GOVERNMENT OF SINDH

Irrigation Department

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA)
FOR – 26 SMALL DAMS

At Taluka Tanu Bula Khan; Kal, Sangar Nadi 2, Haji Foto, Shamm, Kotharo, Garrouk, Talango, M-00 (Murad Barijo), M-01, Chanari Veer Dam, Babu Khan Dam, Khakhar Dam and Muhammad Yousuf Dam.

At Gadap Taluka; Aatho Dam, Sanyasi Dam, National Park Dam, Dhani Bakhsh Bikak Dam, Sundi Nai (Bahi Khan Goth) Dam, Thado Nai (Chhuto Goth) Dam, Abdullah Kanro Dam, Mathal, Haji Imam Baksh, Moidan-2, Moidan Nadi, Vaan Khand and Saan-2.

Sindh Climate Resilience Project

(SCRP)

PROJECT IMPLEMENTATION UNIT
(IRRIGATION COMPONENT)

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This document and its contents have been prepared and intended solely for the information and use of the Government of Sindh, Irrigation Department concerning the **Sindh Climate Resilience Project (SCRP).**

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LIST OF ABBREVIATION

ACE	Associated Consulting Engineers Ltd
BP	Bank Policy
BOQ	Bill of Quantity
EC	Electrical Conductivity
ECA	Employment of Child Act
EIA	Environmental Impacts Assessment
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impacts Assessment
ESMP	Environmental and Social Management Plan
FGDs	Focus Group Discussions
GFP	Grievance Focal Point
GoS	Government of Sindh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature
KPAC	Kirthar Protected Area Complex
LAA	Land Acquisition Act
LAR	Land Acquisition & Resettlement
MCM	Million Cubic Meter
MEAs	Multilateral Environmental Agreements
MSK	Medvedev–Sponheuer–Karnik scale
NCS	National Conservation Strategy
NGO	Non-Governmental Organization
PCC	Public Complaint Centre
PC-I	Pakistan Planning Commission Form – 1 Appraisal of Development Project
PD	Project Director
PDMA	Provincial Disaster Management Authority
pH	Power of Hydrogen
PID	Project Information Document
PIU	Project Implementation Unit
PIC	Project Implementation Consultant
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
RoW	Right of Way
SEPA	Sindh Environmental Protection Agency
SWD	Sindh Wildlife Department
VECs	Valued Ecosystem Components
WB	World Bank

1. EXECUTIVE SUMMARY

The proposed project (Sindh Climate Resilience Project – SCRP) will improve the availability of water for drinking and agriculture by the construction of small recharge/storage dams and lining of ponds / tarries. The availability of additional water will also increase the irrigated area under the command of these dams.

Seasonal heavy monsoon rains and floods have caused disaster in large areas in various districts of the Sindh province. Additionally, it has damaged public, private and community physical infrastructure and has brought destruction to private housing and agricultural lands. Besides floods, Sindh Province is facing prolonged droughts on a recurring basis.

The proposed subproject will have a dual purpose of recharging the groundwater as well as reducing the flood velocity, and there will be fewer losses to the fertile soil erosion, habitat destructions, and public amenities like link roads, electricity poles, and local human settlements.

The present ESIA represents the environmental impacts and mitigations of 26 small dams, thirteen each at District Malir & Jamshoro. At Taluka Tanu Bula Khan; Kal, Sangar Nadi 2, Haji Foto, Shamm, Kotharo, Garrouk, Talango, M-00 (Murad Barijo), M-01, Chanari Veer Dam, Babu Khan Dam, Khakhar Dam, Muhammad Yousuf Dam.

At Gadap Taluka; Aatho Dam, Sanyasi Dam, National Park Dam, Dhani Bakhsh Bikak Dam, Sundi Nai (Bahi Khan Goth) Dam, Thado Nai (Chhuto Goth) Dam, Abdullah Kanro Dam, Mathal, Haji Imam Baksh, Moidan-2, Moidan Nadi, Vaan Khand, Saan-2.

All proposed sites are located in the Kirthar National Park (KNP). The Wildlife hotspots for large endangered species (Sindh Ibex Chinkara, and Urial) are reported at Karchat & Khar Centers. There are in KNP, managed by Sind Wildlife Management Board. The endangered wildlife hotspots Khar & Karchat & tourist centers are located outside of primary and secondary impact zones of proposed small dam sites; at a distance of a minimum of 4 km from the proposed sub-project area. As far as the sub-project area is concerned, none of the endemic or endangered species of both flora and fauna have been recorded from sub-project sites nor is even the habitat for these species part of the proposed project area.

The vegetation of the study area can be classified as a scrub forest (dominated by herbs and shrubs). It is estimated that 136 trees need to be removed (only 16 mature trees) for the construction of the 26 small dams none of them is endangered as per the IUCN list. The replanting of 680 trees will be done with a ratio of 1:5 trees against a single cut. Tree inventory of the tree to be cut shall be prepared before the start of the construction works. The KNP Management Plan (prepared for this ESIA) will be implemented by the Contractor and supervised by the Ecologist of Project Implementation Consultant - PIC (supervision consultants). Furthermore, specific training of the staff related to wildlife aspects (Conservation & Protection) has been incorporated into the training plan.

The initial screening criteria of SCRP suggest that proposed project interventions would have significant levels of environmental and social risks. These risks are likely to be temporary and reversible and are not expected to have lasting effects on the proposed

project intervention areas. However, as the proposed small dams are located within the protected area, ESIA has been prepared in consultation with the World Bank safeguards team accordingly, to meet the Substantial - risk category sub-project requirements. According to Sindh – EPA: Since the storage volume of the proposed dams is less than 25 million cubic meters (for proposed small dams it is 9.07 MCM) and the surface area of the reservoir is also less than 4 sq. km, therefore, all sub-project dams are within limits given in Schedule-II of IEE and EIA Regulations, 2021. These sub-projects fall under Schedule "II" so technically they will require an IEE. However, as the proposed project falls in a protected area, thus, an ESIA (One ESIA will be prepared for all small dams in KNP this has been decided after the consultation of SEPA officials.) has been prepared in compliance with the requirements of the SEPA.

This Environmental Social Impact Assessment (ESIA) covers information on the prevailing physical, biological, socioeconomic, and environmental aspects of the subproject areas. It provides a set of mitigation measures during the project implementation and operation to eliminate environmental and social negative impacts, up to an acceptable level.

The Consultants have undertaken reconnaissance surveys for the selection of the proposed small dam sites. For selecting the sites, reconnaissance surveys by the consultant's staff accompanied by the Client staff were to select the most feasible need-based sites. Subsequently, rapid Socio-Environmental and Ecological Assessment of these sites has been carried out before final selection. Moreover, these sites have been evaluated and endorsed by the Sindh EPA, Sindh Wildlife Department and local communities, for their need and justification. The NOC from Sindh Wildlife Department has obtained.

Topography is mostly plain and gently sloping. All of the sub-project areas are falling in a low-damage risk zone, meaning the areas that fall under these zones have a low chance of having an earthquake. The climate of the subproject area is Arid & Hot. In an average year, sub-project sites receive a maximum rainfall of 0.03 – 3.04 inches.

Sampling from different locations in the sub-project area was done by Nest Lab experts and was analyzed in the Evergreen Environmental laboratory (SEPA Approved). The samples were tested as per Sindh Environmental Quality Standard - 2016 (SEQS). The analysis shows that all the toxic metals are below the limits except turbidity (because surface water has been used for drinking) & salt contents (due to natural strata of the region, as sets in the SEQS.

The local settlements in project areas are also using subsurface and groundwater for consumption. The groundwater depth varies from 150 to 300 ft. in different parts of the secondary impact zone. The distance traveled by women to fetch water varies from area to area for instance they travel about two to three kilometers distance per trip.

No acquisition of any private land is required for these subprojects because nais and nalas (Rainwater Rivers) are state-owned properties. In addition, no demolition of structures (i.e. animal sheds, earthen ponds, public utilities, poultry farms, etc.) will be involved and no one will be required to resettle as subproject areas are lying in the less populated areas and the population is scattered.

The negative impact could only be anticipated during the construction phase, which will last for a short period only. However, mitigation measures recommended in the report would need to be strictly ensured by the contractor during the construction period. Furthermore, temporary facilities (like the establishment of a camp area, martial storage or parking area, etc.) for all of the proposed dams will be constructed on existing clearing or barren land to minimize the impacts on habitat. During the construction stage, the clearing of vegetation or land-use changes will only be anticipated at dam axis points. Moreover, no permanent or temporary road will be constructed and existing alignment will be used. Additionally, during the operational stage no machinery, equipment, etc. needs to be operated during the operation stage.

Occupational health and safety will be ensured through continuous inspection to prevent disease and accidents, awareness raising among labor and community, sanitation measures and emergency response and rescue procedures, and provision of adequate sanitary facilities, potable water, and garbage bins.

The study of dam break was conducted as a part of the detailed design. It has been concluded from the dam break study, the reservoir area of all 26 small dams is small and not exceeding 5.8 Sq. km (1,433 acres). Thus, the area inundated area in a dam breach scenario (Combined volume: Dam Breach + 100-year Flood) is 316 sq. mile or 819 sq. km with exceptional case of Garrouk dam which has 62 sq. mile (160 sq. km) alone. The number of a person affected in the worst-case scenario is 138.846 persons (for Chanari and Veer dam it would be 85,442).

A separate study has been recommended for the Cumulative Environmental and Social Impact Assessment (C-ESIA). The overall goal of the C-ESIA is to identify environmental and social impacts and risks associated with the context of existing, planned, and reasonably predictable developments, which may generate cumulative impacts that could jeopardize the overall long-term environmental, social, and economic sustainability of the watersheds of proposed small dams. The timeline for the completion of the study would be six months after signing the contract.

E&S Safeguard monitoring will be carried out to ensure that the mitigation plans & Grievance Redressal Mechanism (GRM) are regularly and effectively implemented. It will be carried out at two levels. At the PIU level, the environment and social specialists will carry out safeguard monitoring to ensure that the mitigation plans are being effectively implemented and will conduct field visits regularly. At the field level, the relevant staff of Project Implementation Consultants (PIC) will carry out more frequent safeguard monitoring.

The overall responsibility for implementing the SCRP project as well as the present ESIA rests with the PIU-SCRP, Sindh Irrigation Department, headed by the Project Director. PIU has also engaged Project Implementation Consultant (PIC), responsible for construction supervision. Finally, the construction contractor will also have environmental, social, Ecologist and health & safety officers to implement mitigation measures and other requirements defined in the present ESIA.

It is estimated that 136 trees (only 16 mature trees) will need to be relocated for the construction of the above-mentioned 26 small dams none of them be endangered as per the IUCN list. The replanting of 5 times trees against the number of cuts down trees would cost

Rs 2,040,000/-considering the rate of Rs 3,000/- per tree. A separate budget of Rs 347,305,200/-has been allocated for the implementation of the ESMP. For general community support an amount of Rs. 5,000,000/ has been allocated for each proposed site. This has been incorporated as a provisional sum item in the ESMP bill of each small dam and BOQ.

2. INTRODUCTION

In Sindh, there have been past examples of cyclones, droughts wind storms and earthquakes but the scale and frequency of damages caused by floods is viewed as the most major and realistic threat to communities. An increased flood event over the last two decades has caused significant damage to public and private property as well as loss of human lives and livelihood. Besides, torrential flash floods have also severely affected parts of Sindh Province.

The Sindh Irrigation Department established Small Dams Organization in 2006-07 with the aim to cater to the water scarcity in the Arid zone through the construction of small recharge or storage dams. For the construction of small dams, several studies were conducted, and potential sites were identified. Around 180 sites were identified, and 106 small dams have been constructed in the province and currently, construction of 74 dams is in progress. The culture-able command area of completed Dams is about 22,5750 Acres with the potential of around 50,000 acres of addition. The storage capacity is about 203,238 A.ft. of Barani land.

Moreover, in 2016, Sindh Irrigation Department started the implementation of the Sindh Resilience Project (Irrigation Component) and constructed 14 small dams, which benefitted around 100,000 people, 6500 acre-ft of reservoir capacity is increased and 18,000 acres of land for the cultivation increased, Agricultural production has been increased by 17%-23%, Livestock rearing has also been increased by 10%, Ground water has raised by 25-50 Feet. The impact assessment was conducted by Mehran University of Engineering and Technology, Jamshoro. Phase II of the construction of 53 Nos of Small Dams in water scarce area of Sindh is undertaken. Out of which 28 small recharge dams have been completed and physical work on the remaining dams will be completed by June 2023. An estimated 750,000 people (Direct and Indirect) will benefit, increasing 11000 acre-ft of reservoir capacity and 40000 acres of additional land for cultivation.

2.1 The Project

Seasonal heavy monsoon rains and floods have caused disaster in large areas in various districts of the Sindh province. Additionally, it has damaged public, private and community physical infrastructure and has brought destruction to private housing and agricultural lands. Besides floods, Sindh Province is facing prolonged droughts on a recurring basis.

The main objectives of the project are to increase the availability of water for drinking and agriculture by the construction of small recharge/storage dams and lining of ponds / taraies. The availability of additional water will also increase the irrigated area under the command of these dams.

2.2 The Proposed Subproject

The present ESIA represents the environmental impacts and mitigations of 26 small dams at District Malir & Jamshoro (refer to Figure 2-1). The major components of each sub-project are 22 – 30 ft high earthen embankments, concrete structures of spillways and construction of a one room building for dam supervision staff.

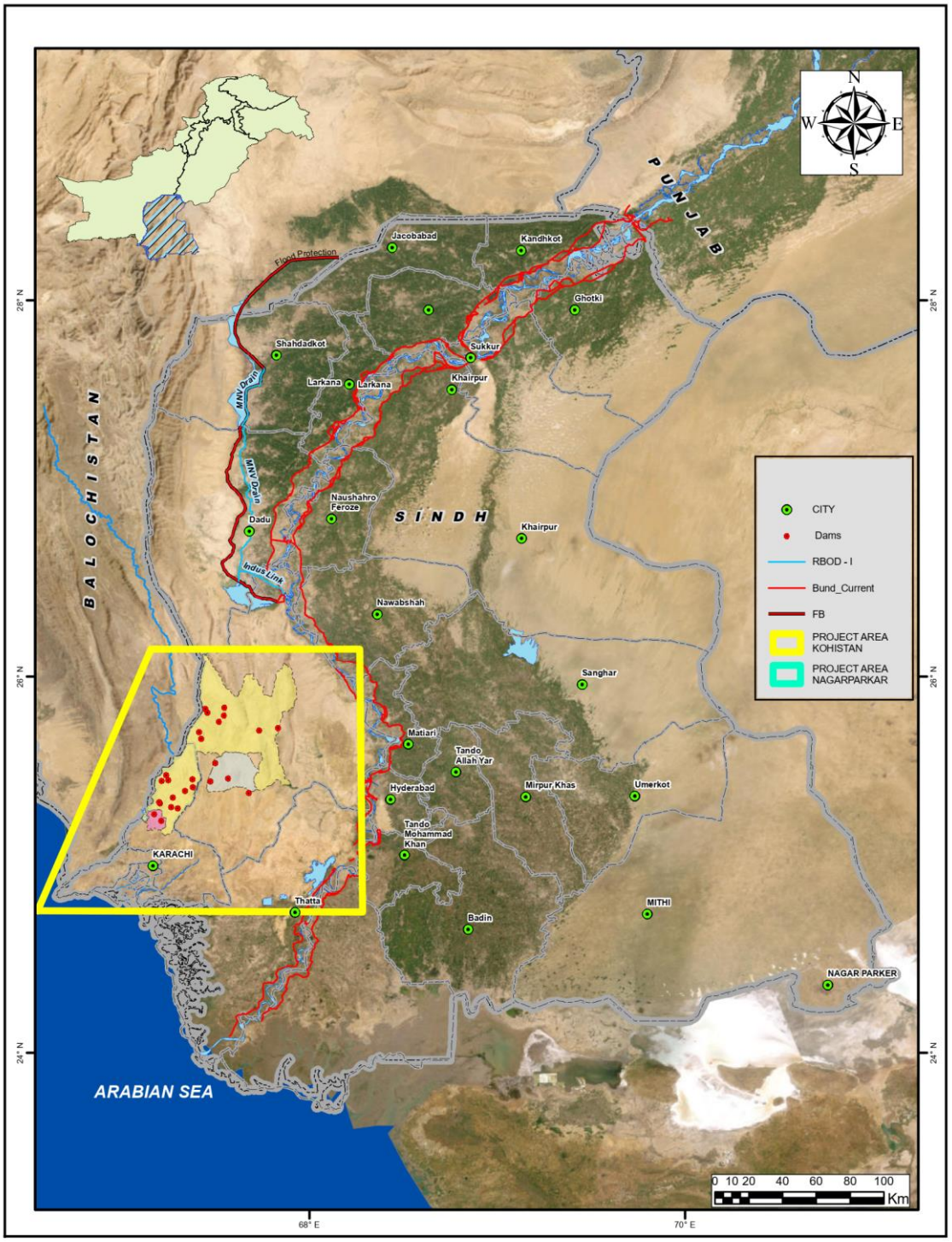

Figure 2-1: Location Map of 26 Small Dams

At Taluka Tanu Bula Khan; Kal, Sangar Nadi 2, Haji Foto, Shamm, Kotharo, Garrouk, Talango, M-00 (Murad Barijo), M-01, Chanari Veer Dam, Babu Khan Dam, Khakhar Dam, Muhammad Yousuf Dam. At Gadap Taluka, Aatho Dam, Sanyasi Dam, National Park Dam, Dhani Bakhsh Bikak Dam, Sundi Nai (Bahi Khan Goth) Dam, Thado Nai (Chhuto Goth) Dam, Abdullah Kanro Dam, Mathal, Haji Imam Baksh, Moidan-2, Moidan Nadi, Vaan Khand, Saan-2, All proposed sites fall in the Kirthar National Park. The Kohistan region is one of the potential sites in Sindh Province, to construct small dams, delay action dams, and weirs to retain the runoff generated from storm rainfall.

2.2.1 Justification for Construction of Dams in Project Area

Construction of small dams in Sindh Province is essential in order to store/conserve runoff generated from rainfall to be used for meeting the drinking and livestock requirements of the local population and to improve the irrigation system which is the backbone of Sindh's economy and social uplift for local people. Significant water is lost due to excessive runoff during rainy seasons.

Furthermore, there are many positive effects of the proposed sub-project, which in general will improve the socio-economic and environmental conditions of the sub-project areas by saving from flash floods during monsoon, including:

- Sub-project also contributes expansion of habitat for wildlife found in the area, it also provides a feeding ground for birds and associated fauna.
- The project will help recharge the groundwater and provide water in the areas where it is crucial for drinking, domestic use, and livestock.
- Due to the project, intervention water will be available for a longer period, which will augment to uplift socio-economic activities.

2.2.2 Sub-Project Categorization

The initial screening suggests that proposed project interventions would have moderate levels of environmental and social risks. These risks are likely to be temporary and reversible and are not expected to have lasting effects on the proposed project intervention areas. However, as the proposed small dams are located within the protected area, hence ESIA has been prepared in consultation with the World Bank accordingly, to meet the high-risk category sub-project requirements.

According to Sindh – EPA: According to Sindh – EPA: Since the storage volume of the proposed dams is less than 25 million cubic meters (for proposed small dams it is 9.0 MCM) and the surface area of the reservoir is also less than 4 sq. km (for proposed small dams it is 6.3 sq. km), therefore, all sub-project dams are within limits given in Schedule-II of IEE and EIA Regulations, 2021. These sub-projects fall under Schedule "II" so technically they will require an IEE. However, as the proposed project falls in a protected area, thus, an ESIA (One ESIA will be prepared for all small dams in KNP this has been decided after the consultation of SEPA officials.) has been prepared in compliance with the requirements of the SEPA.

2.2.3 Delineation of the Corridor of Impact (CoI)

The Corridor of Impact (CoI) for the sub-projects has been considered carefully keeping in view the proposed interventions and associated impacts during the construction, operation, and maintenance phases. The spatial extent of the subproject area when preparing the ESIA has been focused on keeping in view the proposed interventions and broad impacts of the sub-project after completion. The CoI is classified as described below.

2.2.3.1 Primary Impact Zone

The primary impact zone is considered as the area that will be impacted positively/negatively in the form of proposed small dam's construction, development of access routes, and contractor's camps including material storage areas & main pond/reservoir areas.

While in case of a dam break the corridor of impact area was surveyed physically and scanned through the HECRAS and google Maps software to estimate expected loss during the construction and in case of a dam break. Table 2-1 shows the expected loss in terms of Tree cuts, disturbance to track routes, agricultural land, archeological sites, and hand pumps. Since all proposed dams are dual purposes dams, flood detention & recharge dams, in which the estimated loss or disruption will be for a few days (4 to 8 weeks) and temporary as the water will percolate to an aquifer and will pass from barrels gradually. There are 07 kacha tracks and 136 trees that will be impacted due to the construction of the proposed subproject. Appropriate mitigation measures have been suggested in the relevant section for estimated loss, and cost has been built into the BOQ amount of contracts.

Table 2-1: Primary Impact Zone

Sr. No	Dams	Dam Type	Road Type	Trees	Agriculture Land Area (Acres)	Archeological Site (if any)	Hand pump/ Well
1	National Park	Recharge Dam	-	4	-	-	-
2	Sanyasi		-	5	-	-	-
3	Thado Nai		-	6	-	-	-
4	Sundi Nai		Dirt road	4	-	-	-
5	Dhani Baksh Bikak		-	9	-	-	-
6	Aatho		-	4	-	-	-
7	Abdullah Kanro		Dirt road	4	-	-	-
8	Babu Khan		Dirt road	11	-	-	-
9	Muhammad Yousuf		-	5			
10	Khakhar		-	7	-	-	-
11	Chanari and Veer			3	-	-	-
12	Kal		Dirt road	6	-	-	-
13	Garrouk		-	10	-	-	-
14	Katharo		-	2	-	-	-
15	Haji Foto		-	2	-	-	-
16	Shamm		Dirt road	3	-	-	-
17	Talango		-	2	-	-	-
18	Sangar Nadi 2		-	13	-	-	-
19	Mathal		Dirt road	8	-	-	-

20	Haji Imam Baksh		Dirt road	2	-	-	-
21	Saan-2		-	4	-	-	-
22	Moidan Nadi		-	3	-	-	-
23	Moidan-2		-	10	-	-	-
24	Vaan Khand		-	4	-	-	-
25	M-00 (Murad Barijo)	Flood Detention Dam	-	2	-	-	-
26	M-01		-	3	-	-	-
			7	136			

2.2.3.2 Secondary Impact Zone

The secondary impact zone consists mainly of the settlements benefitting from flash flood devastations and the enhanced water availability in the form of groundwater i.e. wells etc. Secondary impact zone has been depicted in Annexure – I The following areas may be considered areas of ecological influence within a 3km radius of the proposed small dam site.

a. Upstream areas up to the originating point of a natural stream. (Secondary Impact Zone)
b. Downstream areas where fewer food particles (biotic matter) and sediments will reach water in comparison to natural conditions. (Secondary Impact Zone).

These areas are mostly expected to be impacted positively in the medium and long term through the availability of surface and groundwater for domestic use as well as for livestock consumption for an extended period. Cumulatively, due to the construction of small dam's downstream damages will be controlled along with the recharge of the aquifer, this will ultimately provide sustainability for the groundwater level both in upper and lower riparians will be increased.

All streams are non-perennial and water is available mostly during the monsoon season. The present agriculture is low by all standards and below subsistence level mainly due to the constraint of irrigation water and its dependence on scanty rains and sporadic. If the rain is absent for more than 2 years, the subsurface water gets dried making the local population gets zero water abstraction both for drinking and harvests. The main source of irrigation water in the vicinity of the selected dam command area is only rain and bore water. During the consultation, the community of downstream villages appreciated the proposed construction of proposed small dams and said that this is the need of the area. They further said that they have been practicing agriculture through rainwater harvesting on a small scale or subsistence level. They said that small dams would recharge the aquifers in the downstream area and would bring positive impacts on water availability in their villages.

During the baseline survey of the sub-project area, no endemic or rare species were observed in the primary impact zone as well as the secondary impact zone. All species recorded during the field survey have a wide range of distribution. Since the proposed dam and campsite will occupy small areas and will be located in existing clearings, because of sparse vegetation cover, the risk will be low to moderate while the impacts are reversible and localized by adopting mitigation measures. Additionally, during the operational stage no machinery, equipment, etc. needs to be operated during the operation stage, as these flood detentions cum recharge dams are on non-perennial streams of the area. Furthermore, the

low-level outlet provided at the spillway will flush out sediment during high floods, serving as the sediment control system.

2.2.4 Sub-project Screening Procedure

The sub-projects screening was performed through the checklist covering major environmental and social issues including storage volume and surface area of the reservoir, loss of community assets, basic facilities and services, livelihoods and income, possibly affected ethnic minorities, archaeological sites, and gender. Surveys were conducted to fill individual checklists and a summary of environmental and social concerns noted during surveys is given below. Sample Checklist used for 26 proposed small dams has been attached as Annexure – II.

- Only 136 trees (including only 16 mature trees) need to be cut, for which 5 trees will be replanted for each tree removed. Inventory regarding tree cutting will be prepared before the start of the civil works.
- Even though all the proposed small dams are located within Kirthar National Park (KNP), none of them are situated in or near the hotspot area. The closest proposed dam site is 3 km away from the hotspot, while the average distance for the remaining sites is 25 km.
- No archaeological site is observed near (within 500 meters) of the proposed subproject area which may likely be affected by construction activities.
- No settlement was observed near the subproject area. The nearest settlement is about an average of 0.5 to 1km away from the proposed small dam sites.
- During the construction phase, a few habitats might be disturbed but this impact is temporary and reversible in nature having a short duration with low significance (by adopting the mitigation measures). Because proposed sites and construction camps will occupy small areas and will be located in existing clearings.
- No resettlement is expected due to the construction of small dams.
- No protected forests were observed near the proposed small dam sites. The revenue department owned the land.
- Ambient air quality, the ambient noise level is within acceptable limits of Sindh Environmental Quality Standards (SEQS).
- Water quality is generally good except for the TDS, Chlorides, and Total coliform; the values of these parameters are slightly high as limits set in SEQS.

2.3 The ESIA

2.3.1 Objective of ESIA

The primary objectives of the ESIA are as follows:

- Identify the social and environmental impacts of the sub-project and related activities.
- Suggest suitable mitigation measures for identified impacts at the planning, designing, and implementation stage of the subprojects and eliminate or reduce their adverse impacts if any.
- Propose an environmental monitoring program to ensure that mitigation measures are implemented during the subproject execution and timely corrective actions are taken where required and

- Propose the institutional arrangements required to implement and monitor the ESMP The Environmental & Social Management Plan of this ESIA for all proposed 26 dams.

2.3.2 Methodology

This report has utilized primary and secondary data, collected through field surveys, field tests and observations, laboratory testing, environmental monitoring in the field, data acquisition from concerned departments through consultation meetings, interviews and filling of questionnaires and sifting through published material to establish a baseline profile of physical, biological, and socio-economic environmental conditions.

2.4 The Legislative Relevance

This section presents an overview of the policy and legal framework relevant to the environmental and social aspects of the subproject.

2.4.1 National/ Provincial Legislation

The scope of cross-sectoral law implied by the legal definition of environment given in SEPA 2014 results in numerous laws enacted since the nineteenth century being classified as environmental laws. These include laws about forests, water resources, wildlife, land, agriculture, health, and safety. Laws that may have relevance to the environment with the brief scope of the law and their applicability are listed in Table 2-2.

Table 2-2: Key Applicable Cross-Sectoral Legislation in Sindh

Legal Instrument	Scope and Applicability	Relevance
Sindh Environmental Protection Act, 2014. SEPA-IEE and EIA Regulations, 2021	Sindh EPA is responsible for ensuring the implementation of provisions of the Act in Sindh territorial jurisdiction. Sindh EPA is also required to ensure compliance with the SEQS and establish monitoring and evaluation systems.	The proposed sub-projects fall under KNP hence ESIA will be developed and submitted to SEPA for issuing NOC before commencing any physical work.
Sindh Climate Change Policy, 2022	The policy aims to identify the effects of climate change, provide solutions and implement framework/ plans to mitigate its effects, among other objectives - all of which are in line with the National Climate Change Policy.	The proposed SCRP project has been developed to cater to the Climate change impacts, which are severe floods, damaged infrastructure, and communities such as women and children.
The Sindh Solid Waste Management Board Act, 2014	The Sindh Solid Waste Management Board Act, 2014 passed unanimously in March 2014, for the collection and disposal of all solid waste, to arrange for effective delivery of sanitation services, to provide a pollution-free environment and to deal with other relevant matters.	The proposed project may generate different types of solid and liquid wastes; therefore, this act shall be applicable to the proposed sub-project to deal with relevant matters.
Land Acquisition Act 1894	Empowers the government to acquire private land for projects of national importance and lays down the acquisition procedure.	No land acquisition is expected as the proposed subproject interventions are on govt owned land. Efforts will be made to minimize this.
The Sindh Forest (Amendment) Act,	Regulates forest resources. Empowers the government to declare any forest area	Not relevant as there is no reserve or protected forest.

