & environmental concerns

preferably within 15 days from receipt of the grievance. DPC will comprise of the following members;

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

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

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

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

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

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

GRC will perform following functions:

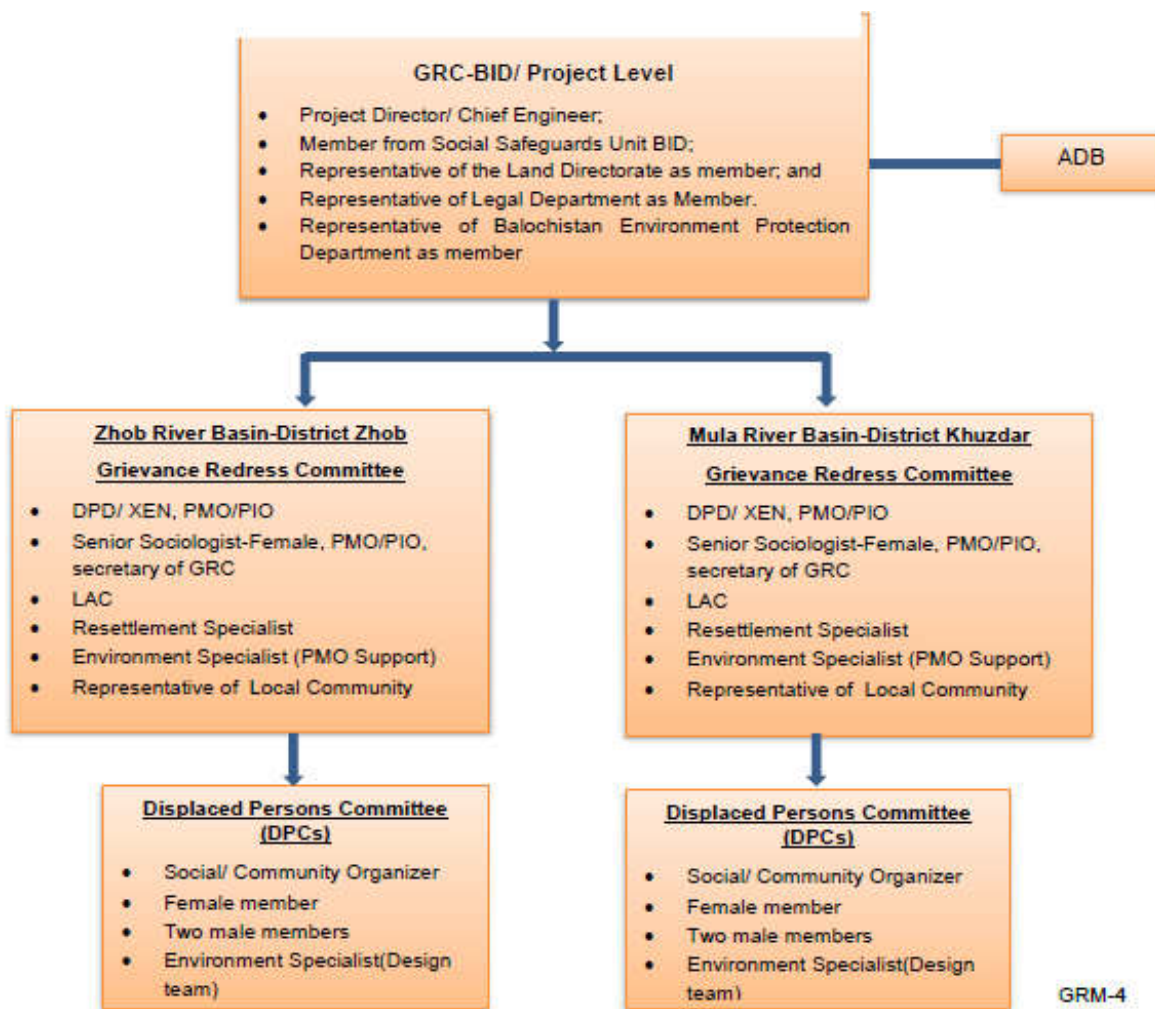
- . Record grievances, categorize and prioritize the grievances that need to be resolved by the committee and solve them within a month;
- . Summon and hear aggrieved persons/parties to produce evidence of their claims and record their view point;
- . Communicate its decisions and recommendations on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

1.6.3 BID/ Project Level

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

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

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



GRM-4

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

1.7 Grievance Redress Mechanism

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

1.7.1 Grievance Redress Procedure

The GRC will work both at the project and field level. The PMO/PIO safeguards and engineering staff, in coordination with district-level BID staff will inform the DPs about the GRC and its mechanism through consultations, focus group discussion and by posting at prominent places. The complaints received through any media will be screened by type and category and registered in a community complaints register (CCR), where the name & address of complainant, date, description of complaint and action taken will be recorded. The GRC will acknowledge the complaints within 5 days of receipt and will review available records. If required, GRC will advise the safeguards/engineering staff to conduct field visits in consultation with the aggrieved person, local community and the land revenue staff and submit a fact finding report. Preferably the fact finding will be completed within 15 days from receipt of complaints. The GRC in its formal meeting to be conducted within 30 days from receipt of complaint, will hear and clarify with the complainant (if required so) about the issue and shall conclude and communicate its recommendations for further implementation. Complainant will be kept informed during the process and the GRC decision will be communicated to him in a language and form understandable to him. The GRC proceedings will be documented step by step and all records will be maintained and summarized in the project progress and internal monitoring reports.

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

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

Table-2: Grievance Redressal Process

Land/Crop Compensation Issues	Project/ Other Issues (Including Environmental)
<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</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</p>

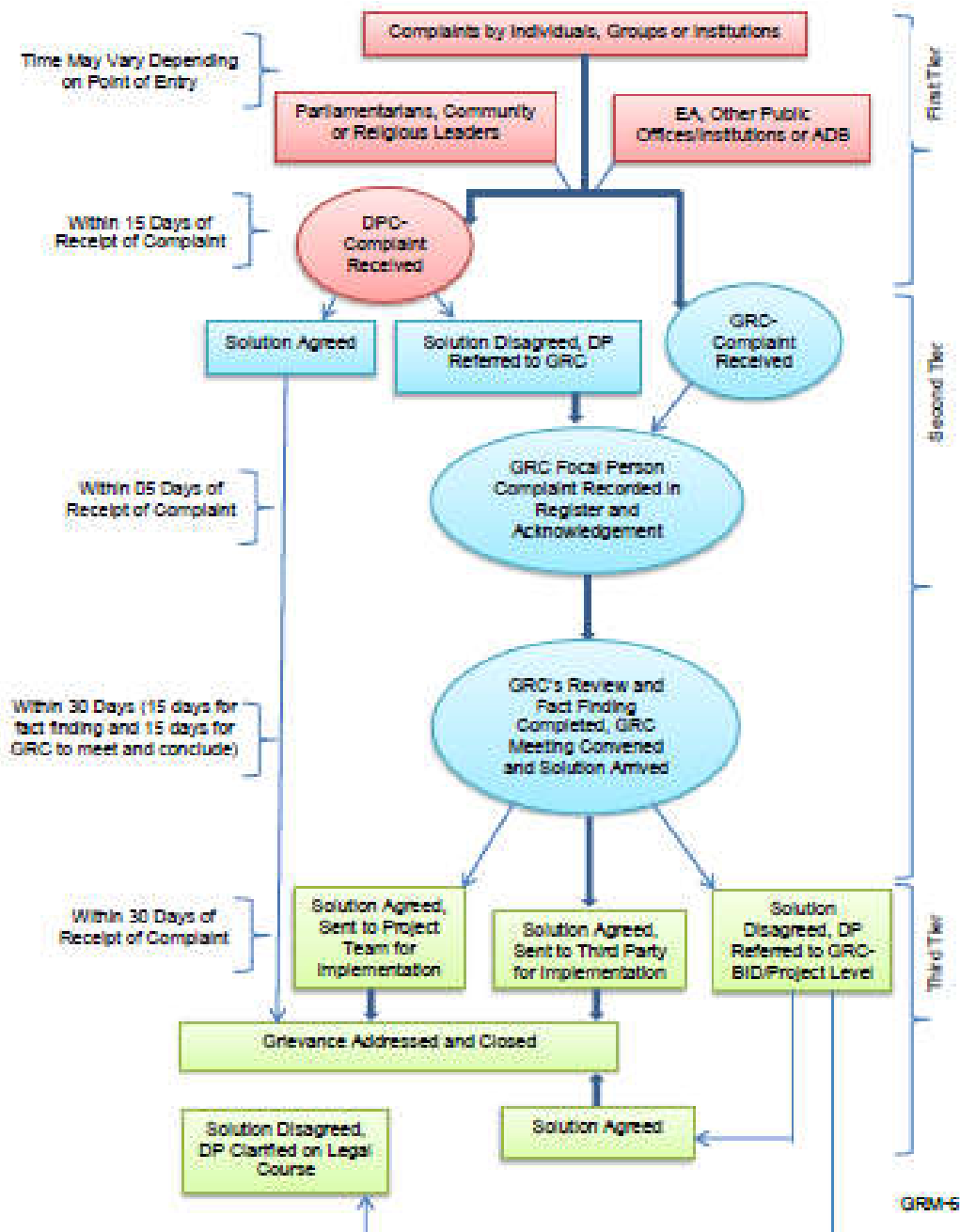
including District Collector and LAC to request early resolution of the issue/complaint.