2012	reserved or protected.	
The Sindh Wildlife Protection Ordinance 1972 (Amendment 2001, 2010) Act, 2007, 2020	The law specifies three broad classifications of the protected areas:- a). **National Parks** - Hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. b). **Wildlife Sanctuaries** - Wildlife Sanctuaries are areas that are left as undisturbed breeding grounds for wildlife. Cultivation, grazing and residing are prohibited in the demarcated areas. Special permission is required for the entrance of the public. However, in exceptional circumstances, these restrictions are relaxed able for scientific purposes or the betterment of the respective area at the discretion of the authority. c). **Game Reserves** - Game reserves are designated as areas where hunting or shooting is not allowed except under special permits.	All of the interventions are likely to be carried out in protected areas. All statutory requirements have been followed. NOC from SWD has been obtained.
The Sindh Occupational Safety and Health Act, 2017	The clauses relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid wastes and effluents, and damage to private and public property. The Act also provides regulations for Compulsory vaccination, inoculation, and Precautions against contagious or infectious diseases at workplaces.	All these regulations will apply to the project construction's contractor.
The Antiquities Act 1975	Preservation and protection of antiquities (any object more than 75 years old). Empower the government to declare any antiquity as protected.	No protected antiquity within the sub-project area only chances are that the procedure will apply.
Sindh Cultural Heritage (Preservation) Act - 1994	The Act 1994 provides rules and regulations to preserve and protect ancient places and objects of agricultural, historical, archaeological, artistic, ethnological, anthropological and national interest in the province of Sindh.	This act may be applicable in a specific situation. i.e. only chance find.

2.4.2 World Bank Environmental and Social Framework (ESF)

The World Bank has defined specific environmental and social standards, compiled in the Environmental and Social Framework 2018 (ESF), which are designed to avoid, minimize, reduce, and/or mitigate the adverse environmental and social risks and impacts of a project. These standards apply to projects supported through Investment Project Financing (IPF). A summary of the environmental and social standards and their relevance to the project is provided in Table 2-3 below.

2.5 World Bank Environmental, Health & Safety Guidelines

World Bank Group's Environmental, Health, and Safety (EHS) Guidelines apply to the proposed project. In particular, contractors will be required to implement the General EHS Guidelines (April 2007)[1].

Table 2-3: World Bank Env. & Social Standards Relevant to the Project

Environmental and Social Standards	Relevance to the Project
ESS1 – Assessment and Management of Environmental and Social Risks and Impacts	**Relevant**.
ESS2 – Labor and Working Conditions	**Relevant**.
ESS3 – Resource Efficiency and Pollution Prevention and Management	**Relevant**.
ESS4 – Community Health and Safety	**Relevant**.
ESS5 – Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	**Relevant**.
ESS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources	**Relevant**.
ESS7 – Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	**Not relevant**.
ESS8 – Cultural Heritage	**Rrelevant**.
ESS9 – Financial Intermediaries	**Not relevant**.
ESS10 – Stakeholder Engagement and Disclosure	**Relevant**.

2.6 Managing the Risks of Adverse Impacts of Labor Influx

The project may face an influx of non-local labor and working conditions issues as skilled laborers might not be available in some of the sub-project sites. The project will take concrete measures to mitigate potential labor influx-related risks.[2] These risks require careful consideration to improve social and environmental sustainability, resilience and social cohesion. Therefore, the project will adhere to mitigation measures such as:

(a) Assessing living conditions of workers' camps and ensuring appropriate living conditions.
(b) Establishing and enforcing a mandatory Code of Conduct for the workers,
(c) Ensuring appropriate location for the camp.
(d) Taking counter measures as indicated in the ESMP to reduce the impact of the labor influx on the public services and,
(e) Devising and implementing a strategy for maximizing employment opportunities for the local population, including women.

2.7 World Bank Group Gender Strategy (2016-2023)

The World Bank Group's Gender Strategy (fiscal year [2016–23) presents gender equality as integral to smart development policy and posits that successful implementation of the strategy will help achieve the Bank Group's Goals. The strategy focuses on four objectives: human endowments, jobs, asset control and ownership, and voice and agency. To

[1] World Bank Group EHS Guidelines are available at: http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

[2] https://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf

implement the strategy, capacity building for local law enforcement and Information and awareness-raising campaigns for community members, specifically women and girls have been proposed in the ESMP. Mobilizing rural communities with a view to maximizing the benefits of the project.

2.8 Compliance with the Environmental and Social Management Plan (ESMP)

The ESMP section of the ESIA report will be part of the bidding documents and its compliance is mandatory. Furthermore, all conditions in the NOC have to be complied with and this will be part of the bid document. The contractor may request amendments in the Environmental & Social Management and Monitoring Plan (ESMP) to align it with ground realities and requirements for each sub-project/site mentioned. If there is any change required, the contractor shall make such a request to the Project Implementation Unit.

The site-specific ESMP/s will then be embedded into the civil works contracts and therefore will be legally binding on the contractor. The amended Site-Specific ESMP would be approved by PIU.

The contractor will be required to prepare other site plans as mentioned in Section 10 including a traffic management plan, HSE plan, waste management plan, communicable diseases management plan, etc. The site-specific plans must be submitted to the PIU for review and clearance before mobilization on-site.

3. DESCRIPTION OF SUB-PROJECTS

3.1 Salient Features of the Sub-Project

This sub-component will support the construction of small dams, less than 10 meters in height in the Kohistan regions. The height of these small dam's ranges between 22 to 23 ft (6.7 to 7 m).

3.1.1 Locations of Sub-Project

At Taluka Tanu Bula Khan; Kal, Sangar Nadi 2, Haji Foto, Shamm, Kotharo, Garrouk, Talango, M-00 (Murad Barijo), M-01, Chanari Veer Dam, Babu Khan Dam, Khakhar Dam, Muhammad Yousuf Dam. At Gadap Taluka; Aatho Dam, Sanyasi Dam, National Park Dam, Dhani Bakhsh Bikak Dam, Sundi Nai (Bahi Khan Goth) Dam, Thado Nai (Chhuto Goth) Dam, Abdullah Kanro Dam, Mathal, Haji Imam Baksh, Moidan-2, Moidan Nadi, Vaan Khand, Saan-2, A detail of each proposed small dam is given in Table 3-1. The location map of each dam site depicts the weir site, proposed camp location, land use, nearby settlement, access road and environmentally sensitive receptors in Annexure -I.

Table 3-1: Location of Proposed Small Dam Sites

Sr. No	Name	Latitude	Longitude	Deh	Taluka	District
1	Kal	25° 27' 35.0991" N	67° 34' 06.6883" E	Mole	Thano Bula Khan	Jamshoro
2	Sangar Nadi 2	25° 32' 29.9411" N	67° 29' 59.1291" E	Mole	Thano Bula Khan	Jamshoro
3	Haji Foto	25° 43' 00.0000" N	67° 44' 00.0000" E	Kohtarach	Thano Bula Khan	Jamshoro
4	Shamm	25° 43' 48.7452" N	67° 49' 55.2543" E	Batharo Karchat	Thano Bula Khan	Jamshoro
5	Kotharo	25° 45' 45.4250" N	67° 31' 05.9760" E	Beli Tap	Thano Bula Khan	Jamshoro
6	Garrouk	25° 48' 41.7980" N	67° 27' 23.7434" E	Beli Tap	Thano Bula Khan	Jamshoro
7	Talango	25° 49' 51.6305" N	67° 26' 45.8433" E	Beli Tap	Thano Bula Khan	Jamshoro
8	M-00 (Murad Barijo)	25° 42' 23.9200" N	67° 24' 48.8100" E	Thano Bula Khan	Thano Bula Khan	Jamshoro
9	M-01	25° 40' 17.7400" N	67° 25' 31.1400" E	Thano Bula Khan	Thano Bula Khan	Jamshoro
10	Chanari And Veer Dam	25° 22' 55.5975" N	67° 40' 40.4148" E	Loyach Malak	Thano Bula Khan	Jamshoro
11	Babu Khan Dam	25° 26' 37.0756" N	67° 28' 19.5972" E	Mole	Thano Bula Khan	Jamshoro
12	Khakhar Dam	25° 47' 39.4116" N	67° 32' 44.5469" E	Beli Tap	Thano Bula Khan	Jamshoro
13	M. Yousuf Dam	25° 50' 12.7787" N	67° 32' 50.4350" E	Beli Tap	Thano Bula Khan	Jamshoro
14	Aatho Dam	25° 18' 01.4909" N	67° 18' 00.2658" E	Jhunjhar	Gadap	Malir
15	Sanyasi Dam	25° 18' 22.3554" N	67° 15' 54.8130" E	Lussar	Gadap	Malir
16	National Park Dam	25° 19' 37.0431" N	67° 12' 21.8521" E	Khar	Gadap	Malir
17	Dhani Bakhsh Bikak	25° 19' 57.9090" N	67° 12' 07.8161" E	Khar	Gadap	Malir
18	Sundi Nai	25° 21' 30.7824" N	67° 16' 30.6516" E	Sondi	Gadap	Malir
19	Thado Nai Dam	25° 23' 34.4081" N	67° 20' 14.5297" E	Jhunjhar	Gadap	Malir
20	Abdullah Kanro Dam	25° 24' 48.1782" N	67° 22' 46.8872" E	Wah Kund	Gadap	Malir
21	Mathal	25° 14' 03.0388" N	67° 12' 47.5568" E	Shoring	Gadap	Malir
22	Haji Imam Baksh	25° 16' 07.2141" N	67° 10' 25.6250" E	Shoring	Gadap	Malir
23	Moidan-2	25° 26' 43.2200" N	67° 12' 54.8100" E	Moedan	Gadap	Malir
24	Moidan Nadi	25° 27' 00.0000" N	67° 15' 00.0000" E	Moedan	Gadap	Malir
25	Vaan Khand	25° 27' 18.4300" N	67° 22' 44.0200" E	Wah Kund	Gadap	Malir
26	Saan-2	25° 28' 36.6597" N	67° 14' 22.8323" E	Shor Kundi	Gadap	Malir

i. Kal

The site is in Union Council Mol of Taluka Thano Bula Khan, District Jamshoro. The site is approachable by Manchar Lake road. The proposed small dam site is about 2 km from Hassan Shano. No temporary/permanent road would be constructed for an approach to the small dam site.

ii. Sangar Nadi 2

The site is in Union Council Mol of Taluka Thano Bula Khan, District Jamshoro. The site is approachable by Manchar Lake road. The proposed small dam site is about 2 km from Abdul Hakeem. No temporary/permanent road would be constructed for an approach to the small dam site.

iii. National Park

The proposed small dam site is in Union Council Mole of Taluka Thano Bola Khan, District Jamshoro. The site is approachable through Mole Sari Sigh Road. The proposed small dam site is 5 km away from Mole Town. A nearby settlement is Babu Khan, which is about 3 km away.

iv. Haji Foto

The site is in Union Council Arab Khan of Taluka Thano Bola Khan, District Jamshoro. The site is approachable by Haji Laong via Manchar Lake road. The proposed small dam site is about 1.5 km from a nearby settlement. No temporary/permanent road would be constructed for an approach to the small dam site.

v. Shamm

The site is in Union Council Arab Khan of Taluka Thano Bola Khan, District Jamshoro. The site is approachable by Faqir Muhammad Khoso via Manchar Lake road. The proposed small dam site is about 4 km from a nearby settlement. No temporary/permanent road would be constructed for an approach to the small dam site.

vi. Kotharo

The site is in Union Council Taongof Taluka Thano Bola Khan, District Jamshoro. The site is approachable by Ali Khan Chhuto via Manchar Lake road. The proposed small dam site is about 3 km from a nearby settlement. No temporary/permanent road would be constructed for an approach to the small dam site.

vii. Garrouk

The site is in Union Council Taong of Taluka Thano Bola Khan, District Jamshoro. The site is approachable by Shah Muhammad Chhuto via Manchar Lake road. The proposed small dam site is about 2 km from a nearby settlement. No temporary/permanent road would be constructed for an approach to the small dam site.

viii. Talango

The site is in Union Council Taong of Taluka Thano Bola Khan, District Jamshoro. The site is approachable by Shah Muhammad Chhutto via Manchar Lake road. The proposed small dam site is about 1 km from a nearby settlement. No temporary/permanent road would be constructed for an approach to the small dam site.

ix. Mole-00 (Murad Barijo)

The proposed dam site is in the Union Council Mole, of the Taluka Thano Bola Kahn, District Jamshoro. The site can be reached via the Karachi-Hyderabad M-9, passing through Nooriabad on Kirthar Park Road. The proposed location for the small dam is approximately

95 km from Nooriabad City and 50 km from Thano Bola Khan Town, accessible via Kirthar National Park Road.

x. Mole-01

The proposed dam site is in the Union Council Mole, of the Taluka Thano Bola Kahn, District Jamshoro. The site can be reached via the Karachi-Hyderabad M-9, passing through Nooriabad on Kirthar Park Road. The proposed location for the small dam is approximately 90 km from Nooriabad City and 45 km from Thano Bola Khan Town, accessible via Kirthar National Park Road.

xi. Sanyasi

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable by Khan Muhammad Khaskhali through Lakshari Goth Road via Hub dam. The proposed small dam site is about 15 km from Lakshari Goth and about 25 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site. A nearby main settlement is Sanyasi alias Kandani, which is about 5 km away.

xii. Thado Nai

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable by Gadap through Kirthar Park Road. The proposed small dam site is about 12 km from Gadap Town. No temporary/permanent road would be constructed for an approach to the small dam site. A nearby main settlement is Chutto Goth, which is about 4 km away.

xiii. Sundi Nai

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable by Bhai Khan Burfat, Gadap through Kirthar Park Road. The proposed small dam site is about 25 km from Gadap Town. No temporary/permanent road would be constructed for an approach to the small dam site. A nearby main settlement is Bhai Khan Burfat, which is about 4 km away.

xiv. Dhani Bakhsh Bikak

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable by Dhani Bux Bikak through Lakshari Goth Road via Hub dam. The proposed small dam site is about 04 km from Dhani Bux Bikak and about 25 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

xv. Aatho

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable by Pathan Goth through Lakshari Goth Road via Hub dam. The proposed small dam site is about 20 km from Lakshari Goth and about 30 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site. A nearby main settlement is Pathan Goth, which is about 3.5 km away.

xvi. Abdullah Kanro

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Gadap via Kirthar Par Road. The proposed small dam site is about 18 km from Mole Town. No temporary/permanent road would be constructed for an approach to the small dam site. A nearby main settlement is Abdullah Kanro, which is about 2.5 km away.

xvii. Babu Khan

The proposed small dam site is in Union Council Mole of Taluka Thano Bola Khan, District Jamshoro. The site is approachable through Mole Sari Sigh Road. The proposed small dam site is 5 km away from Mole Town. A nearby settlement is Babu Khan, which is about 3 km away.

xviii. Muhammad Yousuf

The proposed small dam site is in Union Council Taong of Taluka Thano Bola Khan, District Jamshoro. The site is approachable via Kirthar Park Road. The proposed small dam site is 15 km away from Taong Town. A nearby settlement is Muhammad Yousuf Chhuto, which is about 5 km away.

xix. Khakhar

The proposed small dam site is in Union Council Taong of Taluka Thano Bola Khan, District Jamshoro. The site is approachable via Kirthar Park Road. The proposed small dam site is 10 km away from Taong Town. A nearby settlement is Muhammad Juman Chhuto, which is about 3.5 km away.

xx. Chanari and Veer

The proposed dam site is in Taluka/Tehsil Thano Bula Khan District Jamshoro. The site is approachable by Kirthar National Park Road via Manchar Lake Road. The proposed small dam site is about 17 km from Thano Bula Khan and 2 km from Wadero Muhammad Umer Lalani. No temporary/permanent road would be constructed for an approach to the proposed small dam site. Existing tracks will be used for the transportation of the material.

xxi. Mathal

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Razaq Dino Burfat via Hub dam. The proposed small dam site is about 3.5 km from Lakshari Goth and about 30 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

xxii. Haji Imam Baksh

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Haji Imam Bux via Hub dam. The proposed small dam site is about 1.5 km from nearby village. No temporary/permanent road would be constructed for an approach to the small dam site.

xxiii. Moidan-2

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Razaq Dino Burfat via Hub dam. The proposed small dam site is about 3.5 km from Lakshari Goth and about 30 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

xxiv. Moidan Nadi

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Razaq Dino Burfat via Hub dam. The proposed small dam site is about 3.5 km from

Lakshari Goth and about 30 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

xxv. Vaan Khand

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Mureed Burfat via Hub dam. The proposed small dam site is about 2.5 km from Mureed Burfat and about 45 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

xxvi. Saan-2

The site is in Union Council Moidan of Taluka Gadap, District Malir. The site is approachable through Ghulam Qadir via Hub dam. The proposed small dam site is about 1.5 km from Ghulam Qadir and about 35 km from Hub Dam. No temporary/permanent road would be constructed for an approach to the small dam site.

The main components of the sub-project are given in Table 3-2 below while the project footprint area has been given Figures 3-1 to 3-26 in Annexure - I.

Table 3-2: Salient Features of the Sub-Project

Sr. No	Name	Catchment Area (sq. mi)	Design Flood (cusec)	Reservoir Capacity (acre-ft)	Dam Height (ft)	Spillway Height (ft)	Embankment Length (ft)	Spillway Length (ft)	Reservoir Area (acre)	Storage Volume (MCM)	Surface Area of Reservoir (sq. km)	Riverbed El (ft)	Dam Top El (ft.)
1	Kal	5.0	3,016	175	23	16	291	259	37.02	0.216	0.150	1,151	1,174
2	Sangar Nadi 2	3.8	4,000	225	23	16	270	195	0.28	0.119	0.001	985	1,005
3	Haji Foto	461.0	61,560	553	28	16	1,922	700	239.00	0.682	0.967	609	637
4	Shamm	22.9	28,059	1,320	23	15	4,304	790	136.94	1.629	0.554	623	646
5	Kotharo	2.2	3,128	177	23	16	715	225	47.25	0.218	0.191	1,242	1,266
6	Garrouk	29.6	15,360	182	24	15	355	470	40.70	0.225	0.165	1,033	1,057
7	Talango	22.7	13,045	172	23	15	355	470	70.35	0.212	0.285	168	191
8	M-00 (Murad Barijo)	28.6	7,802	627	30	15	2,469	1,849	75.01	0.773	0.304	1,826	1,856
9	M-01	19.8	13,561	409	30	15	809	1,696	42.60	0.504	0.172	1,673	1,703
10	Chanari And Veer Dam	24.9	17,564	448	23	15	1,376	580	89.22	0.552	0.361	678	701
11	Babu Khan Dam	0.3	678	150	22	15	2,503	64	36.26	0.185	0.147	1,135	1,157
12	Khakhar Dam	12.0	7,037	147	22	15	1,035	350	10.00	0.181	0.040	896	918
13	Muhammad Yousuf Dam	1.4	2,794	130	22	15	2,053	140	17.85	0.160	0.072	925	947
14	Aatho Dam	6.3	8,901	60	23	14	2,140	205	16.00	0.074	0.065	953	976
15	Sanyasi Dam	0.5	1,415	47	23	16	987	100	8.74	0.058	0.035	1,040	1,063
16	National Park Dam	0.6	1,840	23	22	15	541	90	4.90	0.029	0.020	442	464
17	Dhani Bakhsh Bikak Dam	1.0	2,881	50	22	15	505	145	8.96	0.062	0.036	421	443
18	Sundi Nai (Bahi Khan Goth) Dam	6.2	9,166	237	22	15	1,092	440	38.62	0.293	0.156	1,134	1,156
19	Thado Nai (Chhuto Goth) Dam	6.8	10,779	59	23	15	164	340	9.30	0.072	0.038	917	940
20	Abdullah Kanro Dam	43.6	30,799	214	23	14	99	705	35.00	0.263	0.142	830	853
21	Mathal	1.4	5,180	214	23	14	851	120	12.55	0.264	0.051	710	733
22	Haji Imam Baksh	1.4	3,596	82	23	16	978	175	26.70	0.101	0.108	384	407
23	Moidan-2	19.3	12,760	665	25	16	2,962	293	205.61	0.820	0.832	393	418
24	Moidan Nadi	10.7	13,140	576	25	16	4,821	301	133.63	0.711	0.541	476	500
25	Vaan Khand	53.21	25,185	266	23	16	2,783	807	180.50	0.33	0.730	749	775
26	Saan-2	7.8	6,592	281	23	16	53	300	29.64	0.347	0.120	390	413

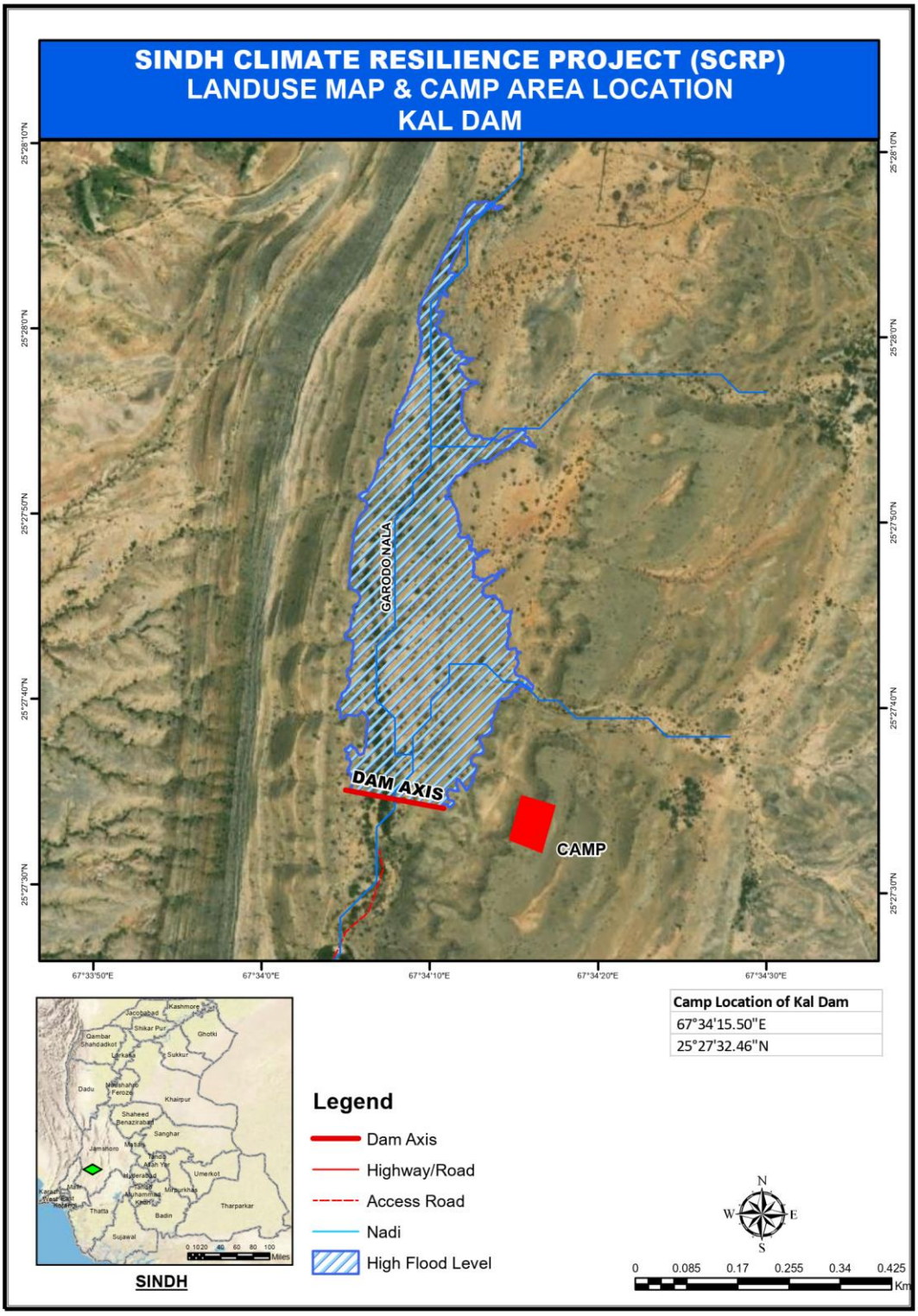

Figure 3-1: Location Map of Kal Dam

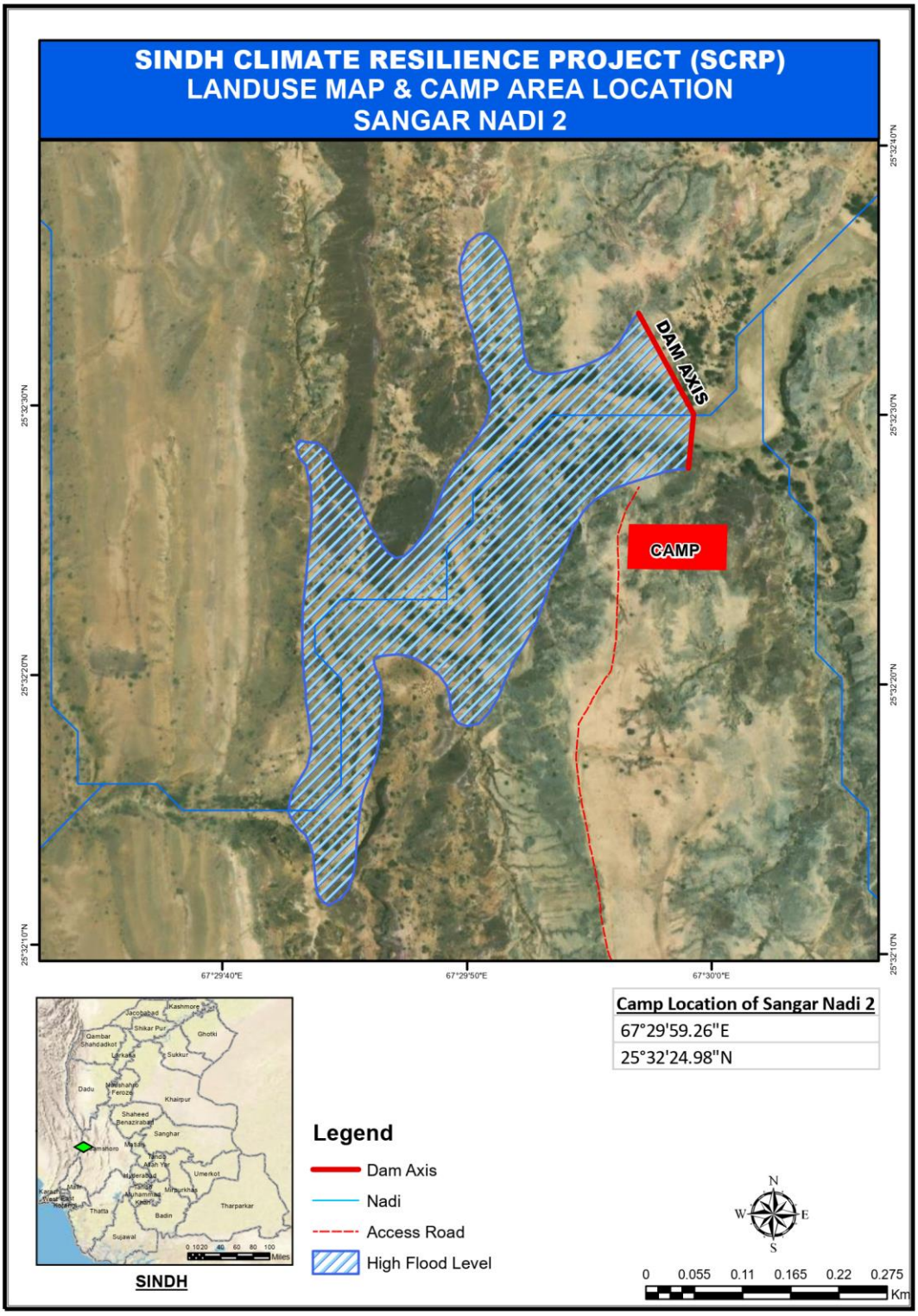

Figure 3-2: Location Map of Sagar Nadi Dam

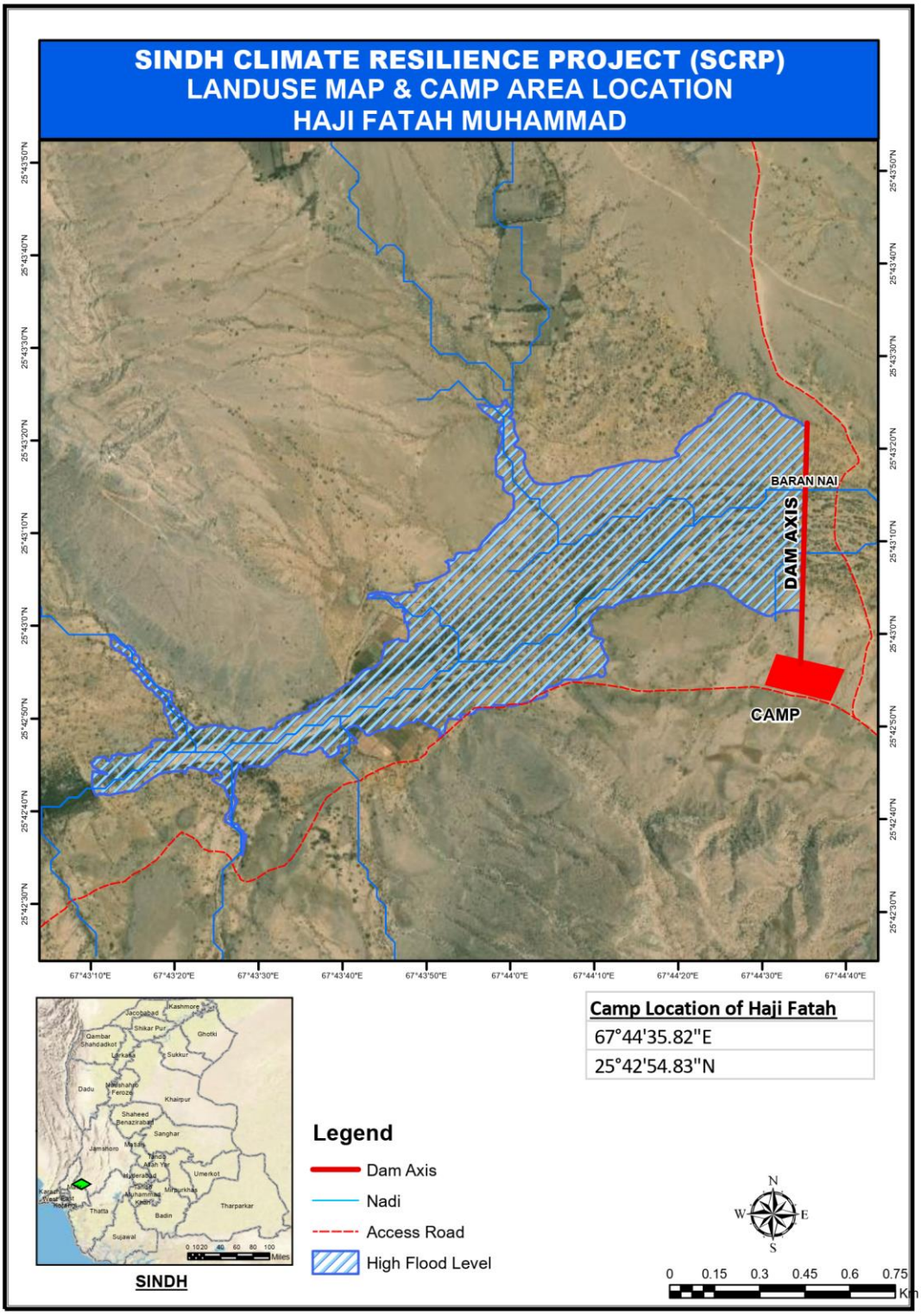

Figure 3-3: Location Map of Haji Foto

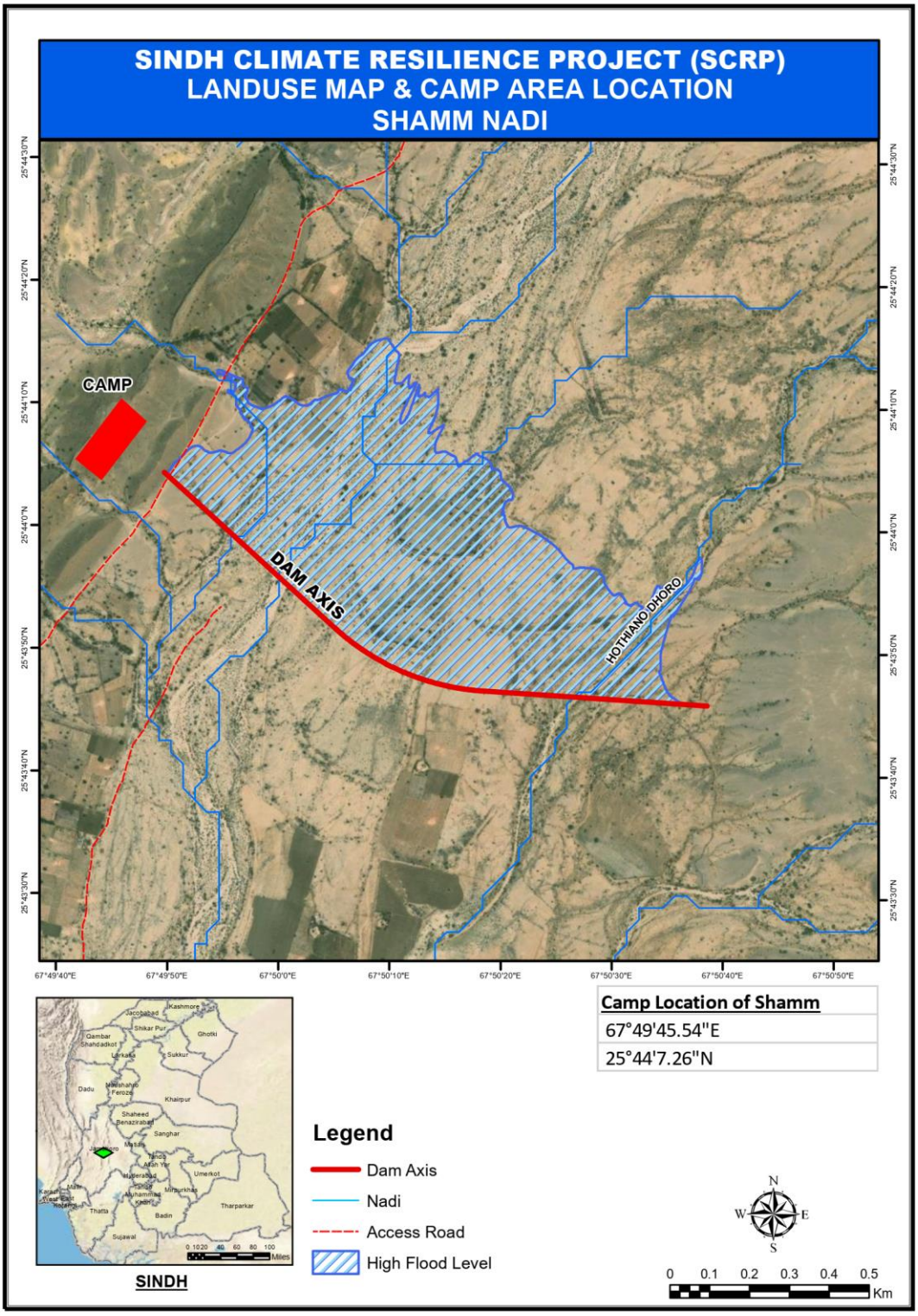

Figure 3-4: Location Map of Shamm Nadi Dam

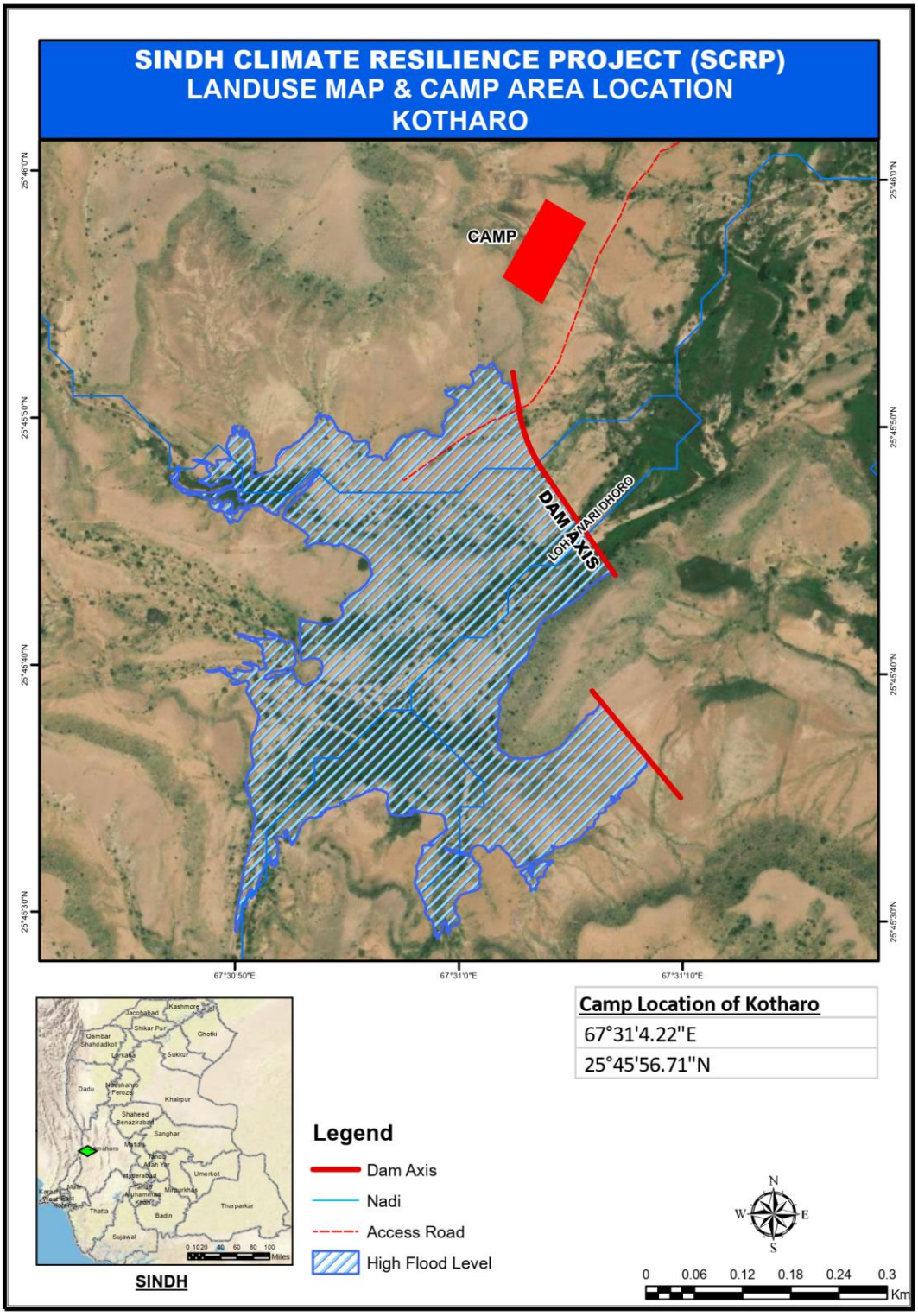

Figure 3-5: Location Map of Kotharo Dam

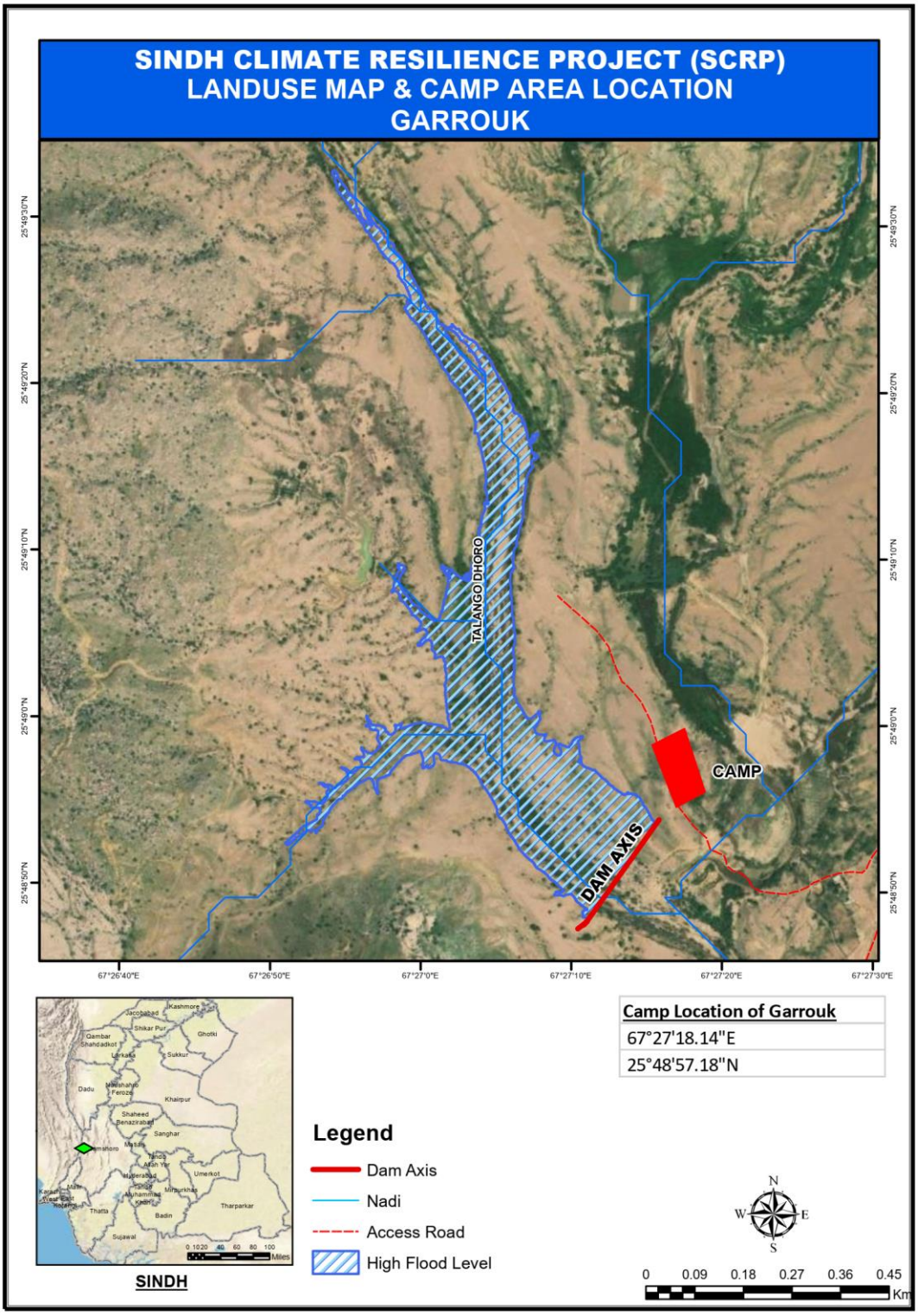

Figure 3-6: Location Map of Garrouk Dam

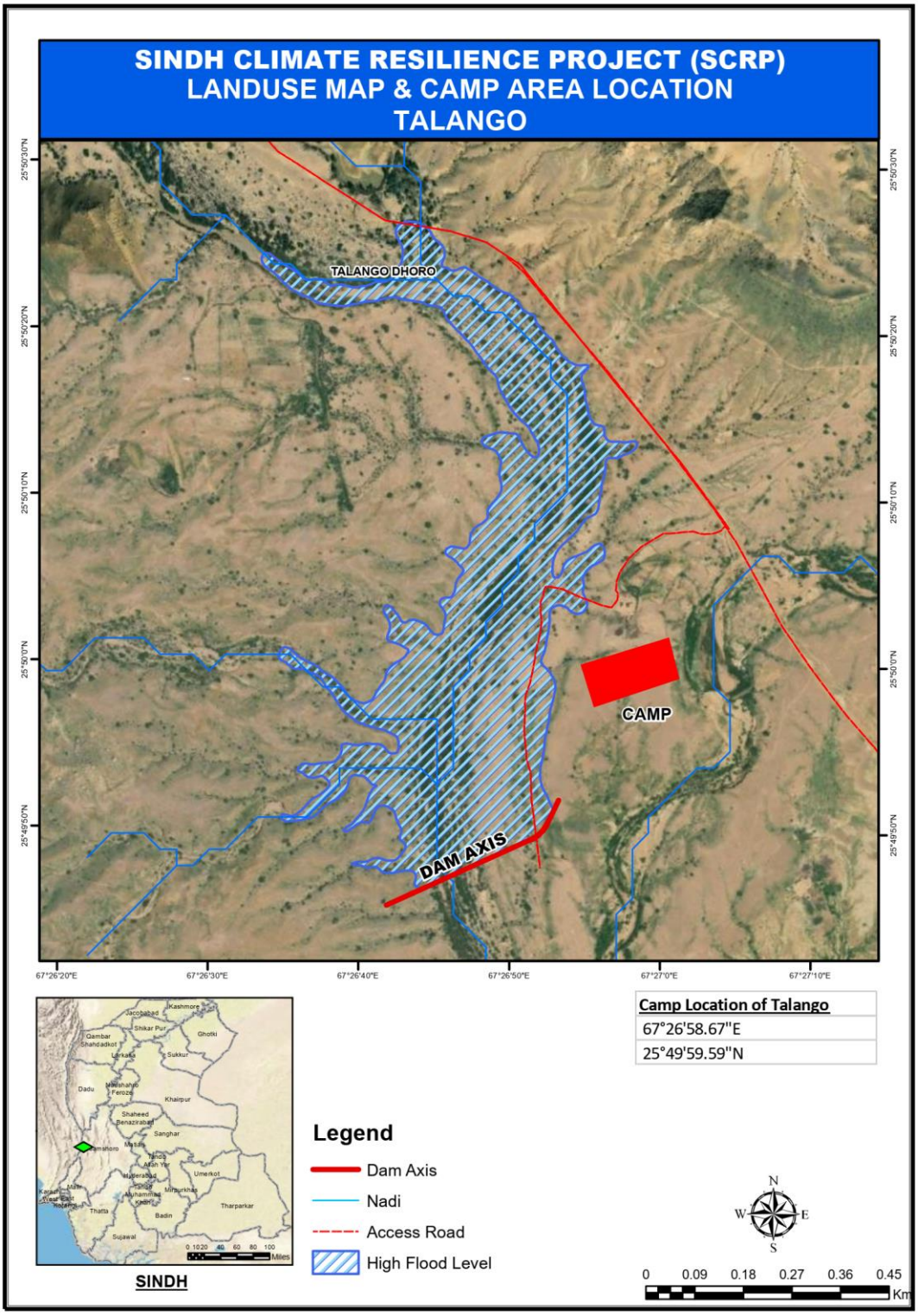

Figure 3-7: Location Map of Talango Dam

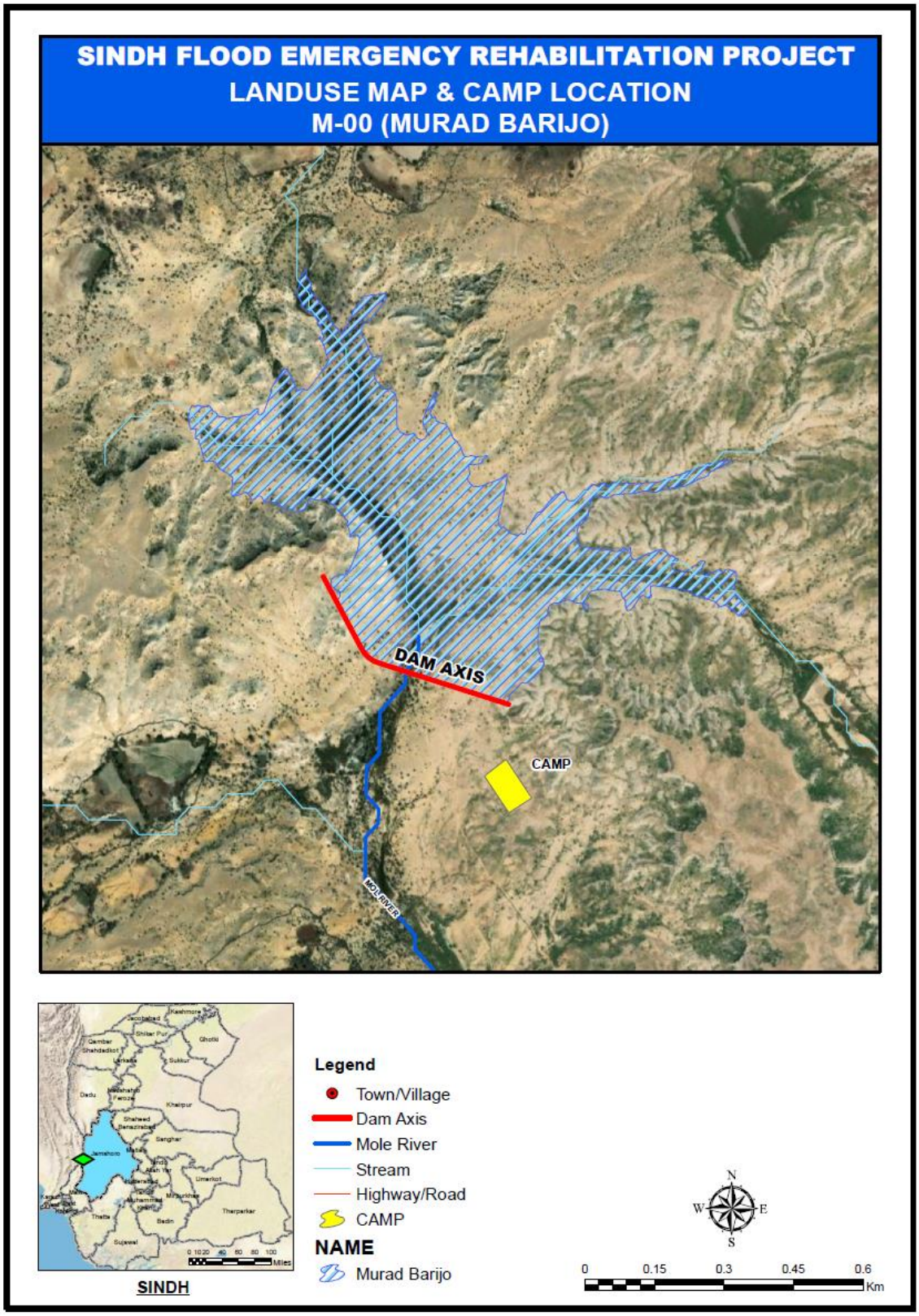

Figure 3-8: Location Map of M-00 Dam

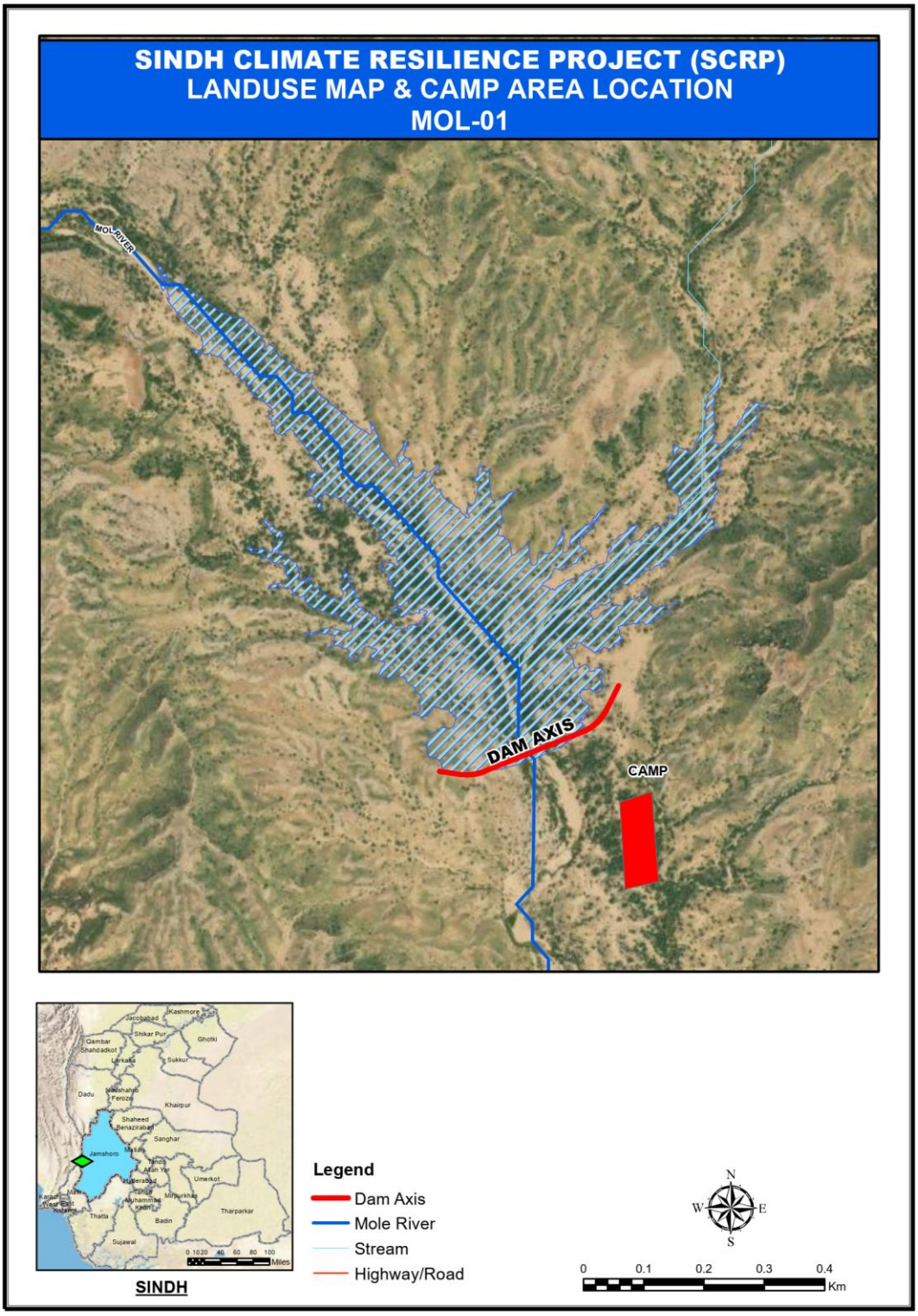

Figure 3-9: Location Map of M-01 Dam

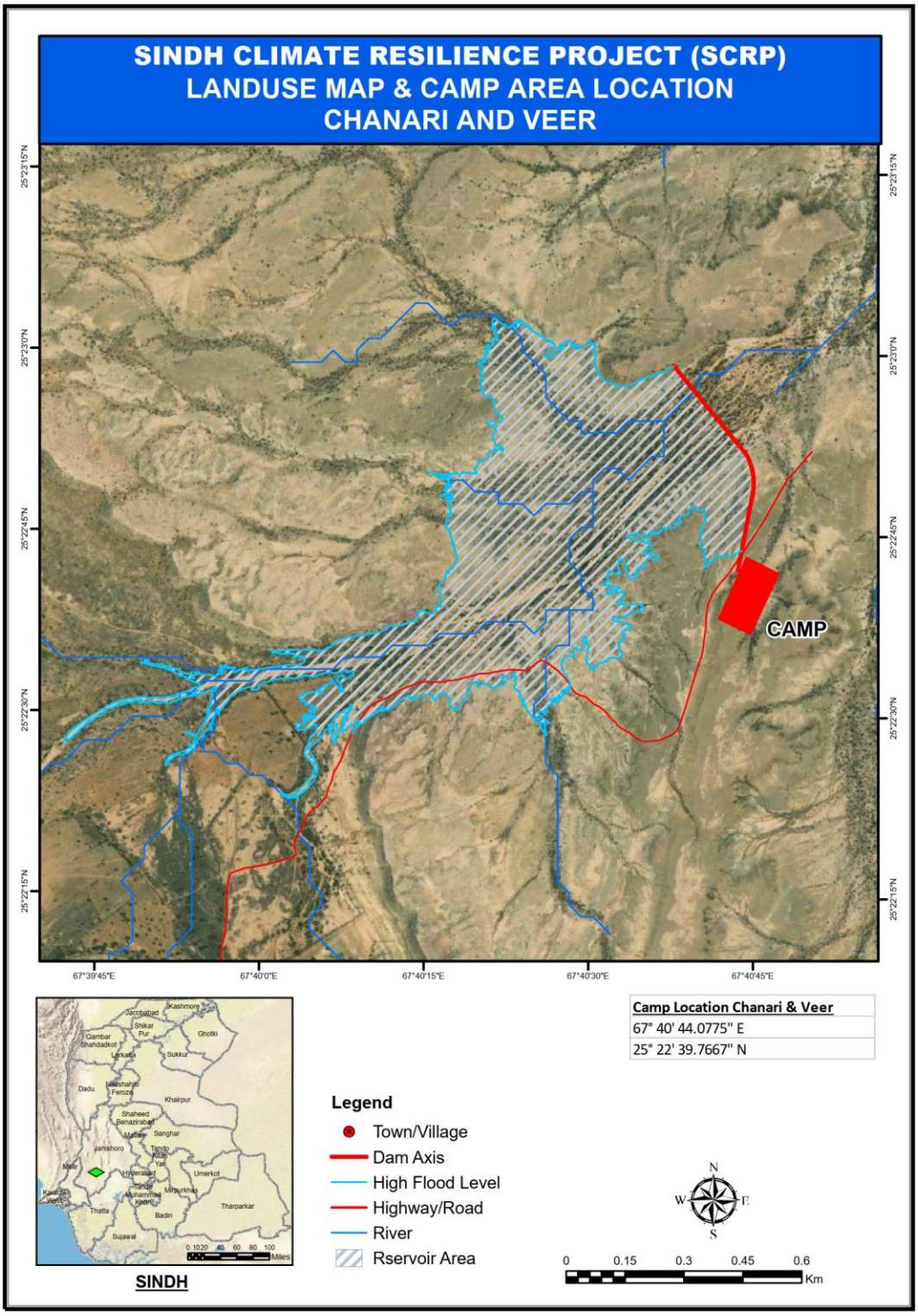

Figure 3-10: Location Map of Chanari and Veer Dam

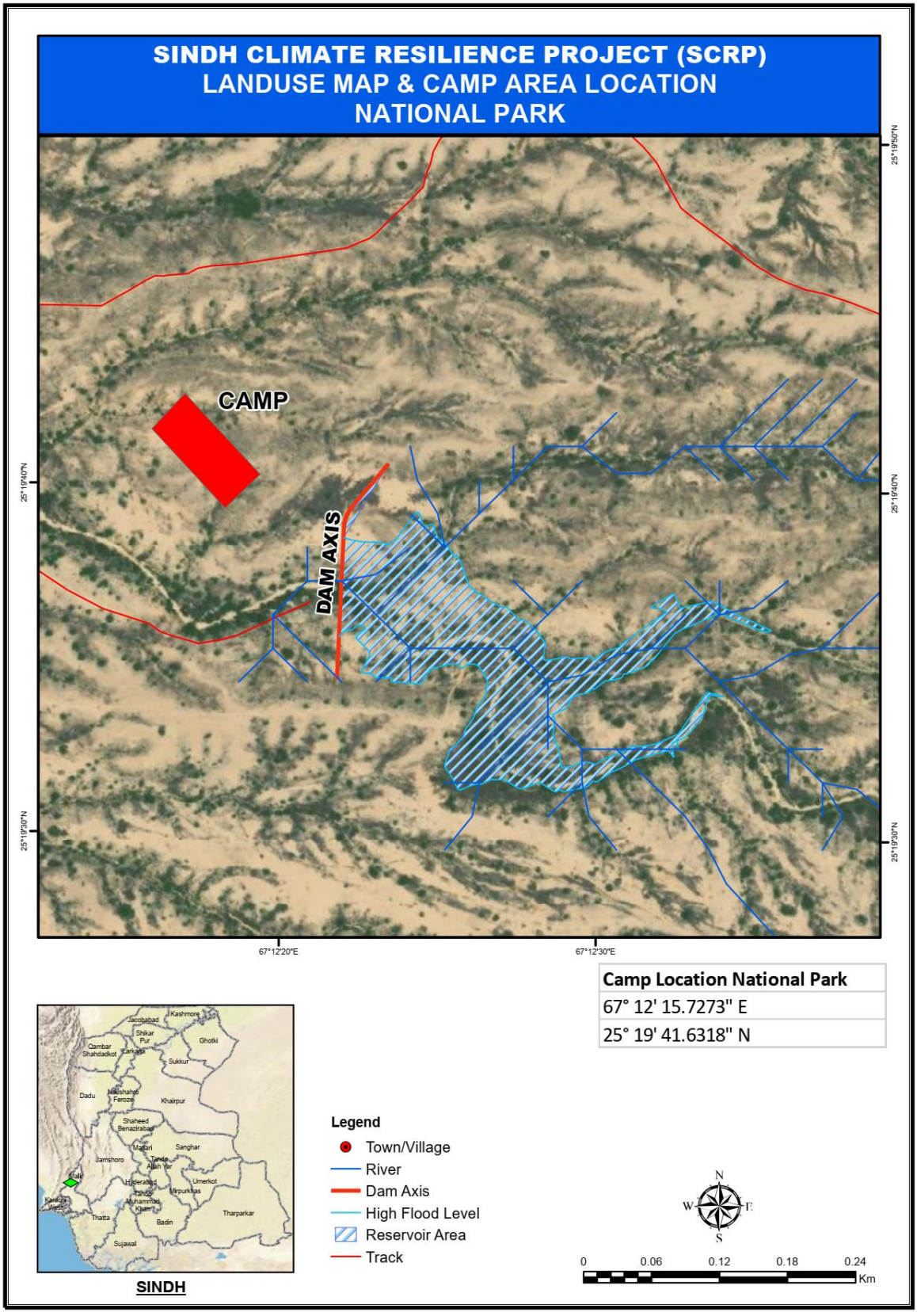

Figure 3-11: Location Map of National Park Dam

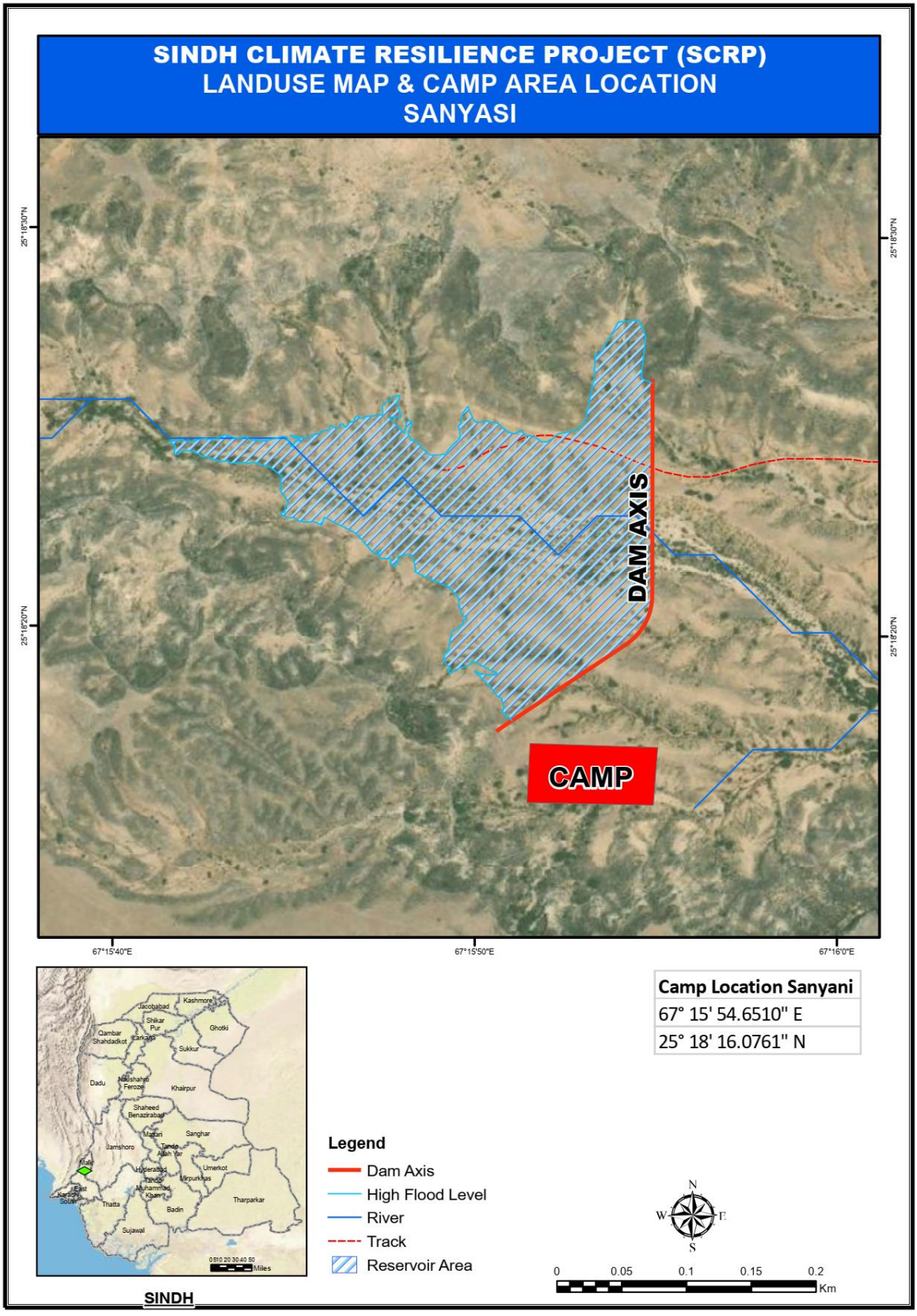

Figure 3-12: Location Map of Sanyasi

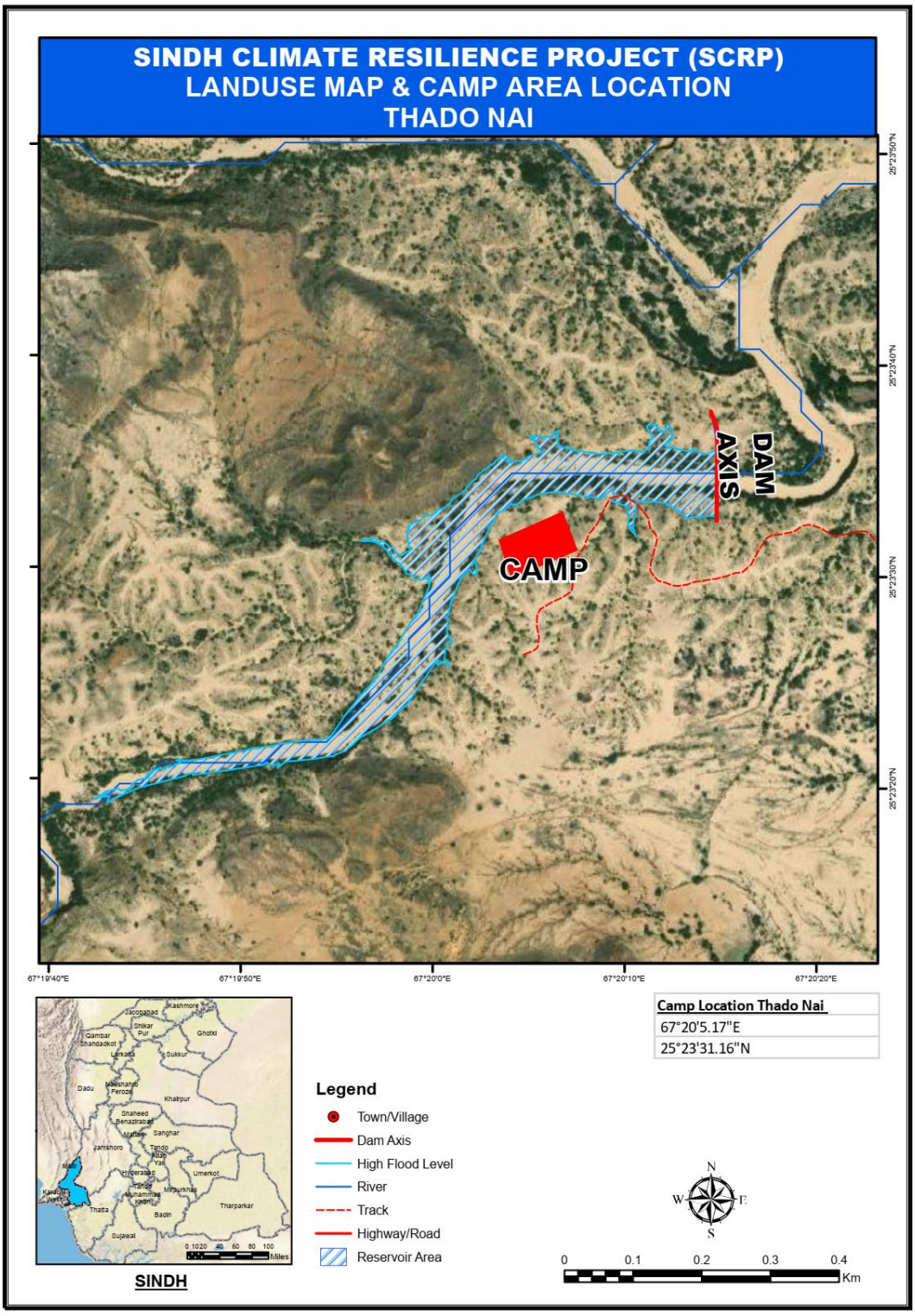

Figure 3-13: Location Map of Thado Nai

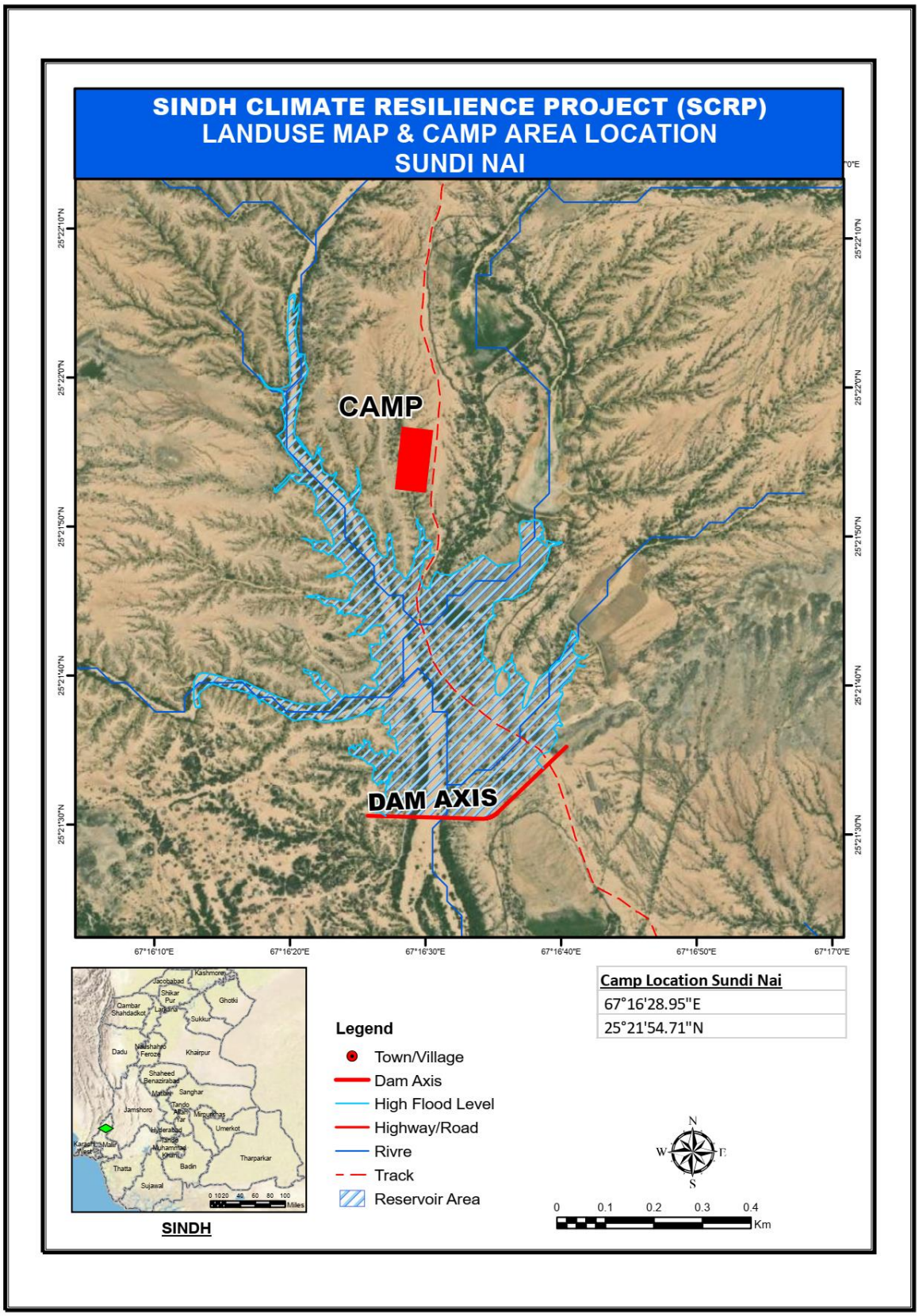

Figure 3-14: Location Map of Sundi Nai

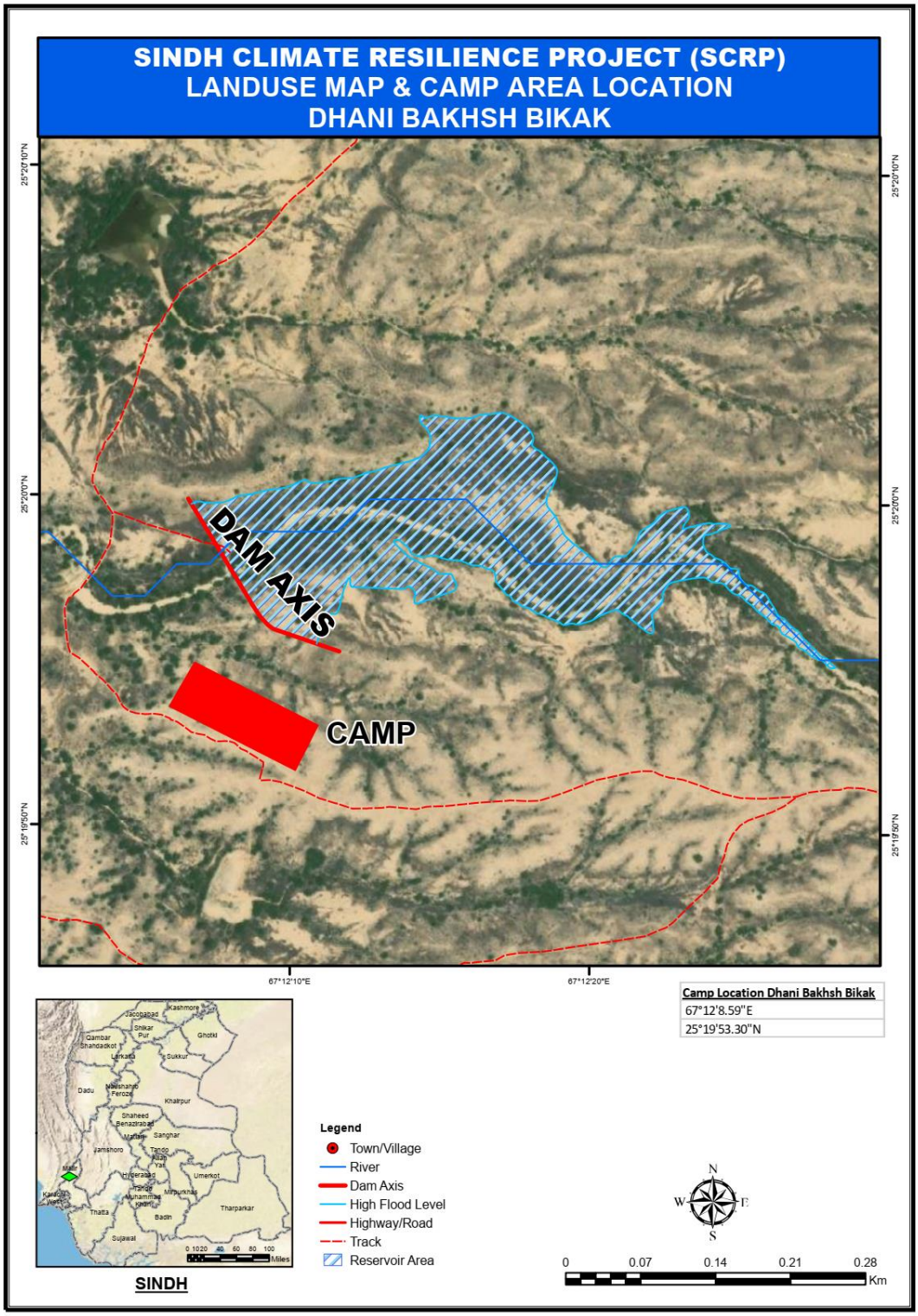

Figure 3-15: Location Map of Dhani Baksh Bikak