d. In case the grievance pertains to awarded compensation, PMO will clarify with the DPs the process as set out in Section 18 to 22 of the LAA.

reasons if any will be recorded and the grievance will be resolved in next 30 days.

d. If the complainant is not satisfied, he can pursue further by submitting to the appropriate court of law.

Figure-2: Grievance Process and Time Frame



ANNEXURE 28: Meetings/Consultation with Male Participants of Siri Toi Dam Subproject.

Killi Ahmad Khel (Killi Hazrat Sahib)

S.No.	Name	Father,s Name	Occupation	Education
1	Pir Ameer ul Haq	Sahibzada Noor ul Haq	Small business	Matric
2	Abdul Qayyum	Jamal ud Din	Advocate	BA.LLB
3	Noor Elahi	Haji Muzammal	Service	MA
4	Abdul Razzaq	Abdul Rashid	Service	Graduate
5	M. Hashim	Ghulam Qadir	Driver	Primary
6	Abid Ullah	Hameed Ullah	Nil	FA
7	Imdad Ullah	Ubaid Ullah	Nil	Primary
8	Muhammad Sadiq	Abdul Razzaq	Teacher	FA
9	Muhammad Ayub	Faiz ul Haq	Nil	Middle
10	Abdul Ghafar	Abdul Sattar	Nil	Nil
11	Muhammad Sarwer	Ghulam Qadir	Nil	Nil
12	Yaqoob Khab	Din Gul	Pensioner	FA
13	Abdul Rehmat	Nasir ud Din	Nil	Nil
14	Ahwal Khan	Nasir ud Din	Livestock	Nil
15	Kashir Khan	Nasir ud Din	Nil	Nil
16	Nasar Ullah	Nasir ud Din	Nil	Nil
17	Ghafar Khan	Kareem Khan	Livestock	Nil
18	Mohuddin Khan	Muhammad Haheen	Nil	Nil
19	Shambuddin	Gul Barram	Nil	Nil
20	Gulab Khan	Akhter Khan	Nil	Primary
21	Haji Abdul Haji	Abdul Quddus	Nil	Primary
22	Sher Jan	Haji Nsar Ullah	Livestock	Primary
23	Faizaull	Jan Muhammad	Nil	Primary
24	Muhammad Rafiq	Haji Abdul Razzaq	Nil	BA
25	Jan Muhammad	Jumma	Livestock	Nil
26	Jumma	Abdul Mannan	Nil	Nil
27	Hafiz Ubaidulla	Sahibzada Noor ul Haq	Nil	Primary
28	Sami ul Haq	Haji Ameer ul Haq	Service	Matric
29	Hafiz M. Ibraheem	Qari Sana ul Haq	Nil	FA
30	Mehboob Ullah	Hameed Ullah	Nil	Matric
31	Ubaid Ullah	Kam Kaley	Nil	Nil
32	Muhammad Zahid	Kamal Uddin	Nil	Nil
33	Muhammad Ayub	Kamal Uddin	Nil	Nil
34	Daud Khan	Kamal Uddin	Nil	Nil
35	Muhammad Naeem	Ehsan ullah	Nil	FA
36	Shamasuddin	Abdul Wahab	Nil	FA

Killi Landi

S.No.	Name	Father,s Name	Occupation	Education
1	Mehboob	Hameed	Nil	Middle
2	Ubaid Khan	Kam Kaley	Nil	Middle
3	Abidullah	Hameed	Nil	FA
4	Muhammad Naeem	Ehsan Ullah	Nil	Primary
5	Ehsan Ullah	Safar Khan	Nil	Primary
6	Imdad ullah	Hameed Ullah	Nil	Primary
7	Hameed Ullah	Safar Khan	Nil	Middle
8	Shamsullah	Kam Kaley	Nil	Matric
9	Masoom Khan	Ehasn Ullah	Nil	FA
10	Amin Ullah	Ehsan Ullah	Labourer	Matric
11	Muhammad Zubair	Hameed Ullah	Nil	Middle
12	Haseeb Ullah	Hameed Ullah	Nil	Middle
13	Habib Ullah	Kam Kaley	Nil	Middle

Killi Gadda Khel (Bob-e-Erabzai)