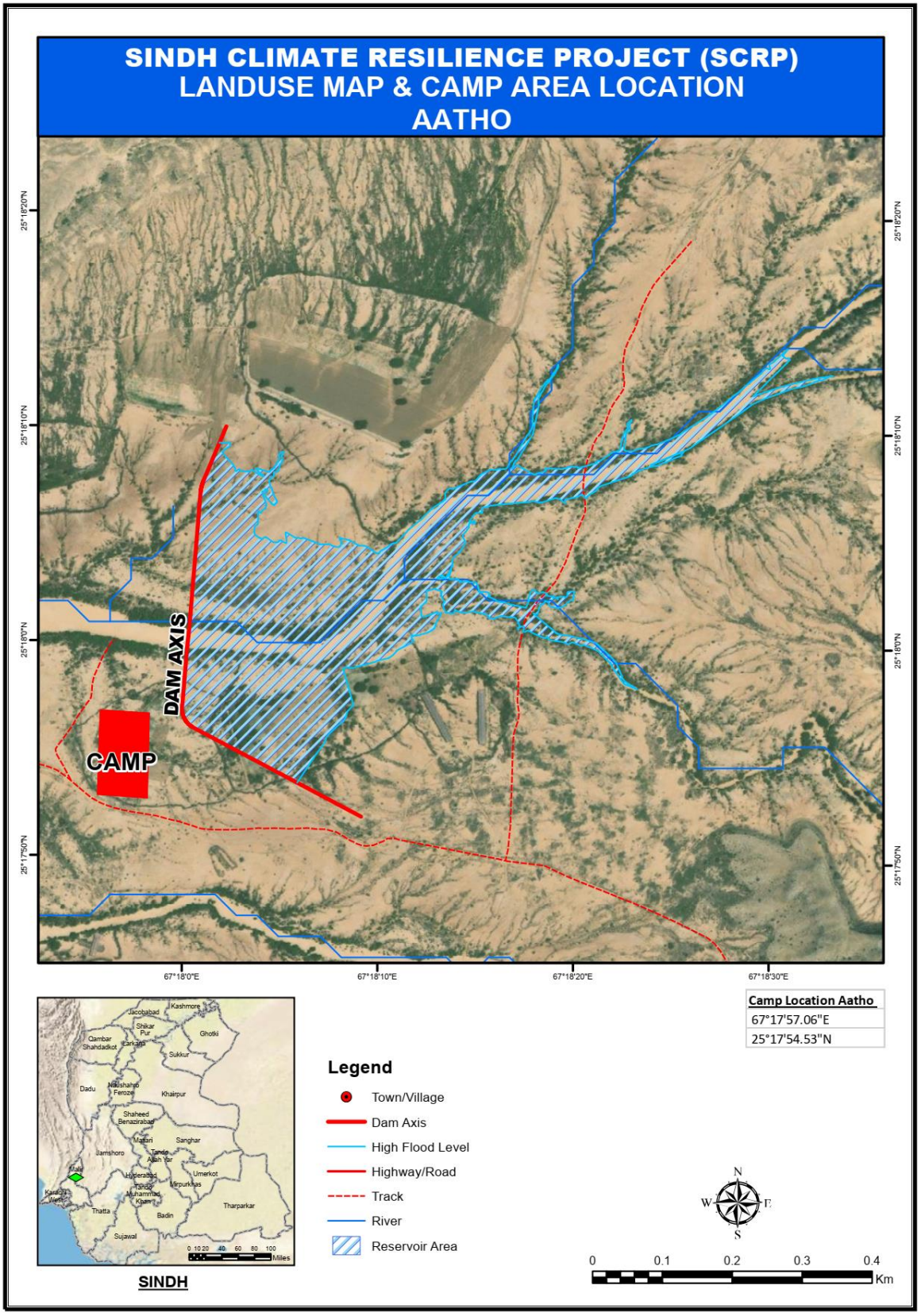

Figure 3-16: Location Map of Aatho

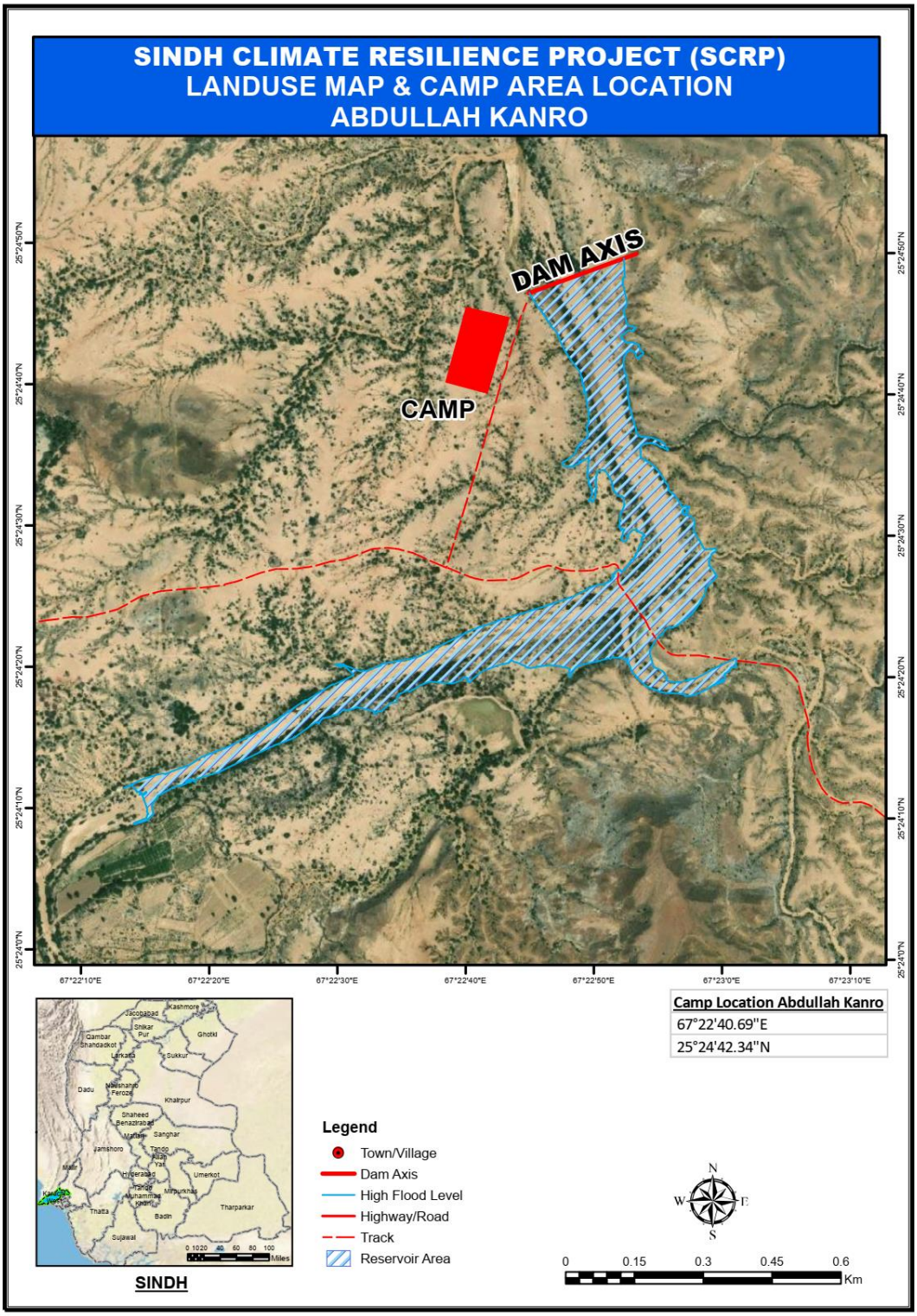

Figure 3-17: Location Map of Abdullah Kanro

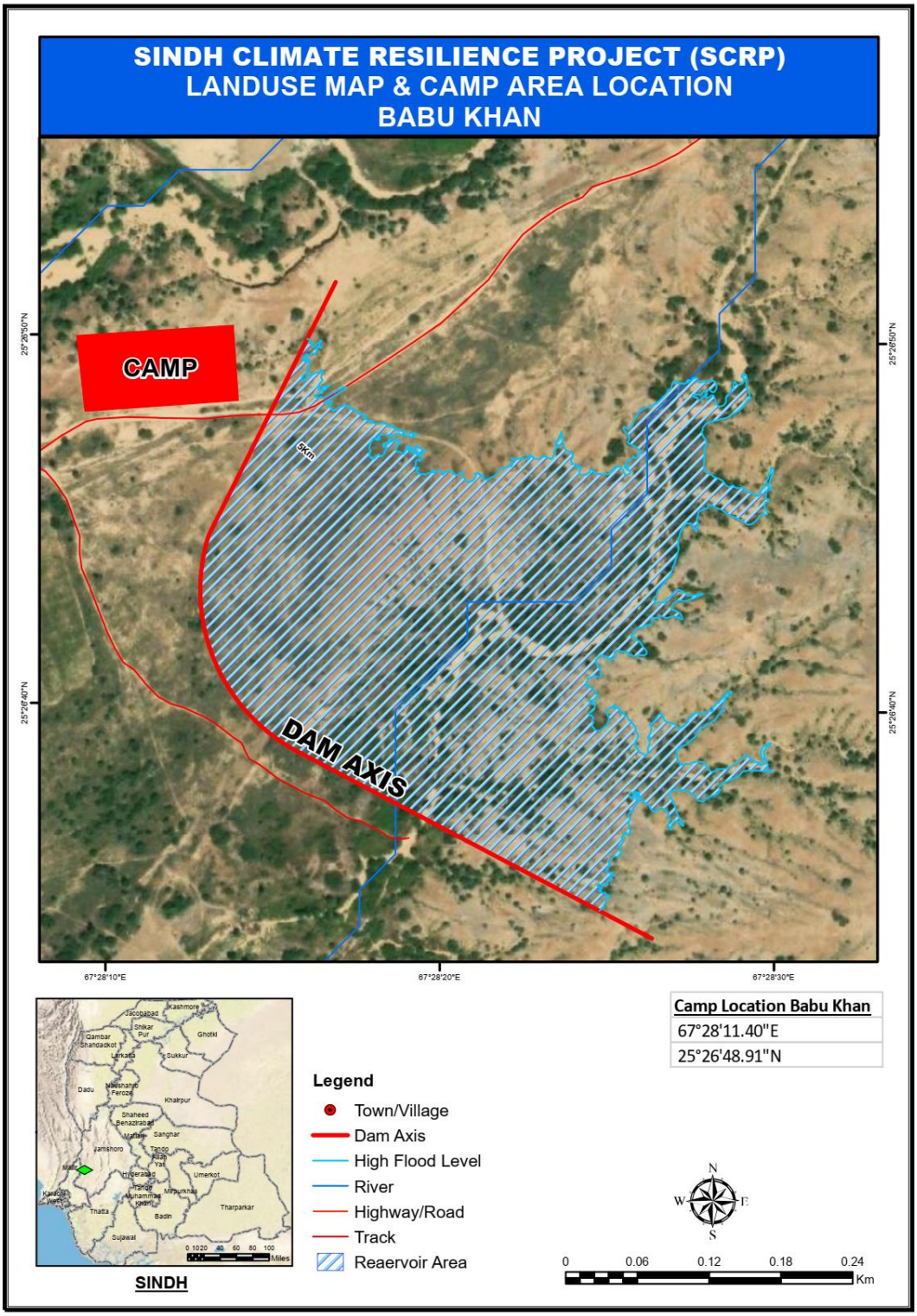

Figure 3-18: location Map of Babu Khan

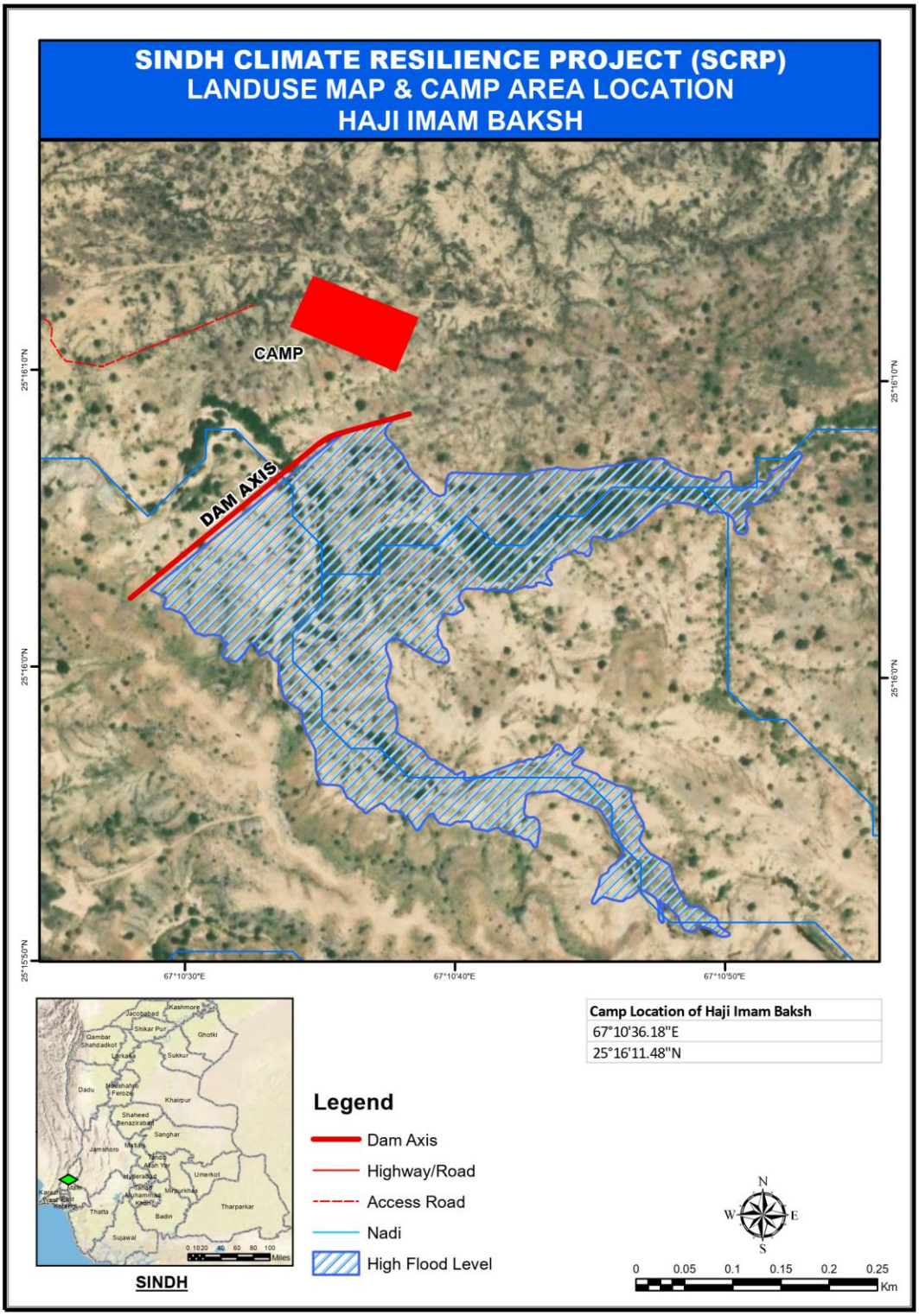

Figure 3-19: Location Map of Haji Imam Baksh

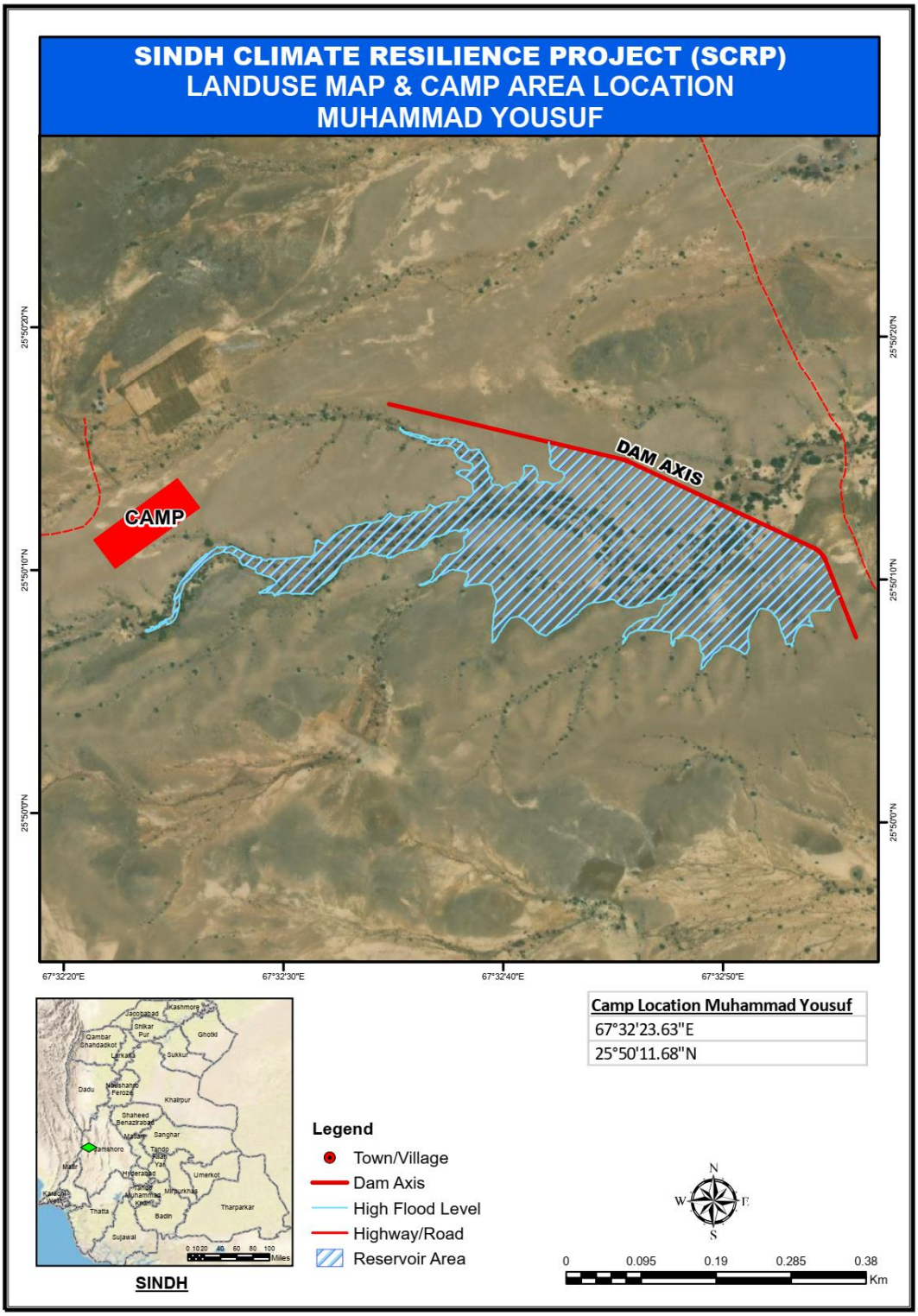

Figure 3-20: Location Map of Muhammad Yousaf

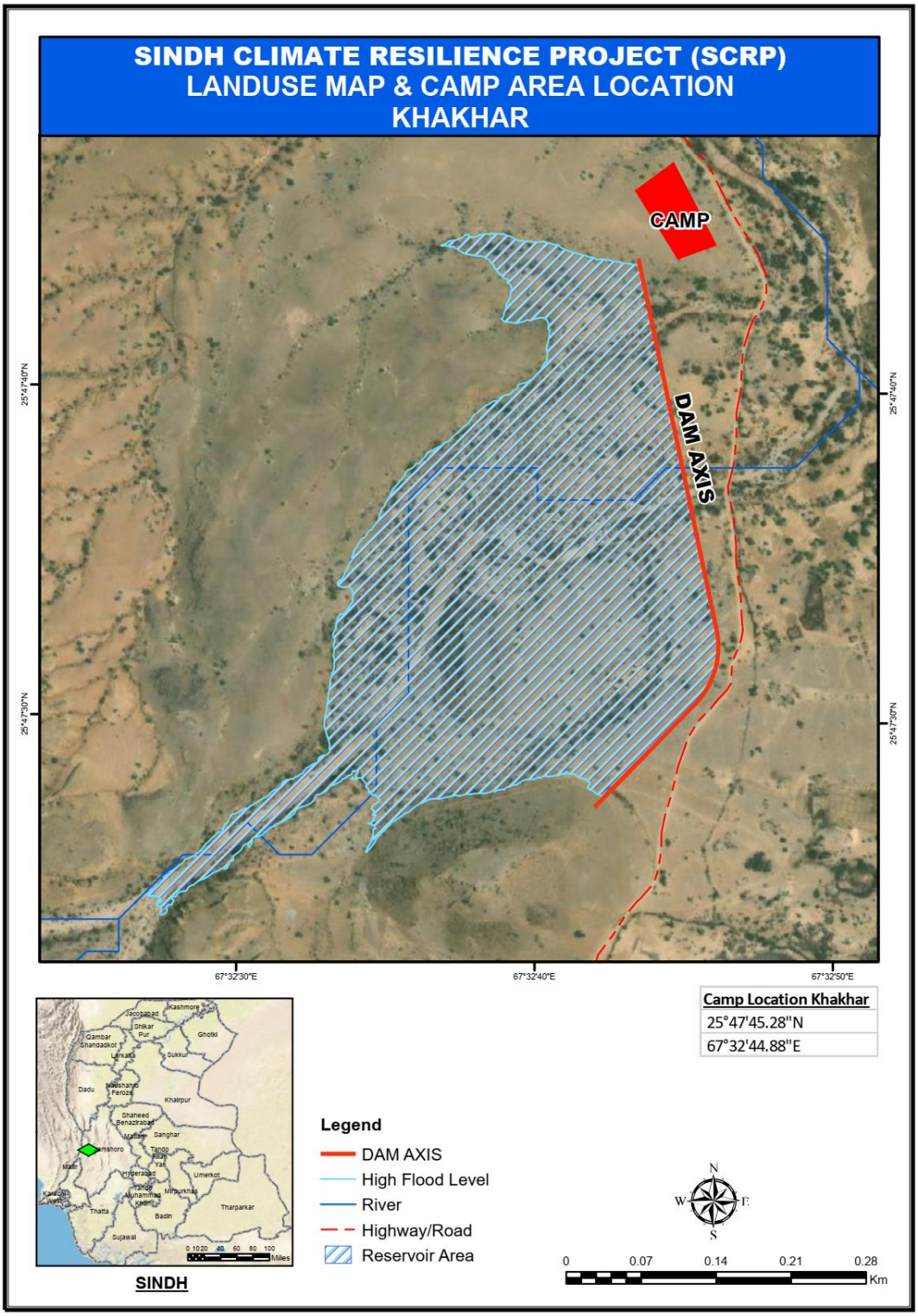

Figure 3-21: Location Map of Khakhar

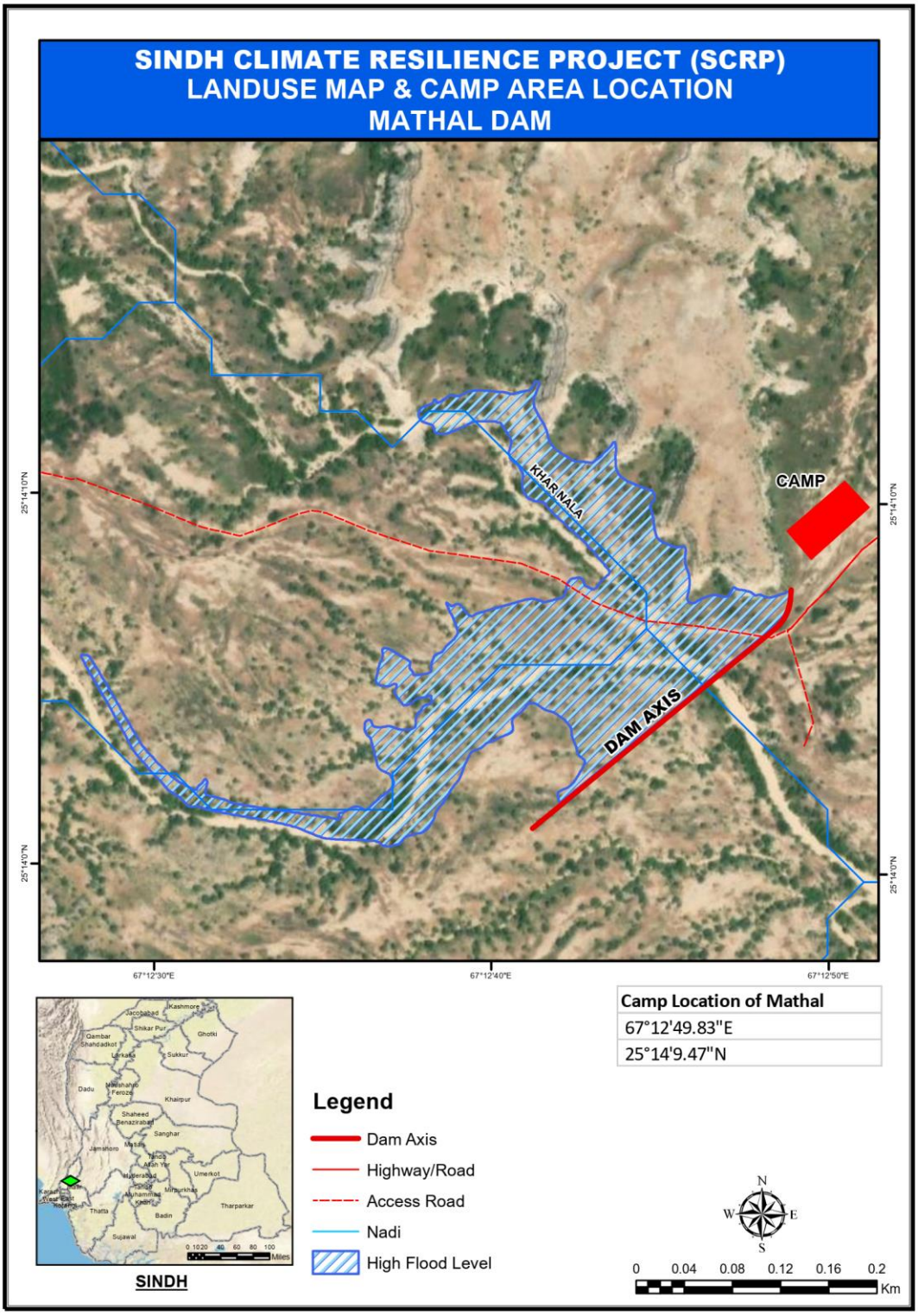

Figure 3-22: Location Map of Mathal

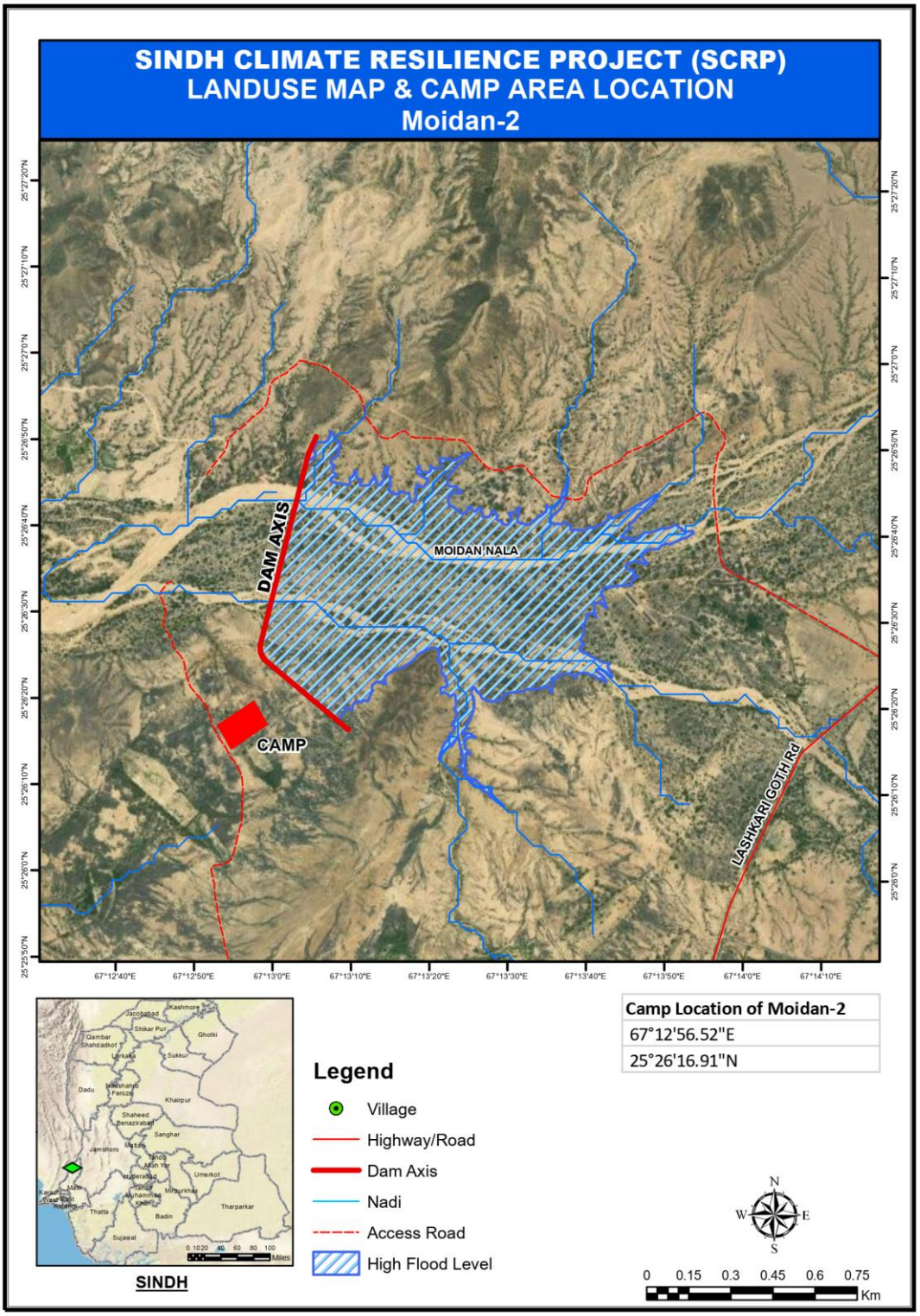

Figure 3-23: Location Map of Moidan 2

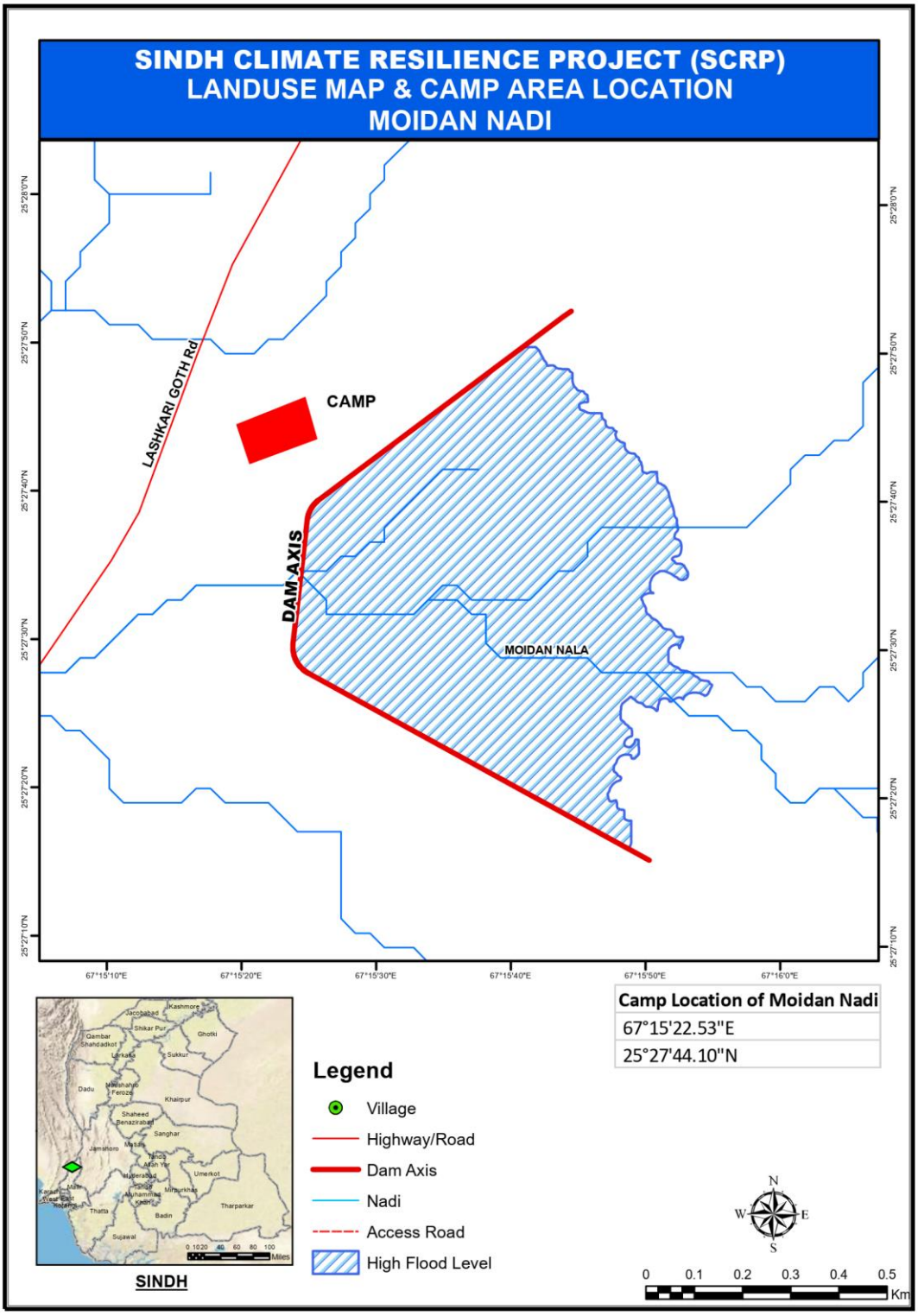

Figure 3-24: Location Map of Moidan Nadi

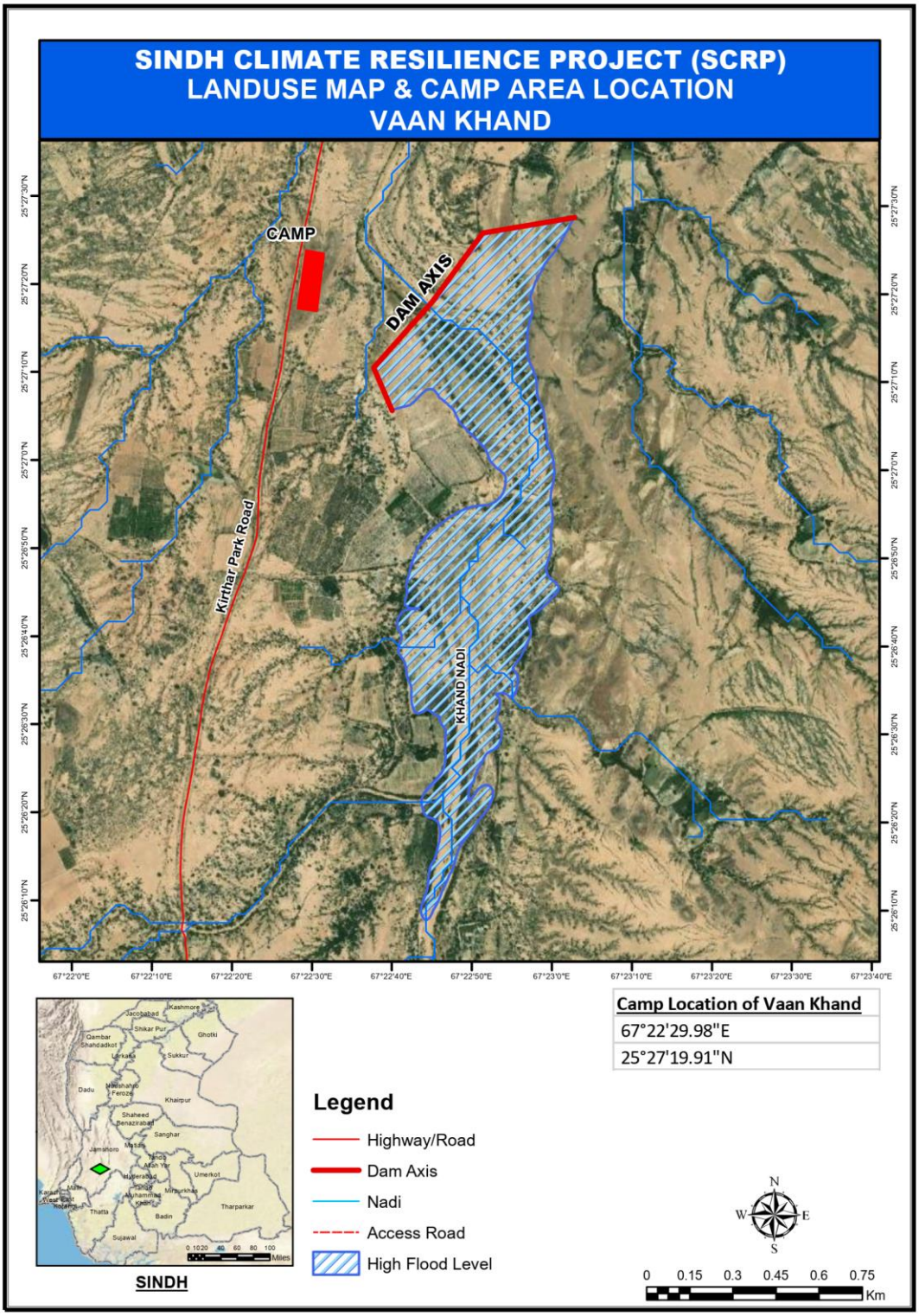

Figure 3-25: Location Map of Vaan Khand

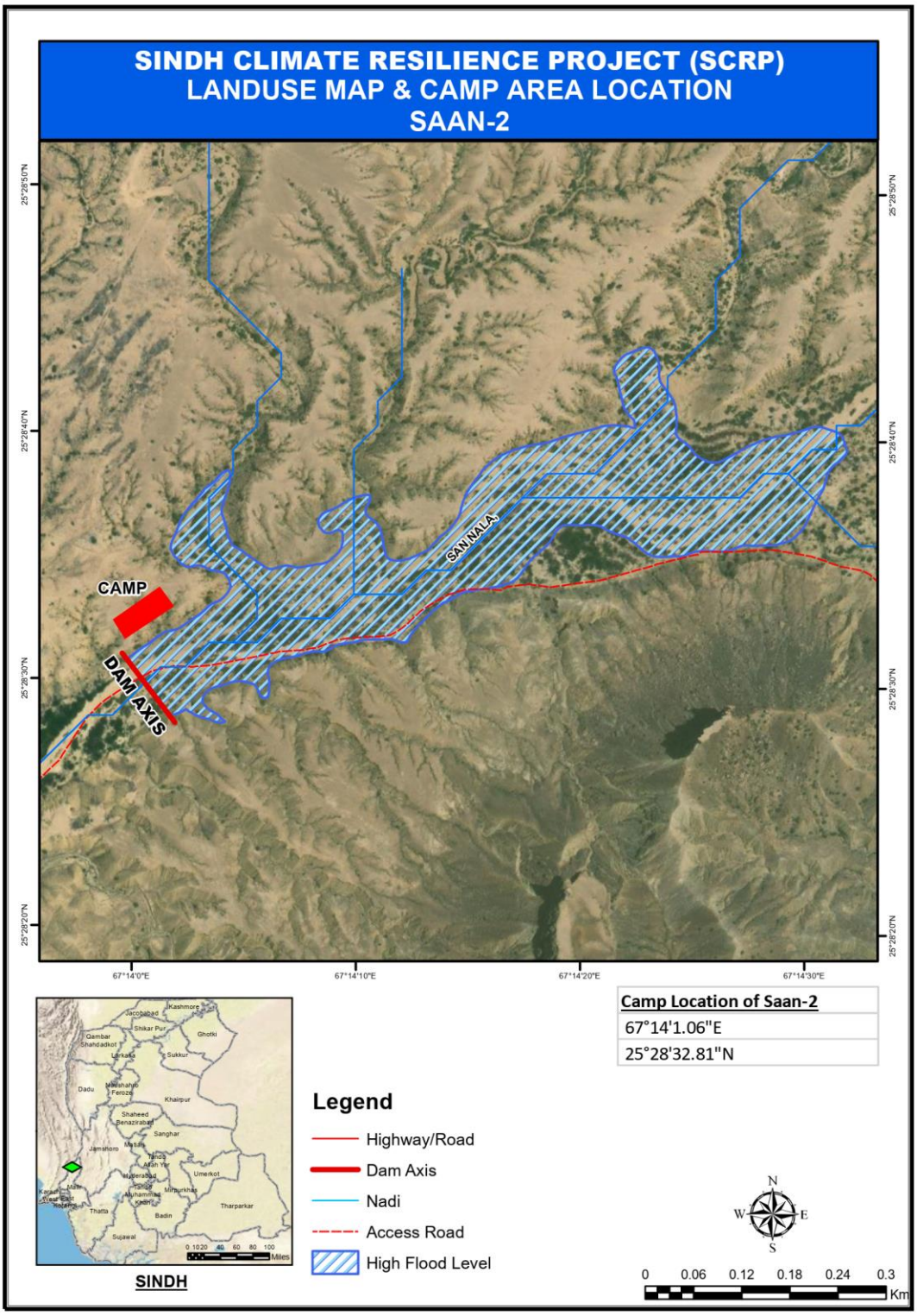

Figure 3-26: Location Map of Saan 2

3.2 Construction Activities

The Construction activities for various sub-project dams will span 12 months. The execution works of the sub-project are proposed to be completed in 12 months after the approval of PC – 1 and the bidding process according to the procurement plan approved by the World Bank. The related activities are the establishment of contractor's camp and stockyards for cement, steel, and aggregate, shifting of necessary machinery and equipment to the site and exploitation of borrow areas, construction of concrete spillways, earth fill embankments and one-room building for dam O&M staff. The major activities are briefed below:

- **i.** Contractor's mobilization: After awarding the contract the selected Contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.
- **ii.** The concrete structures will be constructed with contraction joints. PVC water stoppers shall be provided at these joints.
- **iii.** The borrow areas will be excavated as per specifications. The borrowed material will be loaded and transported by tractor trolleys through the approved traffic management plan.
- **iv.** Formation of embankments/ bunds for the reservoir with the soil obtained from borrow areas. Activities involve unloading the soil on the embankment, leveling, and compaction of soil in layers.
- **v.** The stone shall be loaded and transported from nearby quarries or by approved material quarries to the site through trucks and unloaded/stacked at designated places.
- **vi.** Stone pitching works shall be carried out as per specification.
- **vii.** Restoration of the campsite and Contractor's demobilization.

3.2.1 Construction Material

The construction materials required in the works includes the followings:

a) Embankment fill
b) Fine and coarse filters
c) Toe drain stones
d) Gravel bedding
e) Riprap stones
f) Cement
g) Fine and coarse aggregates
h) Reinforcement
i) Water
j) PVC water stops

Estimated quantities of construction material for construction are given in Table 3-3. The materials used for the construction of the sub-project proposed dams include coarse aggregates, fine aggregates (sand), rock for stone pitching and riprap, earth, water, cement, and steel.

The contractor will be allowed to purchase natural materials such as coarse aggregate, stones, and coarse filters from the legal crushing plants or material suppliers having

approval from the relevant department of the Sindh Government (Mines and Mineral Development Department & SEPA). No purchase of material from illegal crushing plants or non-approved material suppliers will be allowed. This should be made part of the agreement for each of the contractors with the project.

The water would be obtained from tube wells installed by the Contractors. The contractor shall be strictly bound not to use community tube well as this may compete for the local water resource in the dry season when the water table declines. The contractor will conduct an Electrical resistivity-surveying test along with a pump-out test to assess the groundwater potential required for the construction activities before the tube wellbore. This condition will be included in the bid document as contractual binding. After the completion of the subproject, the recipient of this borehole will be the community representative or notable. Handing over documents will be signed by both community and contractor representatives. Solar-operated tube wells will be preferred if diesel generators are used then the contractor has to keep an eye on CO_2 impacts. This condition will be included in the bid document as contractual binding.

Cement will be procured from Hyderabad and Karachi cities. Most of the other construction supplies such as fuel, steel, and lubricants can also be arranged from big cities like Karachi and Hyderabad. Some other construction materials such as rolled steel bars, PVC water stops, and steel plates for formwork, pump installation materials may be brought from Hyderabad and Karachi.

3.2.2 Machinery & Equipment

The construction work includes earthwork and concrete work. These works will require earth-moving types of machinery such as excavators, dumpers, graders and rollers, transit mixtures, etc. The concrete works will involve medium-sized batching plants and concrete placing equipment. The contractor will provide the exact location of the batching plant and get approval from PIU. The contractors will directly manage all equipment. The estimated machinery and equipment required are given in Table 3-4. However, the actual amount of equipment required on the site will be determined by the contractor to carry out the strengthening work.

3.2.3 Manpower Requirement

The manpower required by the contractor during the execution of the sub-projects is given in Table 3-5. For unskilled laborers, local people will be preferred. Machinery Loader/Dumper/Trucks/ Tractor Trolley will be used for bringing earth material from the designated sites. Local operators/drivers will be preferred with valid driving licenses having experience driving vehicles like (trucks, dumpers, and Dozers, etc.). This does not include the drivers, which will carry the stone from the quarry and other items like cement and steel from the local market.

During surveys and consultations, the major demand of the community was the provision of jobs during the construction phase. Sufficient labor particularly unskilled is available in the sub-project area.

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Table 3-3: Estimated Quantities of Construction Materials

Sr. No	Dams	Earthwork		Cement Concrete		Reinforcement (Steel)	Protection Stones	Filter Material		Waterstop PVC	Swellstops	Water for Concrete and Earth fill
		Excavation (cft)	Fill (cft)	Mass (cft)	RCC (cft)	(Kg)	(cft)	Fine (cft)	Coarse (cft)	(Rft)	(Rft)	(Gallon)
1	Chanari & Veer Dam	1,352,592	1,184,669	403,874	358,514	569,807	322,035	180,870	250,396	3,299	1,877	2,234,372
2	Babu Khan Dam	575,078	1,424,945	42,940	89,644	142,827	415,532	236,334	314,578	1,219	832	1,565,340
3	Khakhar Dam	2,697,286	380,558	527,775	447,369	710,881	217,129	107,083	140,786	4,150	2,280	1,767,391
4	Muhammad Yousuf Dam	824,783	731,767	157,793	176,798	281,214	273,950	133,859	171,160	1,885	1,154	1,190,263
5	Aatho Dam	1,075,127	835,484	143,465	175,046	278,480	325,346	171,008	222,266	1,844	1,163	1,268,404
6	Sanyasi Dam	589,930	710,618	111,039	148,454	236,232	209,323	114,340	155,757	1,528	1,002	1,064,093
7	National Park Dam	610,071	100,515	78,400	120,008	191,024	72,821	26,632	33,810	1,434	923	391,816
8	Dhani Bakhsh Bikak Dam	661,927	159,793	115,931	155,386	247,207	93,926	42,265	55,270	1,678	1,050	554,149
9	Sundi Nai (Bahi Khan Goth) Dam	1,370,127	399,669	306,964	277,208	440,678	189,936	92,148	120,869	2,715	1,577	1,226,407
10	Thado Nai (Chhuto Goth) Dam	2,429,340	30,509	269,135	252,373	401,253	58,165	19,920	26,932	2,430	1,446	784,103
11	Abdullah Kanro Dam	4,016,484	31,316	608,552	471,588	749,394	83,053	32,000	45,717	3,893	2,196	1,575,663
12	Moidan Nadi	2,155,168	4,110,575	327,590	274,102	435,809	1,024,165	608,422	823,124	2,307	1,423	4,904,112
13	Moidan-2	2,056,060	4,221,733	810,341	349,094	554,899	772,803	481,784	675,834	2,312	1,427	5,746,759
14	Mathal	590,979	351,289	65,847	131,927	210,015	133,328	66,616	86,513	1,504	1,000	667,350
15	Haji Imam Baksh	662,943	794,312	113,593	160,945	256,073	195,728	111,998	153,094	2,162	1,545	1,209,694
16	Saan-2	1,471,930	113,137	193,355	225,158	358,040	47,578	17,142	25,551	2,206	1,339	794,134
17	Vaan Khand	1,820,034	299,275	434,838	340,330	540,996	140,529	58,247	76,377	4,447	3,286	1,516,126
18	Kal	914,778	295,195	187,676	209,228	332,750	83,483	40,943	57,541	2,643	1,872	927,955
19	Garrouk	2,189,895	237,885	388,947	332,045	527,819	111,946	46,197	62,079	4,733	3,520	1,376,001
20	Kotharo	1,024,039	931,458	169,201	197,301	313,810	225,501	123,293	169,158	2,550	1,829	1,491,939
21	Haji Foto	3,895,049	1,323,481	895,889	568,478	903,345	393,490	210,950	289,475	7,226	5,529	3,539,214
22	Shamm	2,326,507	2,553,431	255,340	344,974	548,315	823,014	469,749	625,789	5,696	4,150	3,441,448
23	Talango	1,260,334	523,255	413,493	310,042	492,859	158,751	81,520	112,752	4,142	3,026	1,655,587
24	Sangar Nadi 2	589,865	331,636	116,516	161,711	257,293	88,777	44,721	63,010	1,816	1,225	773,076
25	M-00 DAM (Murad Barijo)	978,533	405,906	209,177	260,652	414,452	351,335	291,687	207,143	2,822	2,039	1,491,939
26	M-01 DAM	1,603,815	302,050	362,752	363,380	577,604	149,932	85,412	64,530	3,792	2,821	3,539,214
	Total	**39,742,671**	**22,784,464**	**7,710,422**	**6,901,759**	**10,973,076**	**6,961,574**	**3,895,139**	**5,029,513**	**76,435**	**51,532**	**46,696,550**

Table 3-4: List of Machinery and Equipment to be used on all Sub-Projects

Machinery/ Equipment	Sub-project Names																											Total
	Kal	Sangar Nadi 2	Mehboob (Haji Fatah)	Shamm	Kotharo	Garrouk	Talango	M-00 (Murad Barijo)	M-01	Chanari & Veer Dam	Babu Khan Dam	Khakhar Dam	Muhammad Yousuf Dam	Aatho Dam	Sanyasi Dam	National Park Dam	Dhani Bakhsh Bikak Dam	Sundi Nai (Bahi Khan Goth) Dam	Thado Nai (Chhuto Goth) Dam	Abdullah Kanro Dam	Mathal	Haji Imam Baksh	Moidan-2	Moidan Nadi	Vaan Khand	Saan-2	
Loader	4	3	3	3	4	3	3	4	3	4	4	3	3	3	4	3	3	4	3	4	4	4	3	3	4	3	**89**
Tractor Trolley dumper	7	5	6	5	7	6	6	7	5	7	5	5	6	5	7	6	6	7	5	7	5	7	6	6	7	5	**156**
Earth leveler machine	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**52**
Excavator	3	2	2	2	3	2	2	3	2	3	2	2	2	2	3	2	2	3	2	3	2	3	2	2	3	2	**61**
Transit Mixtures	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**78**
Batch Plant	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**26**
Total	20	16	17	16	20	17	17	20	16	20	17	16	17	16	20	17	17	20	16	20	17	20	17	17	20	16	**462**

Table 3-5: Estimation of Required Manpower

Sr. No.	Type of Manpower	Sub-project Names																										Total
		Kal	Sangar Nadi 2	Mehboob (Haji Fatah)	Shamm	Kotharo	Garrouk	Talango	M-00 (Murad Barijo)	M-01	Chanari & Veer Dam	Babu Khan Dam	Khakhar Dam	M Yousuf Dam	Aatho Dam	Sanyasi Dam	National Park Dam	Dhani Bakhsh Bikak Dam	Sundi Nai (Bahi Khan Goth) Dam	Thado Nai (Chhuto Goth) Dam	Abdullah Kanro Dam	Mathal	Haji Imam Baksh	Moidan-2	Moidan Nadi	Vaan Khand	Saan-2	
1	**Construction Supervisor**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**26**
2	**Environment, HSE, Ecologist & Social Safeguard Staff**	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	**104**
3	**Surveyor**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**52**
4	**Skilled laborer**	4	4	5	3	3	4	3	4	5	3	5	5	4	4	5	3	3	4	3	4	5	3	5	5	4	5	**105**
5	**Semi-skilled laborer**	8	7	8	5	5	6	8	5	5	8	4	6	6	7	8	5	5	6	8	5	5	8	4	6	5	5	**158**
6	**Unskilled laborer**	10	8	10	15	10	8	10	8	8	12	10	10	8	8	10	15	10	8	10	8	8	12	10	10	8	8	**252**
7	**Drivers/operators**	5	5	6	5	6	6	6	7	6	5	5	8	6	5	6	5	6	6	6	7	6	5	5	8	7	6	**154**
Total		**34**	**31**	**36**	**35**	**31**	**31**	**34**	**31**	**31**	**35**	**31**	**36**	**31**	**31**	**36**	**35**	**31**	**31**	**34**	**31**	**31**	**35**	**31**	**36**	**31**	**31**	**851**

The contractor will be bound through the contractor's code of conduct and contractual obligations to provide jobs to local people for unskilled labor from the communities. If local unskilled labor is not available in the sub-project area, then the contractor can hire from outside the project area. Local operators/drivers will be preferred with valid driving licenses having experience driving vehicles like (trucks, dumpers, dozers, and stone, cement & steel carriers, etc.). This process would be initiated with the consultation of elders of different communities in an equitable manner hence there would be no need to set up a large-scale camp[3].

The workforce requirement is based on the best estimates and is subject to revision. The final requirement would be determined after the finalization of bid documents by the contractor(s)

3.2.4 Contractor's Camps

For the construction of the sub-project, small scale camp/s will be established on the government land near the subproject area a minimum of 500 m away from settlements to house 15-25 individuals. The contractor will prepare workers' code of conduct plans and Camp layout plans and get them approved by the Resident Engineer and PIU. The camp will be established after the approval of the layout plan. The size of the camp would be 3 acres and after completion of the project, this will be restored to the previous conditions. Location with the coordinates of the camp area are given in Figure 3-1 to 3-26.

Keeping in view the number of settlements and labor pool small number of local labors will go back to their homes after completion of daily work including drivers, operators and semi-skilled labors, for outside labors residential accommodation with requisite amenities will be provided.

The contractor will be bound to provide facilities like dormitories, kitchen/washing/bathing/ latrine with septic tanks and medical checkups (including communicable disease related) to laborers. The health screening of laborers and workers will be conducted at the start of the project. The contractor will prepare workers' code of conduct plans and Camp layout plans and get them approved by the Resident Engineer and PIU for implementation at the site. The camp will be established after the approval of the layout plan. All these interventions have been discussed and a consensus was built from the community during the public consultations.

3.2.5 Borrow Material

The fill for the earthwork can be obtained from borrowed areas where suitable soil is available. The Contractors will identify them borrow areas as per their arrangement and get approval from PIU. The contractor will be bound to procure the material from authorized quarries. Before the start of the work, the contractor will get approval. Priority will be given to getting the earth fill material from the licensed contractors, where the use of agricultural land is unavoidable private land will not be taken until a prior written agreement (with local tradition) and documentation of relevant details of compensation (on prevailing market rates)

[3] Very small = less than 10, Small= 11 to 20, Medium= 21-50, large = 51 to 200, very Large = more than 200

are signed between the owner/s and relevant authorities. For reference, the list of authorized queries areas is given in Table 3-6:

Table 3-6: List of Authorized Queries Areas

S. No	District	Name	Quarry Code
1	Sukkur	Rohri Lime Stone	SIN-252
2	Khairpur	Ubhan Shah	SIN-243
3	Sanghar	Khaddro Soil Quarry	SIN-211
4	Jamshoro	Goth Akro Quarry	SIN-052
5	Jamshoro	Indus River dunes	SIN-053

3.2.6 Construction Time

The execution works of the sub-project are proposed to be completed in the stipulated time (PIU determined to ensure project completion in 1 year) after the approval of PC-1 and the bidding process according to the procurement plan approved by the World Bank.

4. ANALYSIS OF ALTERNATIVES

4.1 Selection of Dam Site Location

The proposed small dam sites were identified/scrutinized within the project area. Initially, the dam sites were identified based on GIS studies and reconnaissance surveys. Field observations and preliminary data were collected during the reconnaissance survey.

4.1.1 Criteria for Selection of Dam Sites

In the process of identification/selection of the most suitable dam sites, the criteria mentioned below have been adopted:

Technical Criteria

- A reasonable catchment size in order to generate sufficient runoff.
- A good storage site from a topographical point of view.
- The valley bed on the upstream side should not have a steep slope. A gorge that widens further upstream would be favorable.
- Impervious valley sides and a rather shallow valley fill for storage dams and in the case of groundwater recharge dams, groundwater flows below and around the storage structure must be minimized, as they could cause scouring and finally the failure (break) of the structure.
- Absence of major geologic faults at the proposed dam site.
- Easy access to the site would be advantageous and cost-effective.

The Consultants have undertaken a reconnaissance survey for a selection of sites. Subsequently, rapid Socio-Environmental and Ecological Assessment of these sites has been carried out before final selection.

4.1.2 Rational for the Proposed Small Dam Project

The construction of proposed small dams in this sub-project area will supplement the habitat, which ultimately supports food and shelter for fauna and flora. The freshwater reservoir will provide support to primary producers like free-floating algae (phytoplankton), which is the source of food for primary consumers (Zooplankton) and secondary consumers. This food chain provides the ultimate feeding source for associated fauna as well as water birds in terms of habitat expansion in the area.

The operation phase of the proposed dams will create a positive impact on land use and ecology in terms of enhanced vegetation cover & habitat restoration due to the availability of water. With reference to a research paper published in Civil Engineering Journal on Land Covers Change Assessment After Small Dam's Construction Based on the Satellite Data (Accepted 08 March 2019). A study conducted by the Small Dam Organization (Sindh Irrigation Department) named performance evaluation of small dams in Sindh province in April 2020 also endorsed this aspect.

The present 26 dam sites have been selected considering findings of the reconnaissance survey & recommendations of the previous studies by following criteria as given below:

Selection Criteria	Status
(i) The dam is located in a water-scarce area, which solely depends for water on groundwater and rain runoff for drinking and agriculture purposes.	(i) All 26 proposed dams are located in water-scare areas of Sindh Province.
(ii) Dam can either: a) Effectively recharge groundwater or b) Create a storage pond that will supply water for a longer period of time	(ii) All of the proposed dams are groundwater recharge and Flood detention dams
(iii) The topographical and geotechnical conditions at the dam site provide suitable conditions for a safe and economical structure.	(iii) The topographical and geological conditions at all 26 dams are such that they provide the most economic and safe dams.
(iv) The negative effect of the dam on lower riparians is negligible.	(iv) The proposed dams will help prevent loss of lives and damage caused by flooding
(v) There should be a minimum negative social or environmental impact of the dam or on the other hand, there must be a positive long-term positive impact on environmental and social conditions.	(v) This is true for all sub-projects.
(vi) No or small land acquisition or resettlement is involved due to the construction of the dam.	(vi) In all 26 dams no land is to be acquired and no resettlement is involved, as all sub-projects will be built on lands owned by the Revenue Department, Government of Sindh and there are no settlements, which need to be displaced nor even any farm or agricultural land will be impacted.
(vii) The project must be economically viable.	(vii) The economic analysis has shown that the sub-projects are economically viable.

An analysis of alternatives has been performed to review and assess different ways of meeting the project objectives that might have fewer environmental or socio-economic impacts.

This section presents an overview assessment of the impacts of each option under the following categories:

- Economic;
- Environmental; and
- Social

For the alternatives considered in this chapter, each category is assigned an impact significance according to the criteria given in Table 4-1.

Table 4-1: Determination of Impact Significance

Impact Magnitude	Impact Significance	
	Short-term Duration	Long-term Duration
Major Positive	Moderate Positive	Major High Positive
Moderate Positive	Minor Positive	Moderate Positive
Minor Positive	Negligible	Minor Positive
Neutral	Negligible	Negligible
Minor Negative	Negligible	Minor Negative
Moderate Negative	Minor Negative	Moderate Negative
Major Negative	Moderate Negative	Major Negative

4.2 The Available Alternatives for Sub-projects

The subject small dams are planned to be constructed in water scare areas of Malir & Jamshoro. The proposed small dams will primarily contribute to the provision of safety from flash floods to communities as well as water availability during the dry period by recharging underground aquifers and the formation of storage ponds.

To develop resilience against draughts the following alternatives may be considered:

Option 0: Do nothing

Option 1: Construction of Gabion Dams

Option 2: Construction of Diversion Dams

Option 3: Construction of Small Earthen Dams with proper overflow Spillways

4.2.1 Option 0: No Project Alternative

In the No Project Scenario, the following issues are expected to continue:

- Communities will suffer the hardships of a flash flood, particularly.
- Due to flood damages, local people (Communities from flood-affected areas) may resort to migrations, which may increase social problems and economic burdens.
- Due reduction in crop production and livestock mortality people may experience loss in income and experience impoverishment, and may even resort to social vices such as armed robbery, etc to earn money.

4.2.2 Option 1: Construction of Gabion Dam

Gabion dams are the structures constructed across rivers / nallas / nais by placing stones in boxes/crates of steel wire mesh is an option to obstruct flows of water and recharge groundwater. This option is considered not suitable for the purpose for the following reasons.

- Gabion dams do not have a long life. The steel meshes are rusted and enclosed stones get washed away during nalla / river flows.
- Gabion dams are vulnerable to vandalism. People cut the mesh wires and steal them for their use. A broken gabion gets easily damaged and washed away by subsequent flows.
- The heights of gabions are not kept more than 6 to 10 feet. The required heights of subproject dams vary from 16 to 23 feet.
- The gabion dams can be used as recharge delay action dams only. Due to their porous body, the gabion dams cannot be used as storage dams.

In view of the above reasons, the gabion dams are not considered technically feasible for the subprojects.

4.2.3 Option 2: Construction of Diversion Dams

The small diversion dams can be constructed to access rivers/nallas to divert river flows to adjoining lands for spate irrigation. There are the following observations on this option:

- This option is suitable in cases where river / nallas flow for a long duration of time. Whereas in arid zones of Sindh, the rains are very scanty and are of short duration.

However, discharges in Nais / Nallas are very high but occur for a period of 7 to 15 days a year. Therefore, this type of dam will not be beneficial.

- There are chances that the diversion of flow may become uncontrolled, which may badly inundate the adjoining crops and villages and may create a shortage of water in the downstream area.

Due to the above reasons, the diversion dam option is not adopted for the sub-projects.

4.2.4 Option 3: Construction of Dams

These dams can be constructed to 16 to 29 ft in height. Normally water remains in these reservoirs for a period of 2 to 3 weeks. The recharged groundwater is also safe from loss by evaporation and impurities. In these dams, though there will be some loss in evaporation, still surface water will be available for 5 - 6 months.

The dams shall be constructed as earth-fill embankments using local materials of earthfill, fine and coarse filters and stone protection. Where large-size stones are not available for riprap for upstream slope protection, they can be obtained from limestone quarries. A concrete spillway will be provided in the central part of the dam to allow safe passage of high river flow. These types of small dams are very useful, use local materials and the construction industry, store more water for a long duration of time in the form of groundwater recharge, and are thus recommended as the most suitable option to achieve the project objectives.

Table 4-2 reviews the alternative interventions considered to improve resilience against flash floods and water scarcity in the sub-project area.

Table 4-2: Analysis of Alternatives: Construction of Small Dams

Option No.	Action	Economic Impacts		Environmental Impacts		Social Impacts	
		Positive	Negative	Positive	Negative	Positive	Negative
0	Without project	None	• Cost of relief to be provided during draughts (major, long term) • Loss of structures, agriculture production and livestock (major, long-term)	• No disturbance to the environment (neutral)	• Loss of trees, crops, and livestock (major, long-term) • Biodiversity loss due to disease proliferation via habitat destruction. Many insects and smaller mammals are particularly vulnerable to flooding because the excess water and rainfall interrupt their hibernation patterns, deprive them of a food source and even drown them. • The impact of flood happened in the form of changes in tree cover, substrate embeddedness, sediment deposition, riffle frequency and bank stability	None	• People and livestock will face hardships to due to flash flood damages. There will be more losses to the fertile soil erosion, habitat destructions, and damages to public amenities like link roads, electricity poles, and local human settlements etc.
1	Construction of Gabion Weir for groundwater recharge	• Employment during construction (Moderate, short term) • Increase in crop production and livestock (Moderate, short term as compared to Options 2 and 3)	• Moderate capital cost to implement (Moderate short term); • Due to the short life not more than 5-7 years the benefit will be short-lived • Due to short heights, the economic benefits will be low (moderate long term) • Storage of water not possible (major, long	• Improvement in water availability (Moderate, short term as compared to Options 2 and 3) • Improvement in crop production Moderate, short term as compared to Options 2 and 3) • Improvement in ecology, and green cover (Moderate, short term as compared to Options 2 and 3)	• Felling trees in construction area (Moderate short term); • Quarrying of stone (Minor long-term) • Greenhouse gas emissions from machinery during construction (Minor short term)	• Resilience against draught (Moderate, short term as compared to Options 2 and 3) • Improvement in standard of life (Moderate, short term as compared to Options 2 and 3)	• Minor loss of displacement of people due to stone pitching and widening of bunds (Minor long-term) • Construction stage disturbance (Moderate short term)

Option No.	Action	Economic Impacts		Environmental Impacts		Social Impacts	
		Positive	Negative	Positive	Negative	Positive	Negative
			term) • Short-lived benefit			• Reduction in migration of communities (Moderate, short term as compared to Options 2 and 3)	
2	Construction of diversion dam	As for Options No. 1	• Moderate capital cost to implement – higher than alternative #3(Moderate short term); • Moderate on-going maintenance costs(Moderate, long term) • Due to reduction floods in a downstream reduction in crop production and livestock in the downstream area	As for Options No. 1	• Felling trees on new alignment (Moderate short term); • Quarrying of stone (Minor long term) • Transport of earth material(Minor short term); • Air emissions from heavy machinery during construction Negative Positive Negative (Minor short term) • Serious decrease in water flows on the downstream affection of human life and ecology	As for Option No. 1	• Borrow areas and construction of structures (Major, long term); • Construction stage disturbance (Moderate, short term) • Downstream populations may face a series of shortages of water supply resources for their livelihood
3	Construction of Recharge / Storage Dam of Earthen Dam with Concrete Spillway	• Increased economic activities • Prolonged availability of water	Same as Option 2 • High capital cost to implement – higher than alternative #2 (Major, long term); • Moderate on-going maintenance costs(Moderate, long term)	• Increase in greenery and plantation (after implementation) • Due to groundwater recharging water will be available for a longer time. • Only some amount of water of Nai will be stored/recharged, the remaining water will overspill.	• Felling trees on new alignment (Moderate short term); • Quarrying of stone (Minor long term) • Air emissions from heavy machinery during construction(Minor short term)	• As for Option No. 2 but more than Option 2 and 3.	• Moderate loss of land to be acquired due to establishment of borrow areas and embankments (Major long term);

5. DESCRIPTION OF ENVIRONMENT

5.1 Introduction

This section describes the existing environmental and socio-economic conditions of the SCRP project area. The environmental and social baseline aims to provide a baseline against which the project impacts can be measured. This section also identifies protected areas, and sensitive flora and fauna receptors in the project area[4].

5.2 Physical Environment

5.2.1 Geography

Sindh can be divided into four distinct parts topographically: Kirthar range on the west, a central alluvial plain bisected by the Indus River in the middle, a desert belt in the east and south-east, and the Indus delta in the south Figure 5-1. The proposed small dams are located in the Kohistan region. The geographical features of these areas are described below.

Kohistan Region

Proposed sub-projects are lying in Southern Sindh, between the Western hills of Kirthar range and the right bank Command area of Sukkur barrage.

It is a strip of land that, during the monsoon period, is irrigated by rain/floodwaters but when the floodwaters recede in the Nai, this again becomes dry and barren. If water is provided by the conservation of the floodwater of nai, the conditions could be improved to a great extent. The rim of the cup-shaped mountainous range around Manchhar Lake forms the upper or Northern part where the Nais water enters the Lake.

5.2.2 Geology

The area of the various sites lies in the central and lower Kirthar Ranges, which are technically disturbed having parallel anticlines and synclines running almost north-south (Figure 5-2). The geological formations in the reported area are covered with Miocene and Oligocene formations.

1. Recent to Sub-recent
2. Manchar formation
3. Gaj formation
4. Nari formation

The oldest formation in the area is Nari, which belongs to Oligocene. The Nari formation is dominantly comprised of yellowish-brown, fine to coarse-grained sandstones interbedded with layers of shales/silts and arenaceous limestones. Gaj formation is dominated by brackish limestone, sandstone, and shales of variegated gray and gypsiferous.