S.No.	Name	Father,s Name	Occupation	Education
1	Malik Noor Khan	Muhammad Draz	Nil	Primary
2	Malik M.Shafiq	Haji Jamey	Nil	Middle
3	Maulvi Ghulam Muhammad	Abdul Haleem	Nil	Middle
4	Abdul Wahid	Abdul Haleem	Nil	Middle
5	Abdul Wakeel	Muhammad Shafiq	Nil	BA
6	Durrani	Haji Payand	Nil	Nil
7	Alam Khan	Muhammad Rafjan	Nil	Primary
8	Zia Uddin	Qalander Khan	Teacher	BA
9	Haji M.Sadiq	Haji Tamey	Nil	Matric
10	Haji Moula Khan	Haji Surat Khan	Nil	Middle
11	Dost Muhammad	Din Muhammad	Nil	Middle
12	Malik Nasar Ullah	Haji Sahib Khan	Nil	Middle
13	Maulvi Abdul Shan	Maulvi Moula Bakhtiar	Nil	Middle
14	Malik Mir Salam	Gul Barran	Nil	Middle
15	Malik Sakhi Daad	Haji Daad Khan	Nil	Middle
16	Haji Muhammad Khan	Haji Jumma gul	Nil	Middle
17	Khair Muhammad	Akhtar Muhammad	Nil	Middle
18	Muhammad Sadiq	Muhammad Din	Service	MA
19	Amin Gul	Laal Gul	Service	Engineer
20	Muhammad Sarwer	Haji Hassan Khan	Service	MA

ANNEXURE 29: Meetings/Consultation with Female Participants of Siri Toi Dam Subproject.

Killi Ahmad Khel (Killi Hazrat Sahib)

No.	Name	Age	Education	Occupation
1	Tahira	22	Nil	House Wife
2	Bilqees	35	Nil	House Wife
3	Sumiya	20	Nil	House Wife
4	Aqeela	18	Nil	House Wife
5	Musrat	18	Nil	House Wife
6	Zahida	35	Nil	House Wife
7	Bibi Ruqia	35	Nil	House Wife
8	Sumiya	35	Nil	House Wife
9	Saima	30	Nil	House Wife
10	Sadia	28	Nil	House Wife
11	Laila	25	Nil	House Wife
12	Uoorjan	40	Nil	House Wife
13	Fareeda	40	Nil	House Wife
14	Shanoo	35	Nil	House Wife
15	Jamila	45	Nil	House Wife
16	Fatima	40	Nil	House Wife
17	Zulikha	40	Nil	House Wife
18	Durdana	35	Nil	House Wife
19	Jan Bibi	50	Nil	House Wife
20	Feroza	35	Nil	House Wife
21	Gull Bashra	30	Nil	House Wife
22	Naz Bibi	40	Nil	House Wife
23	Shah Bibi	35	Nil	House Wife

Killi Landi

No.	Name	Age	Education	Occupation
1	Sabira	33	Nil	House Wife
2	Bibi Bakhtawar	23	Nil	House Wife
3	Tahira Bibi	50	Nil	House Wife
4	Namika	33	Nil	House Wife
5	Malika	30	Nil	House Wife
6	Zinab Bibi	31	Nil	House Wife
7	Hasina Bibi	31	Nil	House Wife
8	Zulikha Bibi	45	Nil	House Wife
9	Mamata Bibi	48	Nil	House Wife
10	Sajida Bibi	26	Nil	House Wife
11	Shafifa	27	Nil	House Wife
12	Rahima	23	Nil	House Wife

Killi Gadda Khel (Bob-e-Erabzai)

S.No.	Name	Age	Education	Occupation
1	BiBi Tahira	30	Nil	House Wife
2	Safora	28	Nil	House Wife
3	Shah Bibi	40	Nil	House Wife
4	Rabia	25	Nil	House Wife
5	Shazia	30	Nil	House Wife
6	Akhtir Bibi	30	Nil	House Wife
7	Arifa	28	Nil	House Wife
8	Gullali	25	Nil	House Wife
9	Sajida	30	Nil	House Wife
10	Marjan	40	Nil	House Wife
11	Hasina	35	Nil	House Wife
12	Sultana Bibi	35	Nil	House Wife
13	Robina	35	Nil	House Wife
14	Palwasha	28	Nil	House Wife
15	Bakhtawar	30	Nil	House Wife
16	Rakima	30	Nil	House Wife
17	Bibi Naz	35	Nil	House Wife
18	Wahida	35	Nil	House Wife
19	Naida	25	Nil	House Wife
20	Zarmina	30	Nil	House Wife