[4] limitation of site specific data/availability

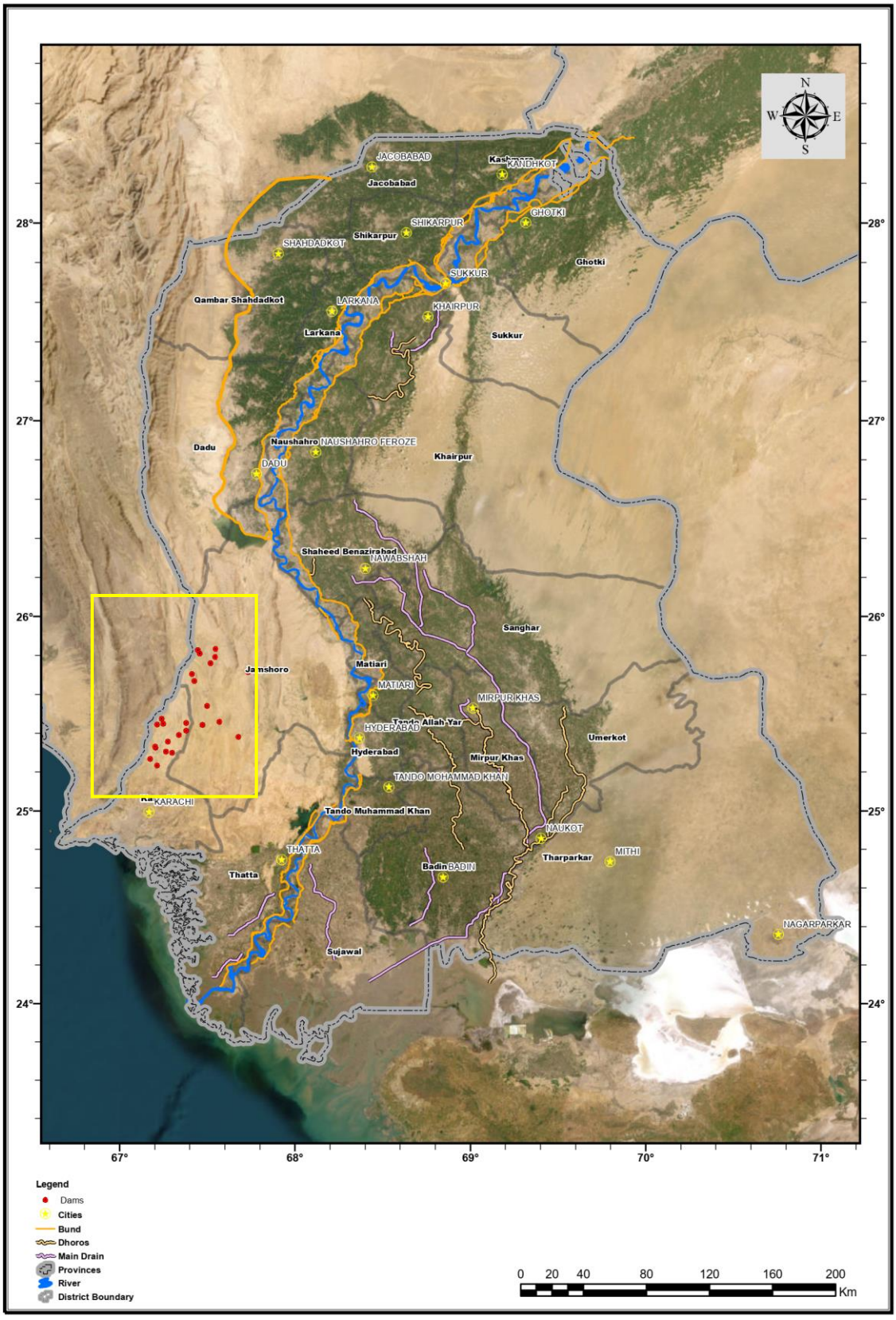


Figure 5-1: Geographical Map of Sub-Project Area

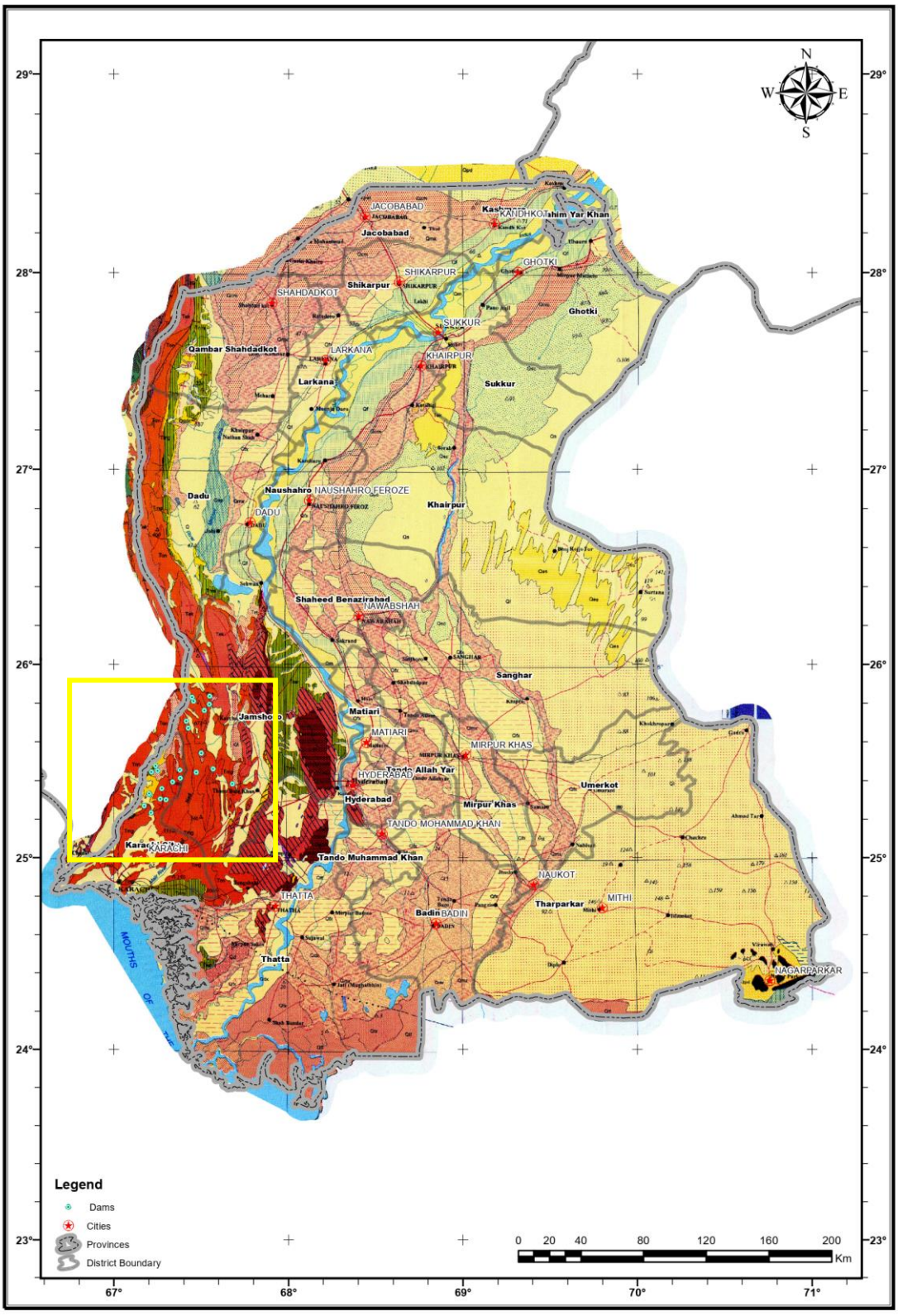


Figure 5-2: Regional Geological Map of Sub-Project Area

The Machar formation contains brownish sandstone and shale with the conglomerate. At places in foothill regions where the stream flows through sub-recent and recent deposits consist of sand, silt, and gravel. The geology is complex and Oligocene & Miocene formations are not easily recognized. The formations are dipping in general towards the west at about 15 to 25 degrees.

5.2.3 Soils

According to a reconnaissance soil survey carried out by the Soil Survey of Pakistan, generally, the area likely to be occupied by the proposed subproject comprises the hilly sandy soil of the Aeolian desert. Specifically, in places, rock outcrop is covered with gravel and rock land and valley soil is mainly loamy soil.

The soils in the plain near the subproject sites have a homogenous porous structure, mainly silt and fine silt clayey, strongly calcareous with 18-20 % lime content uniformly distributed in the profile. Small patches contain shallow or very shallow, strongly calcareous, gravely, and stony loams. While the soils afford very sparse shrub and grass vegetation offering limited grazing, the rocky outcrop only has a water catchment value.

5.2.4 Seismicity

The map shown in Figure 20 indicates that all of the sub-project areas are falling in Zone 2A & 2B, with peak ground acceleration (PGA) varying from 0.8 to 0.16 & 0.16 to 0.24 (Pakistan Building Code of Pakistan, 2007). It is a low-damage risk zone, meaning the areas that fall under these zones have a low chance of having an earthquake. While no site is falling in Zone 4 which is called the High Damage Risk Zone and covers areas liable to MSK VIII. Moreover, the World Bank dam expert will review all structure designs.

5.2.5 Climate & Rainfall

The climate of Sindh is arid and hot. According to the classification made by UNESCO, the region has been divided into three zones: Coastal- South of Thatta; Southern- from Thatta through Hyderabad to Nawabshah; and Northern-from Nawabshah to Jacobabad. In an average year, sub-project sites receive rainfall ranges 01 mm to 41 mm (0.3 – 1.6 inches (Figure 5-3) The climatological conditions of the proposed subproject areas are represented by the following meteorological station (Table 5-1).

Table 5-1: Nearest Meteorological Stations

Name of Proposed Small Dams	Meteorological Station
At Taluka Tanu Bula Khan; Kal, Sangar Nadi 2, Haji Foto, Shamm, Kotharo, Garrouk, Talango, M-00 (Murad Barijo), M-01, Chanari Veer Dam, Babu Khan Dam, Khakhar Dam and Muhammad Yousuf Dam.	Hyderabad
At Gadap Taluka; Aatho Dam, Sanyasi Dam, National Park Dam, Dhani Bakhsh Bikak Dam, Sundi Nai (Bahi Khan Goth) Dam, Thado Nai (Chhuto Goth) Dam, Abdullah Kanro Dam, Mathal, Haji Imam Baksh, Moidan-2, Moidan Nadi, Vaan Khand and Saan-2.	Karachi

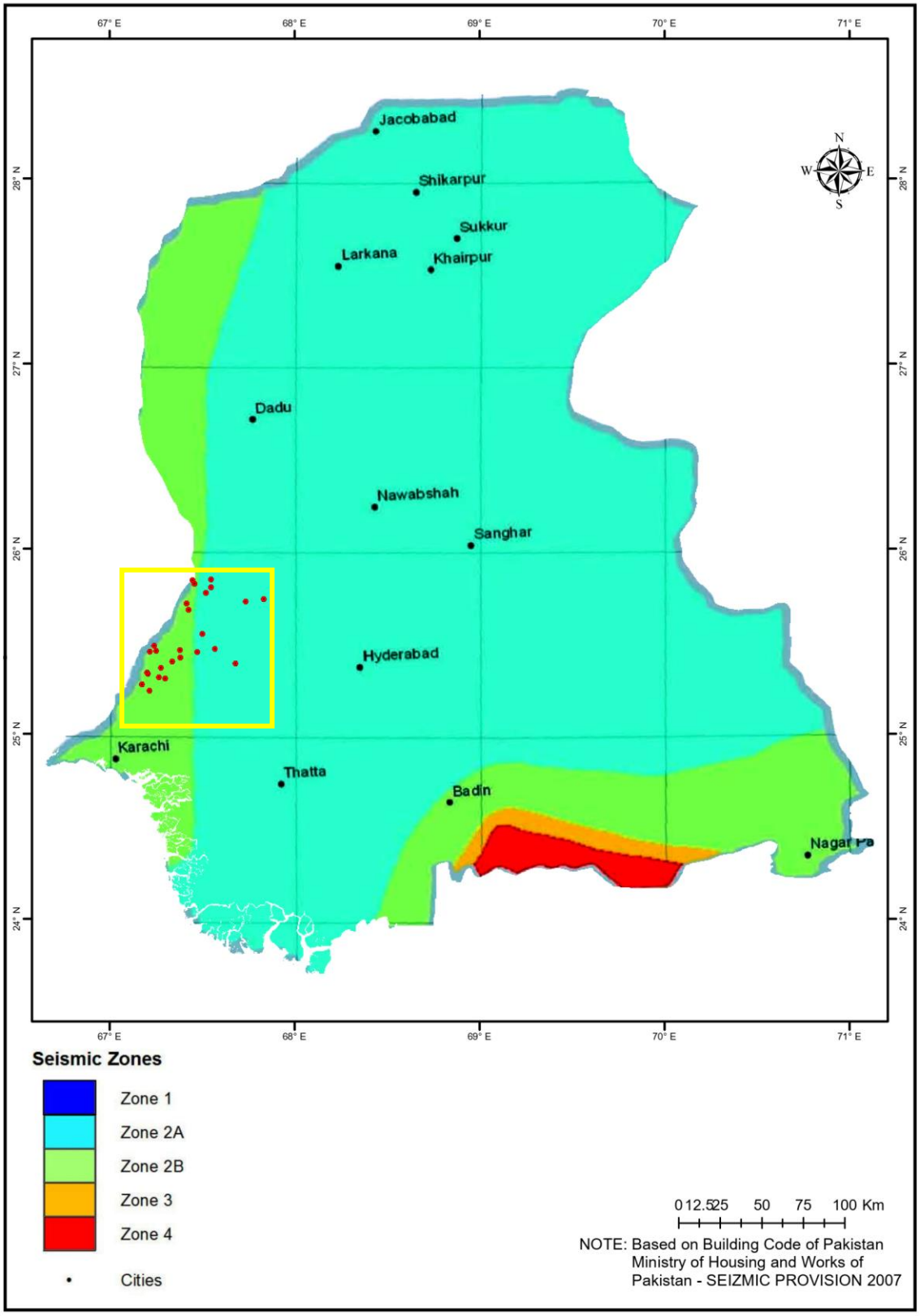


Figure 5-3: Seismic Zones of the Sub Project Area

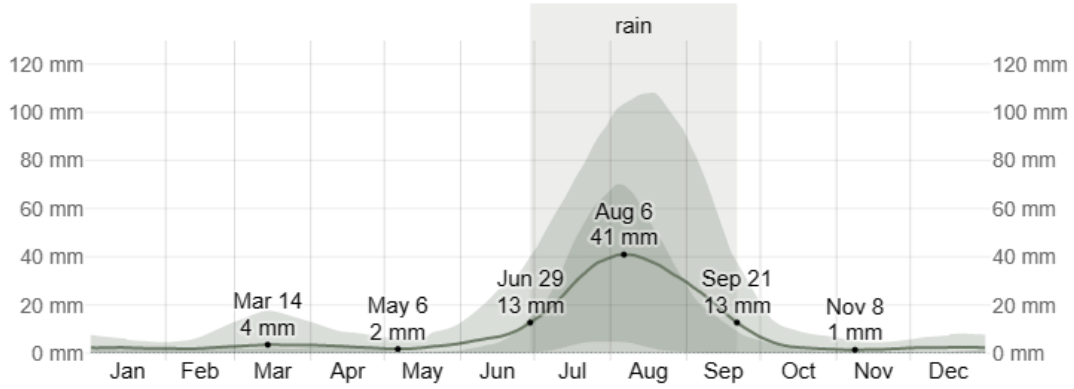
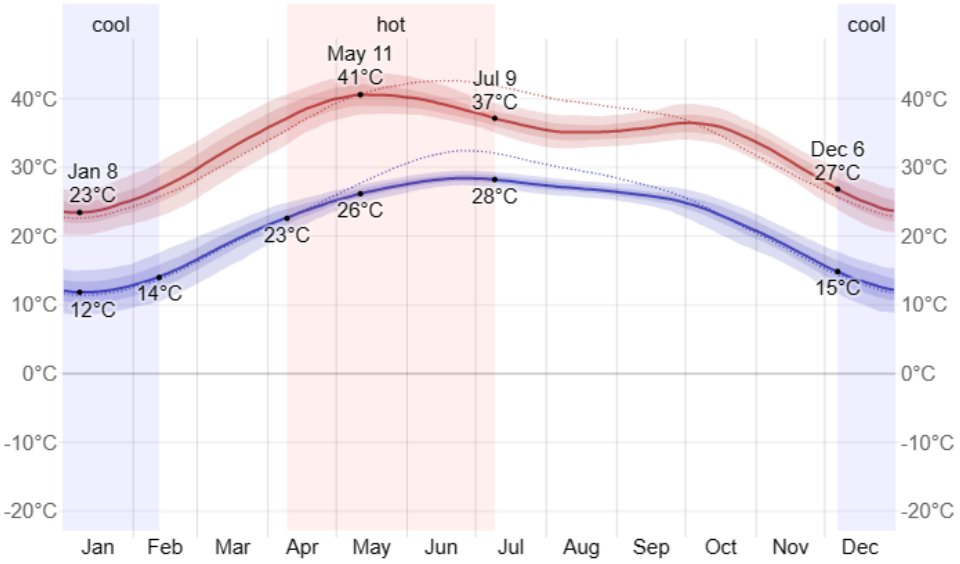


Figure 5-4: Monthly Average Rainfall

The hot season lasts for 3.0 months, from April 9 to July 9, with an average daily high temperature above 37°C. The hottest month of the year is June, with an average high of 39°C and a low of 28°C.

The cool season lasts for 2.2 months, from December 6 to February 12, with an average daily high temperature below 27°C. The coldest month of the year is January, with an average low of 12°C and a high of 24°C (Source: www.weatherspark.com).



Note: The daily average high (red line) and low (blue line) temperature. The thin dotted lines are the corresponding average perceived temperatures.

Figure 5-5: Monthly Average Temperature

The windier part of the year lasts for 4.9 months, from April 19 to September 16, with average wind speeds of more than 4.9 meters per second. The windiest month of the year in the district is June, with an average hourly wind speed of 7.0 meters per second. The calmer time of year lasts for 7.1 months, from September 16 to April 19. The calmest month of the year is November, with an average hourly wind speed of 2.9 meters per second.

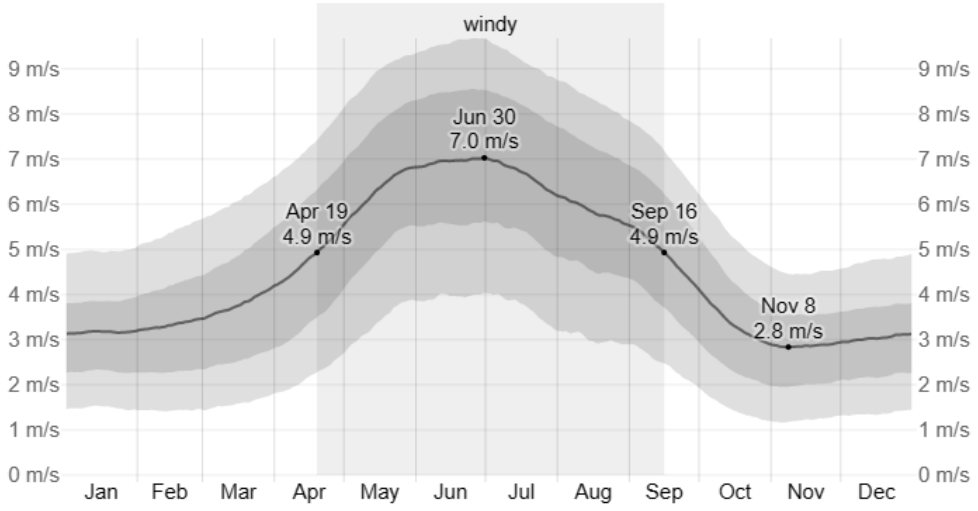


Figure 5-6: The Average of mean Hourly Wind Speeds

The wind is most often from the west for 8.4 months, from February 21 to November 2, with a peak percentage of 84% on May 14. The wind is most often from the north for 3.7 months, from November 2 to February 21, with a peak percentage of 68% on January 1.

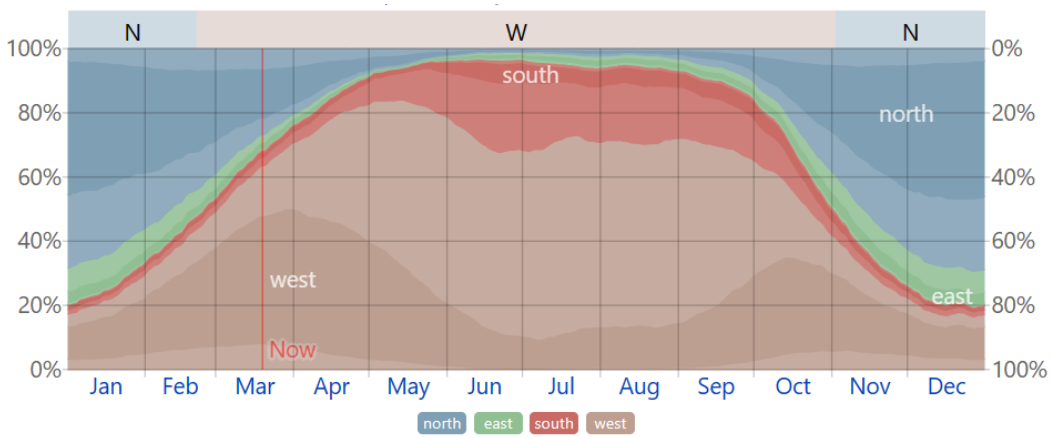


Figure 5-7: Mean Wind Direction

The district experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 5.8 months, from April 22 to October 14, during which time the comfort level is muggy, oppressive, or miserable at least 25% of the time. The month with the muggiest days in the area is July, with 30.3 days that are muggy or worse. The month with the fewest muggy days in the areas is January, with 0.1 days that are muggy or worse. (Source: www.weatherspark.com)

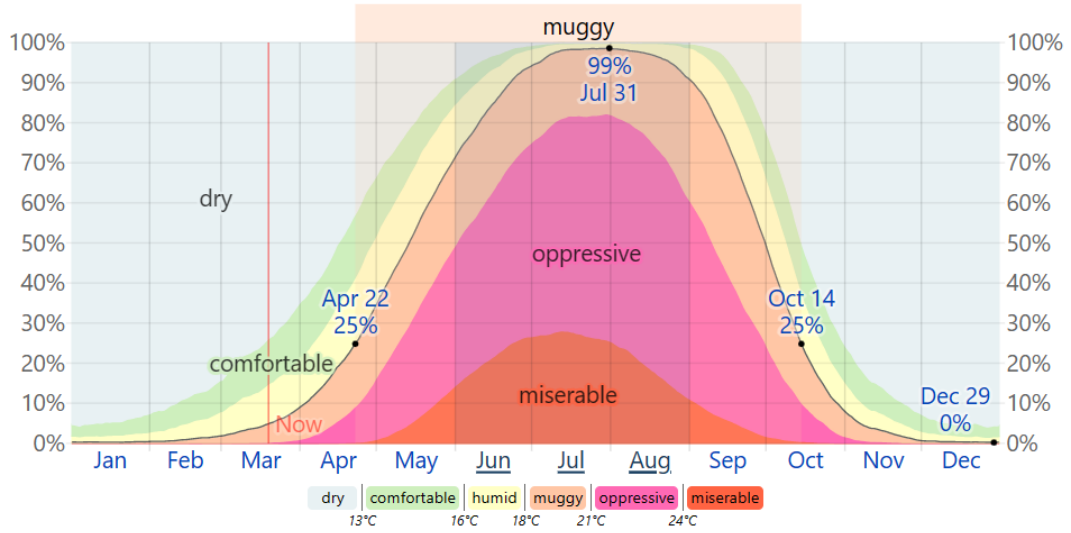


Figure 5-8: Relative humidity of the Subproject Area

5.3 Baseline Environmental Monitoring

Nest Lab experts conducted representative sampling from various locations within the sub-project area, with analysis performed at the SEPA-approved Evergreen Environmental Laboratory. Monitoring locations were selected with careful consideration of sensitive receptors, finalized during the baseline survey, site walkover, and visits to surrounding areas. The samples were tested according to the Sindh Environmental Quality Standards - 2016 (SEQS). Results are detailed in Tables 5-3 to 5-5 for drinking and surface water analysis.

The sub-project areas are in sparsely populated rural regions with no industrial or commercial activity. Dust emissions, primarily caused by vehicular traffic on dirt roads, have localized effects. Water quality, ambient air quality, and noise levels will be monitored at each site before the commencement of civil work by the contractor, after approval from the Project Implementation Consultants' Environmentalist. The rationale for the baseline environmental monitoring is provided in Table 5-2.

Table 5-2: Rationale for the Baseline Environmental Monitoring

Sr. No	Monitoring Parameters	No. of samples	Rationale
1	Ambient Air	52	One from the proposed camp area, one from each proposed dam site
2	Drinking Water/Ground Water	26	One from the proposed camp area
3	Waste/Surface Water	-	Subject to availability as the streams are non-perennial
4	Noise	78	one from proposed dam site and 2 from nearby Socially sensitive receptor

5.3.1 Water Resources and Quality

i. Groundwater

One of the impeding factors for irrigated agriculture in Sindh is the brackish groundwater. More than 80% of the irrigated land in Sindh is underlain with brackish water unfit for agriculture. The shortage of irrigation water coupled with drought conditions in Sindh has increased the importance of groundwater exploitation wherever freshwater is available.

In subproject areas, precipitation is the main source of the natural recharge of groundwater. These streams are mostly non-perennial and water passes through them in the form of flash floods after rainfall. Depending on local conditions, the duration of such floods varies from a few hours to a few days. The recharge of groundwater is a safe, inexpensive, and reliable technique to improve the quality of water. It is also reported that watershed vegetation measures can add an average of 33% more to the groundwater recharge. Hence, the construction of proposed small dams will increase the vegetation cover and consequently recharge the capacity of the catchment as well.

ii. Surface and Groundwater Analysis

The samples were tested as per Sindh Environmental Quality Standard - 2016 (SEQS) The analysis shows that all the toxic metals are below the limits except turbidity (because surface water has been used for drinking) & salt contents (due to natural strata of the region).

Table 5-3: Drinking Water Analysis

S. No	Parameters	SEQS limit	Unit	Babu Khan Dam	Channari & Veer Dam	Khakhar Dam	Muhammad Yousuf	Thado Nai	Aatho Dam	Abdullah Kanro Dam	Dhani Baksh Dam	National Park-2 Dam	Sanyasi Dam	Sundai Nai Dam
1	pH value	6.5-8.5	SU	7.1	7.2	7.4	6.8	7.4	8	8.2	7	7.2	7.8	7.2
2	Odor	Acceptable	Physical	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
3	Taste	Acceptable	Physcal	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
4	Color	≤15	TCU	0.5	2	0.3	0.1	0.4	0.3	5	0	0	0.2	3
5	Turbidity	<5	NTU	0.1	0.1	0.1	0.1	0.2	1	0.3	0	0	0.1	0.1
6	Total Dissolved Solids	<1000	mg/l	338	444	1210	1260	1060	347	1210	2780	3890	1550	1030
7	Total Hardness as CaCO3	<500	NTU	125.3	218.6	263.4	245.3	125.3 298.1	175	325.4	484.2	463.1	264.3	185.6
8	Fluoride	<1.5	mg/l	0.078	0.157	0.284	0.245	0.084 0.352	0.842	0.412	1.1543	1.352	0.325	0.463
9	Chloride	<250	mg/l	217.3	229.5	325.1	298.4	121.6	201.5	412.1	314.2	365.2	231.9	229.4
10	Nitrate (NO3)	≤50	mg/l	2.9	3.1	3.4	4.9	2.3	2.1	2.9	4.3	5.6	2.9	2.5
11	Nitrite (NO2)	≤3	mg/ L	0.63	0.52	0.872	0.78	0.28	0.596	0.985	0.745	0.854	0.724	0.852
12	Cyanide (as CN-) total	≤0.05	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Phenolic Compound as (Phenols)	-	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14	Aluminum (Al)	≤0.2	mg/l	0.0096	0.0063	0.00784	0.0095	0.0055	0.00432	0.00695	0.00474	0.00653	0.00854	0.00635
15	Antimony (Sb)	≤0.005	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Arsenic	≤0.05	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0286	0.0498	BDL	BDL
17	Cadmium	0.01	mg/l	0.0055	0.0038	0.00728	0.00723	0.0035	0.00463	0.00584	0.00421	0.00854	0.00721	0.00596
18	Chromium	≤0.05	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Copper	2	mg/l	0.096	0.025	0.0725	0.0694	0.047	0.0102	0.0639	0.0287	0.0398	0.0528	0.0468
20	Lead	≤0.05	mg/l	0.0074	0.0074	0.00658	0.00725	0.0042	0.00711	0.00521	0.00412	0.00332	0.00596	0.00594
21	Mercury	≤0.001	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Selenium	0.01	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Nickel	≤0.02	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Boron	0.3	mg/l	0.063	0.092	0.0425	0.0715	0.039	0.0428	0.0496	0.0824	0.0985	0.0296	0.0384
25	Residual Chlorine	0.2-0.5 at consumer End	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
26	Zinc	5	mg/l	0.55	0.55	0.77	0.77	0.72	0.59	0.69	0.355	0.436	0.38	0.45
27	Manganese	≤0.5	g/l	0.37	0.051	0.0596	0.0632	0.081	0.0463	0.0532	0.0321	0.0301	0.0396	0.0485
28	Barium	0.7	mg/l	0.0043	0.0048	0.00684	0.00798	0.0042	0.00584	0.00814	0.00411	0.00598	0.00429	0.00632
29	Pesticides	-	Mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/l	ND	ND	ND	Nd	ND	ND	ND	ND	ND	ND	ND
31	Total Coliform	0 cfu/100ml	cfu	0	0	0	0	0	0	0	0	0	0	0
32	Fecal Coliform	0 cfu/100ml	cfu	0	0	0	0	0	0	0	0	0	0	0
33	Escherichia Coli (E-Coli)	0 cfu/100ml	cfu	0	0	0	0	0	0	0	0	0	0	0

Table 5-4: Surface Water Analysis Results

S. No	Parameter	Analysis Method	SEQS Limit	Khakhar Dam	Muhammad Yousuf Dam	Thado Nai Muhammad	Channari & Veer Dam	Abdullah Kanro Dam
1	Temperature	SMWW 2550 B	≤ 3oC	26	32	24	27	8.2
2	pH	SMWW 4500 H+ B	9-Jun	7.2	7.3	7.5	7.7	7.2
3	Biochemical Oxygen Demand - BOD5)	SMWW 5210-B	250 mg/l	93.1	78.9	112.1	115.3	128.2
4	Chemical Oxygen	SMWW 5220 B	400 mg/l	145.7	124.5	160.7	174.85	210.5
5	Total Suspended Solids (TSS)	SMWW 2540 D	400 mg/l	70.1	69.4	84	76.8	96
6	Total Dissolved Solids (TDS)	SMWW 2540 C	3500 mg/l	1490	1290	1080	321	401
7	Phenolic Compounds (as Phenols)	SMWW 5530 D	0.3 mg/l	0	0	0	0	0
8	Grease and Oil	USEPA 1664 B	10 mg/l	0	0	0	0	0
9	Chlorine (Cl-)	SMWW 4500 Cl- B	1000 mg/l	0	264.3	387.4	110.5	265.3
10	Fluoride (F-)	SMWW 4500 F C	10 mg/l	42.8	0	0	0	0
11	Cyanide (CN-)	SMWW 4500 CN- F	1.0 mg/l	0	0	0	0	0
12	An-ionic Detergents (as MBAs)	SMWW 5540-C	20 mg/l	0	0	0	0	0
13	Sulfate (SO42-)	SMWW 4500 SO4-2 C	600 mg/l	0.0147	55.9	58.7	51.7	43.5
14	Sulfide (S2-)	SMWW 4500 S- 2 F	1.0 mg/l	0.006 32	0	0	0	0
15	Ammoni a (NH3)	SMWW 4500-NH3 D	40 mg/l	0.321	0	0	0	0
16	Cadmium (Cd)	SMWW 3113 B	0.1 mg/l	0.0155	0.0155	0.0132	0.0089	0.0118
17	Chromiu m (Cr)	SMWW 3113 B	1.0 mg/l	BDL	0.00791	0.00598	0.0065	0.00432
18	Copper (Cu)	SMWW 3113 B	1.0 mg/l	0.083 9	0.378	0.411	0.285	0.396
19	Lead (Pb)	SMWW 3113 B	0.5 mg/l	0.036 3	0.0129	0.0163	0.0084	0.0132
20	Mercury (Hg)	SMWW 3112 B	0.01 mg/l	0.004 84	BDL	BDL	BDL	BDL
21	Selenium (Se)	SMWW 3114 B	0.5 mg/l	0.1296	0.0947	0.0564	0.063	0.0474
22	Nickel (Ni)	SMWW 3113 B	1.0 mg/l	0.063 2	0.0325	0.0245	0.0374	0.0296
23	Silver (Ag)	SMWW 3113 B	1.0 mg/l	0.005 38	0.00463	0.00463	0.0068	0.00354
24	Total Toxic Metals	Calculated Value	2	0.00596	0.0729	0.1165	0.157	0.254
25	Zinc (Zn)	SMWW 3111 B	5.0 mg/l	0.32	0.00863	0.0598	0.066	0.0721
26	Arsenic (As)	SMWW 3114 B	1.0 mg/l	0.069 8	0.00732	0.00621	0.0069	0.0721
27	Barium (Ba)	SMWW 3113 B	1.5 mg/l	0.0725	0.263	0.00543	0.0078	0.00596
28	Iron (Fe)	SMWW 3113 B	8.0 mg/l	0	0.0742	0.465	398	0.521
29	Manganese (Mn)	SMWW 3111 B	1.5 mg/l	0.069 8	0.0865	0.0762	0.085	0.0614
30	Boron (B)	SMWW 3113 B	6.0 mg/l	0.0725	0	0.0784	0.079	0.0768
31	Residual Chlorine (Cl2)	SMWW 4500 Cl- B	1.0 mg/l	0	0	0	0	0

While the location coordinates with detailed results in the form of scan reports are appended as Annexure – III.

5.3.2 Air Quality

The sub-project areas are in a sparsely populated area with no industrial or commercial activity. Vehicular traffic on dirt roads causes some dust emissions whose effect is localized. The main pollutants emitted by vehicle exhaust pipes are particulate matter, carbon monoxide, sulphur dioxide, and nitrogen oxides. These emissions generally affect the air quality in the vicinity of the roads. However, traffic on the roads in the sub-project area is low compared to the national highways or other major roads. The ambient air quality tests were carried out in the month of Jan 2023. The results reveal that all parameters are within the permissible limits of SEQS 2016 as depicted in Table 16. Detailed ambient air quality laboratory reports are attached as Annexure – III.

5.3.3 Noise

Proposed sub-projects are in sparsely populated areas where traffic is very less, and no existences of other noise sources are in the reported areas. During the baseline survey ambient noise levels were recorded in the sub-project areas and found within permissible limits of SEQS and WHO standards.

Table 5-5: Ambient Air Quality Results

S.no	Parameters	SEQS Limit	Unit	Babu Khan Dam	Khakhar Dam	Muhammad Yousuf Dam	Thado Nai Muhammad Yaseen Dam	Aatho Dam	Abdullah Kanro Dam	Dhani Baksh Dam	National Park-2 Dam	Sanyasi Dam	Sundai Nai Dam	Thado Nai Dam
1	CO	10	mg/m3	0.8	1.2	0.9	1.1	0.8	1.6	1.2	1.3	0.9	1.1	0.9
2	NO2	80	mg/m3	14.9	14.6	13.7	12.6	14.9	14.9	14.1	15.2	11.3	10.9	12.5
3	NO	40	mg/m3	1.3	1.6	1	1.2	2.3	1.4	2.8	2.5	1.6	1.3	1.9
4	O3	130	mg/m3	4.6	4.3	3.5	5.2	4.7	6.5	5.7	6.1	6.9	4.3	5.9
5	Particular matter (10-Microns)	150	mg/m3	128	110.6	118.3	121.4	115	128.9	123.4	127.9	115.2	119	120.5
6	Particularmatter 2.5	75	mg/m3	30	21	25	28	25	31.5	30.4	32.4	20	23	30.4
7	SPM	500	mg/m3	397	355.1	368.4	274.1	324	352.6	396.4	374.9	296.4	354.2	328.9
8	Pb	1.5	mg/m3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9	SO2	120	mg/m3	8.6	8.1	7.3	9.3	10.7	10.1	10.1	11.5	9.1	8.3	10
10	Noise	75	dB (A)	50.9	44.2	44.9	48.6	46.3	49.3	49.6	34.6	45.1	46.2	46.8

5.4 BIOLOGICAL ENVIRONMENT

To adopt a simplified way of assessments, giving due consideration to the time frame, seasonal representation and also factoring in the climate change scenarios. The project was broadly categorized into 26 dispersed points within the defined boundary of KNP and tagged as the area of primary concern. This has been done considering the consistency in physical and biological concomitants.

The floristic list was prepared on ocular observation, the compiled data was subject to the IUCN red list filter and verification from secondary records mainly from the baseline study of Kirthar National Park by Melbourne Enterprises International Ltd. Each plant species was thoroughly scrutinized for conservation sensitivities.

A similar strategy was adopted for faunal studies, it was mainly based on palate traces and foot of herpetofauna, whereas avian studies were supported by the camera with an appropriate lens mounted on it. The vantage point observations could not be possible within a short span of sampling time, therefore a qualitative assessment was made

The project area has a diverse habitat, which supports a large variety of faunal and floral species. Common animal habitats are mountains, deserts, and wetlands. These habitats support the different species according to their requirements. The following broad categories have been identified for this report focusing on the project areas.

5.4.1 Fauna of the Sub-Projects Area

Field studies conducted in the proposed subproject areas revealed the presence of eight large mammal species, including the Asiatic Jackal, Indian Fox, Red Fox, Honey Badger, and Grey Mongoose. All mammalian species observed are categorized as Least Concern (LC) in the IUCN Red List. In addition, thirteen small mammal species were recorded from microhabitats within the same sites, all of which are also categorized as Least Concerns in the IUCN list. The study area also yielded sightings of two amphibian species and twenty-one species of reptiles, encompassing a Buffo toad, a Skittering frog, six lizard species, three gecko species, two agama species, and four snake species, two of which are venomous (Black Cobra and Krait). These recorded species belong to eleven genera and ten families.

The observation methods included plot searches in microhabitats of each proposed area, supplemented by indirect evidence such as tracks, burrows, skin, and nests, which confirmed the presence of certain species. Additionally, a dead specimen of the Saw Scale Viper and the Black Cobra was encountered in the sub-project area of Kohistan.

A total of sixty-four bird species, including raptors, scavengers, partridges, and other common birds, were documented within the project area. Among them, species such as the Crested Lark, Common Myna, Grey Shrike, Black Redstart, Indian Roller, Indian House Crow, Bush Babbler, and Red-Wattled Lapwing were particularly common throughout the study area. All recorded avian species are of Least Concern (LC) by the IUCN red list. Details of the Fauna of Kohistan in the study area is given in Table 5-6 and a list of avifauna is in Table 5-7 & Figure 5-9 & 5-10.

Table 5-6: Fauna in Study Area

Sr. No.	Common Name	Scientific Name	Conservation status by IUCN
	Large mammals		
1	Asiatic Jackal	*Canis aureus*	LC
2	Indian Fox	*Vulpes bengalensis*	LC
3	Red fox	*Vulpes vulpes*	LC
4	Honey Badger	*Mellivora capensis*	LC
5	Grey Mongoose	*Herpestes edwardsi*	LC
6	Small Indian Mongoose	*Herpestes javanicus*	LC
7	Jungle Cat	*Felis chaus*	LC
8	Indian wild boar	Sus scrofa	LC
	Small mammals		
1	Indian Hare	*Lepus nigricollis*	LC
2	Longeared Desert Hedgehog	*Hemiechinus collaris*	LC
3	Indian Hedgehog	*Paraechinus micropus*	LC
4	Five Striped Palm Squirrel	*Funambulus pennantii*	LC
5	Indian Porcupine	*Hystrix indica*	LC
6	Roof Rat / House Rat	*Rattus rattus*	LC
7	House mouse	*Mus musculus*	LC
8	Little Indian Field Mouse	*Mus booduga*	LC
9	Balochistan Gerbil	*Gerbillus nanus*	LC
10	Indian Gerbil	*Tatera indica*	LC
11	Indian Desert Jird	*Meriones hurrianae*	LC
12	House Shrew	*Suncus murinus*	LC
13	Kuhl's Pipistrelle	*Pipistrellus kuhlii*	LC
	Herpeto-fauna		
1	Indian Garden Lizard	*Calotes versicolor*	LC
2	Yellow-headed Rock Agama	*Laudakia lirata*	LC
3	Black Rock Agama	*Laudakia melanura*	LC
4	Rock Agama	*Laudakia nupta*	LC
5	Brilliant Agama	*Trapelus agilis*	LC
6	Indian Fat-tailed Gecko	*Eublepharis macularius*	LC
7	Keeled Rock Gecko	*Cyrtopodion scabrum*	LC
8	Spotted Indian House Gecko	*Hemidactylus brookii*	LC
9	Yellow bellied House Gecko	*Hemidactylus laviviridis*	LC
10	Indian Fringe-toed Lizard	*Acanthodactylus antoris*	LC
11	Orange tail Skink	*Novoeumeces blythianus*	LC
12	Indian Sand Swimmer	*Ophiomorous tridactylus*	LC
13	Indian Spiny tailed Lizard	*Saara hardwickii*	LC
14	Desert Monitor	*Varanus griseus*	LC

Sr. No.	Common Name	Scientific Name	Conservation status by IUCN
15	Common Sand Boa	*Eryx johnii*	LC
16	Cliff Racer	*Platyceps rhodorachis*	LC
17	Sindh Ribbon Snake	*Psammophis leithii*	LC
18	Royal Snake	*Spalerosophis diadema*	LC
19	Common Krait	*Bungarus caeruleus*	LC
20	Black Cobra	*Naja naja*	LC
21	Saw scaled Viper	*Echis carinatus*	LC
22	Buffo toad	*Buffo stomaticus*	LC
23	Kettering frog	*Euphlyctis cyanophlyctis*	LC
EN = Endangered, CR = critically endangered, VU = vulnerable, L C = least concern, N T = near threatened. R = Resident WV = Winter Visitor M = Migratory PM = Passage Migrant SV= Summer Visitor			

Table 5-7: Avifauna in Study Area

Sr. No.	Common Name	Scientific Name	Conservation status by IUCN
Birds			**Seasonal Status**
1.	Black Kite	*Milvus migrans*	R
2.	Shikra	*Accipiter badius*	R
3.	Asiatic Sparrow-Hawk	*Accipiter nisus*	WV
4.	Common Buzzard	*Buteo buteo*	WV
5.	White-eyed Buzzard Eagle	*Butastur teesa*	R
6.	Imperial Eagle	*Aquila heliacal*	WV
7.	Tawny Eagle	*Aquila rapax*	R
8.	Egyptian Vulture	*Neophron percnopterus*	R
9.	Laggar Falcon	*Falco jugger*	R
10.	Peregrine Falcon	*Falco peregrinus*	WV
11.	Pallid Merlin	*Falco columbarius*	WV
12.	Common Kestrel	*Falco tinnunculus*	WV/r
13.	Grey Partridge	*Francolinus Pondicerianus*	R
14.	Red Wattled Lapwing	*Vanellus indicus*	R
15.	Chestnut-Indian Sandgrouse	*Pterocles exustus*	R
16.	Blue Rock Pigeon	*Columba livia*	R
17.	Ring Dove	*Streptopelia decaocto*	R
18.	Red Turtle Dove	*Streptopelia Tranquebarica*	R
19.	Little Brown / Senegal Dove	*Streptopelia senegalensis*	R
20.	Rose ringed Parakeet	*Psittacula krameri*	R
21.	Common Crow-Pheasant	*Centropus sinensis*	R
22.	Spotted Owlet	*Athene brama*	R
23.	Longeared Owl	*Asio otus*	WV
24.	Syke's or Sind Nightjar	*Caprimulgus Mahrattensis*	R
25.	House Swift	*Apus affinis*	R
26.	Indian Pied Kingfisher	*Ceryle rudis*	R
27.	White breasted Kingfisher	*Halcyon smyrnensis*	R
28.	Sind Small Green Bee- eater	*Merops orientalis*	R
29.	Roller or Blue Jay	*Coracias benghalensis*	R
30.	Hoopoe	*Upupa epops*	WV
31.	Sind Woodpecker	*Picoides assimilis*	R
32.	Ashycrowned Finch-Lark	*Eremopterix grisea*	R
33.	Indian Desert Finch-Lark	*Ammomanes deserti*	R
34.	Crested Lark	*Galerida cristata*	R
35.	Indian Bush Lark	*Mirafra erythroptera*	R
36.	Common Swallow	*Hirundo rustica*	WV
37.	Rufous-tailed or lsabelline Shrike	*Lanius isabellinus*	WV
38.	Grey Shrike	*Lanius excubitor*	R

Sr. No.	Common Name	Scientific Name	Conservation status by IUCN
39.	Rufous-backed Shrike	*Lanius schach*	R
40.	Black Drongo or King Crow	*Dicrurus adsimilis*	R
41.	Rosy Starling or Rosy Pastor	*Sturnus roseus*	PM
42.	Bank Myna	*Acridotheres ginginianus*	R
43.	Indian Myna	*Acridotheres tristis*	R
44.	Tree Pie	*Dendrocitta vagabunda*	R
45.	Sind House Crow	*Corvus splendens*	R
46.	Common Raven	*Corvus corax*	R
47.	White-cheeked Bulbul	*Pycnonotus leucogenys*	R
48.	Red-vented Bulbul	*Pycnonotus cafer*	R
49.	Common Babbler	*Turdoides caudatus*	R
50.	Sind Jungle Babbler	*Turdoides striatus*	R
51.	Long tailed Warbler	*Prinia gracilis*	R
52.	Long tailed Grass Warbler	*Prinia burnesii*	R
53.	Orphean Warbler	*Sylvia hortensis*	PM/ WV
54.	Common White throat	*Sylvia communis*	M
55.	Chiffchaff	*Phylloscopus collybita*	WV
56.	Black Redstart	*Phoenicurus ochruros*	WV
57.	Pied Bush Chat	*Saxicola caprata*	R
58.	Indian Robin	*Saxicoloides fulicata*	R
59.	Blue Rock Thrush	*Monticolas olitarius*	WV
60.	Long-billed Rock Pipit	*Anthus similis*	R
61.	Yellow or Citrine Wagtail	*Motacilla flava*	PM
62.	White or Pied Wagtail	*Motacilla alba*	WV
63.	Purple Sunbird	*Nectarinia asiatica*	R
64.	House Sparrow	*Passer domesticus*	R
65.	Sind Jungle Sparrow	*Passer pyrrhonotus*	R
66.	Black-headed Bunting	*Emberiza melanocephala*	PM
67.	Striped or House Bunting	*Emberiza striolata*	R

EN = Endangered, CR = critically endangered, VU = vulnerable, L C = least concern, N T = near threatened. R = Resident WV = Winter Visitor M = Migratory PM = Passage Migrant SV= Summer Visitor

Asiatic Jackal

Sus sacrofa

Jungle cat

Red Fox

Grey mongoose

Blanford fox

Funambulus Palmarum

Balochistan gerbil

Suncus murinus

Indian Hedgehog

Figure 5-9: Mammals Observed at Study Area

Indian roller

Grey shrike

Coller Dove

White cheek bulbul

Common Kingfisher

Cattle egret

Pied Kingfisher

Green bee-eater

Figure 5-10: Birds in the Sub-Project Areas

5.4.2 Flora of Sub-Project Area

The vegetation of the study area can be classified as scrub forest (dominated by herbs and shrubs). The plants are best adapted to the ecological conditions either for high or low-temperature fluctuations as well as poor soil and rainfall ranges.

The soils of the Kohistan region are sandy loam to sandy; the soil in the eastern part is alluvial which supports good vegetation. The herbs abundantly grow around the Kohistan region, this type of vegetation may raise on the water temporarily adsorbed in the topsoil layer, synchronic to precipitation. Further, this is supported by the added layer of moisture present in the subsurface soil and the sandstone lying beneath the soil. However, the dominance of perennial may indicate the resistance of species towards the harsh climate or access to plentiful moisture for long periods after monsoon rains.

The common flora of the Kohistan sub-project area is Thor (*Euphorbia caducifolia*), Phog (*Calligonum polygonoides*), and Akk (*Calotropis gigantea*). In irrigated tracts, Babul or Babur (*Acacia nilotica*), Tali (*Dalbergia sissoo*) Nim (*Azadirachta indica*), Peelo (*Salvadora oleoides*), and Lai (*Tamarix gallica*) are found.

Dunes are represented by xerophytic plants because of their topographical features. They are all of deserted nature with sandy soil makeup. The dominant and frequent species like Thor (*Euphorbia caducifolia*), Phog (*Calligonum polygonoides*), Buye (*Aerva javanica*), Peelo (*Salvadora oleoides*) & Gokhru (*Tribulus longipetalus*) are common vegetation of the area. Details of flora found in Kohistan sub-project areas are given in Table 5-8 and a photo gallery of flora and their habitats are given in Figure 5-11.

Table 5-8: Flora of Sub-Project Area

Sr. No.	Common Name	Scientific Name	Plant type	IUCN status
1	Sindhi Babur	*Acacia nilotica*	Tree	LC
2	Kumbat	*Acacia senegal*	Tree	NA
3	Lamb gaah	*Aristida funiculata*	Grass	NA
4	Neem	*Azadirachta indica*	Tree	LC
5	Ak	*Calotropis procera*	Shrub	NA
6	Kirar	*Capparis decidua*	Shrub	LC
7	Dhaman	*Cenchrus ciliaris*	Grass	LC
8	Trooh	*Citrullus colocynthis*	Climber	NA
9	Gugur	*Commiphora wightii*	Tree	CR
10	Sussai	*Convolvulus spinosus*	Herb	NA
11	Chag	*Crotalaria burhia*	Shrub	NA
12	Drabh	*Desmostachya bipinnata*	Grass	LC
13	Thohar	*Euphorbia caducifolia*	Shrub	NA
14	Khip	*Leptadenia pyrotechnica*	Shrub	LC
15	Pesh	*Nannorrhops ritchiana*	Tree	NA
16	Ghander	*Ochthochloa compressa*	Grass	NA
17	Dhaman	*Panicum turgidum*	Grass	NA
18	Nar khip	*Periploca aphylla*	Shrub	LC
19	Kandi	*Prosopis cineraria*	Tree	NA
20	Kikar	*Prosopis juliflora*	Tree	NA

Sr. No.	Common Name	Scientific Name	Plant type	IUCN status
21	Wekho	*Pteropyrum aucheri*	Shrub	NA
22	Sar	*Saccharum spontaneum*	Grass	LC
23	Jar/Peroon	*Salvadora oleoides*	Tree	NA
24	Rohiro	*Tecomella undulata*	Tree	NA
25	Lawo	*Tamarix aphylla*	Tree	NA
26	Lawo	*Tamarix dioica*	Shrub	NA
27	Lai	*Tamarix indica*	Shrub	NA
28	Paneer	*Withania coagulans*	Shrub	NA
29	Ber	*Ziziphus mauritiana*	Tree	LC
30	Ber	*Ziziphus nummularia*	Shrub	NA
LC= Least Concern, NA= Not Assessed, CR=Critically Endangered				

Commiphora wightii

Euphorbia caducifolia

Nannorrhops ritchiana

Leptadenia pyrotechnica

Prosopis juliflora

Prosopis cineraria

Saccharum spontaneum

Salvadora oleoides

Stipagrostis plumosa

Tecomella undulata

Ziziphus nummularia

Withania coagulans

Figure 5-11: Key Floral Species of the Study Area

5.5 Kirthar National Park

Kirthar National Park is Pakistan's second-biggest National Park. It is also the first National Park from Pakistan to be included in the 1975 United Nation's list of National Parks around the world. Kirthar is an area of outstanding beauty and cultural heritage that provides important habitat for a variety of mammals, birds, and reptiles characteristic of the arid subtropics.

Approximately one-third of the park lies in the north of Malir District and two-thirds in the south-west of Jamshoro District.

The park is part of a 447,161ha Protected Areas Complex, being contiguous with Mahal Kohistan Wildlife Sanctuary (70,577ha) to the south and Hub Dam Wildlife Sanctuary (27,219ha) to the south-west. Surjan, Sumbak, Eri and Hothiano Game Reserve (40,632ha)

lies just to the east of the park. Both these protected areas (KNP & MKS) and other protected areas are habitats for threatened and endangered species.

The livestock and wildlife have been living in harmony for ages. There are two tourist centers in the park managed by Sind Wildlife Management Board, namely Khar and Karchat. The centers offer cottage and dormitory accommodation, and guides are available. There are some 671km of non-metallic/ dirt roads within the park, mostly motorable only by 4X4-vehicle.

5.6 Ecology of Kirthar National Park

The baseline study of Kirthar National Park was done in the late 90s by Melbourne Enterprises International Ltd. Kirthar National Park encompasses a diverse array of physical, biological, and cultural assets, all of which hold significant conservation value (refer to Figure 5-12) The baseline identifies the importance of preserving the future of Kirthar National Park's natural and cultural resources necessitates the establishment and execution of a comprehensive park management plan. This plan should integrate conservation efforts while simultaneously fostering community development. Only by engaging in a process that enhances the livelihoods of indigenous peoples residing within the park, and incentivizes their alignment with conservation objectives, can the flora, fauna, and cultural heritage of the region be safeguarded for the well-being of both present and future generations.

Kirthar National Park, nestled in the southeastern province of Sindh, Pakistan, stands as a beacon of biodiversity and ecological significance. Spanning over vast landscapes characterized by diverse ecosystems, Kirthar is not only a sanctuary for numerous plant and animal species but also a critical habitat for indigenous communities and a center for ecotourism. Kirthar National Park is renowned for its rich biodiversity, encompassing a wide range of habitats, from arid plains to rugged mountains. The park is home to a plethora of flora and fauna, including endemic and endangered species such as the Balochistan black bear, Ibex, Urial, and numerous bird species. Its diverse ecosystems support a delicate balance of life, with unique adaptations to the harsh desert environment.

The springs found within Kirthar National Park are areas where groundwater naturally discharges, regulated by geological and topographical features (Figure 5-13). These springs are critical water sources for wildlife and play a vital role in sustaining local ecosystems, particularly in the arid environment of the region. Additionally, water from certain springs is redirected to irrigate nearby fields and meet the domestic needs of surrounding villages. (Figure 5-14).

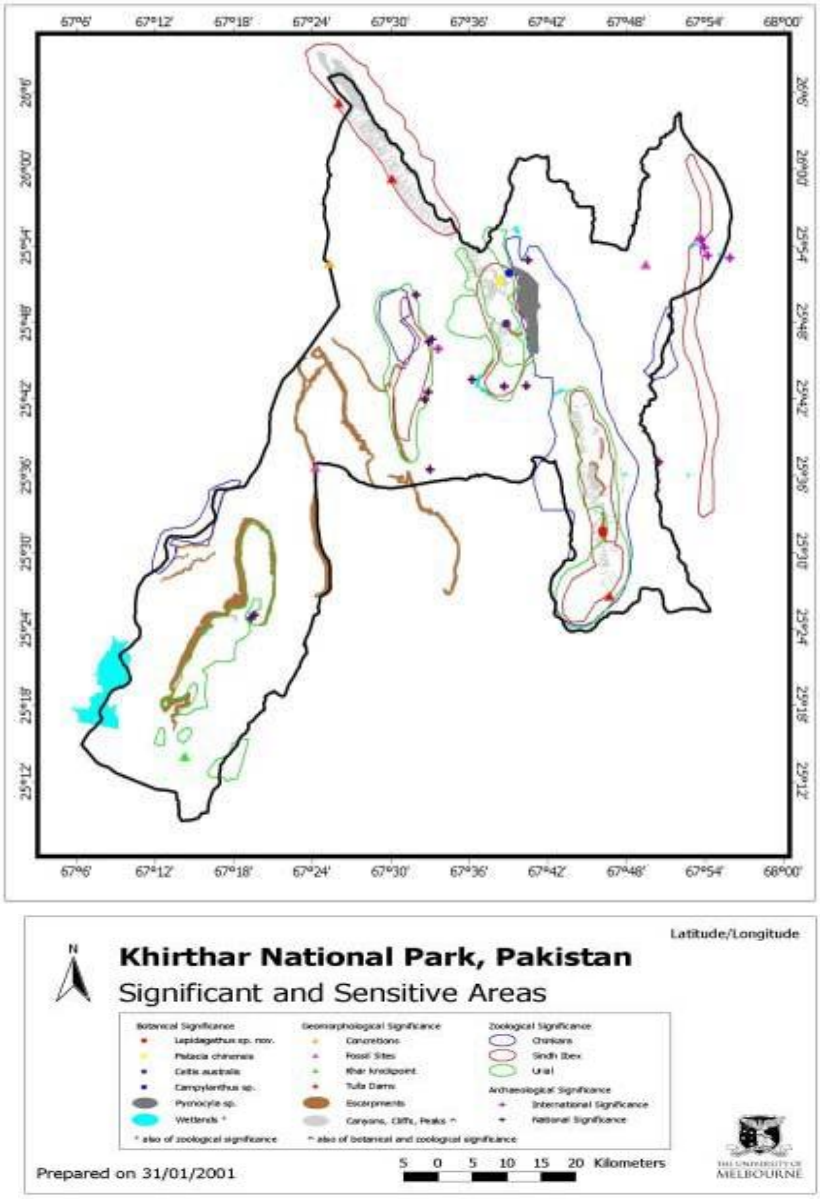


Figure 5-12: Significant and sensitive areas in the KNP complex

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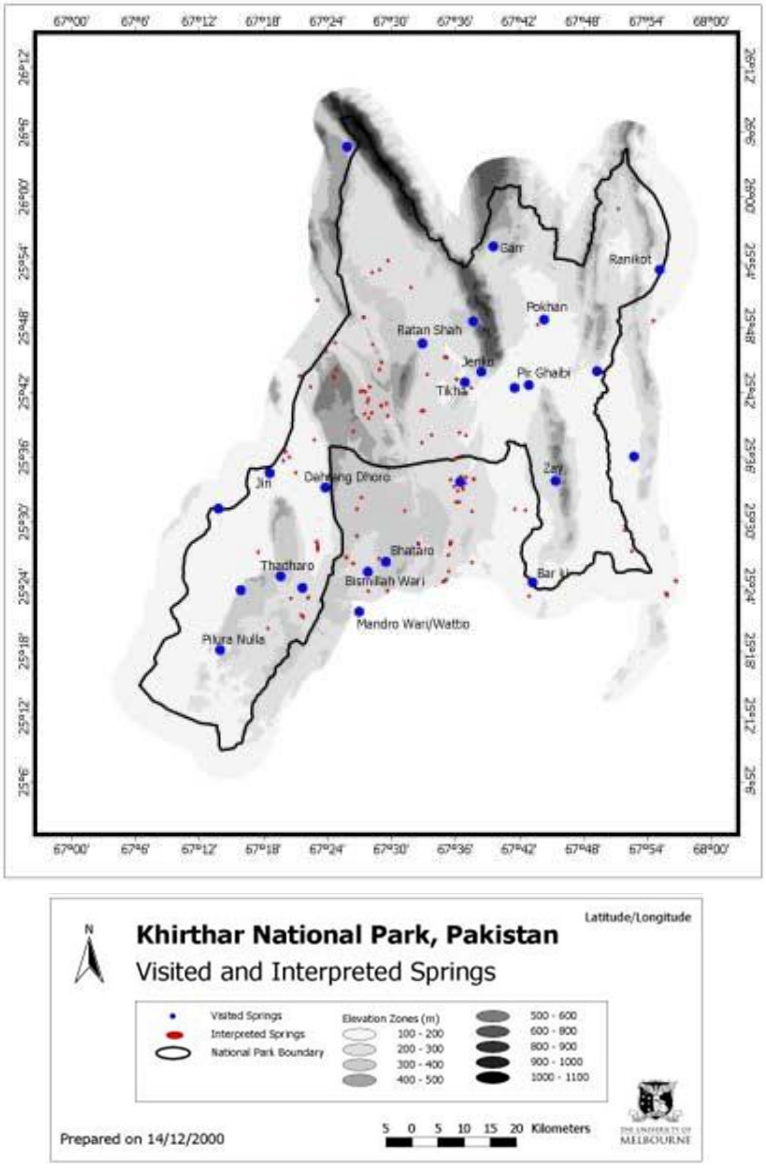


Figure 5-13: Spread of natural spring in and around KNP

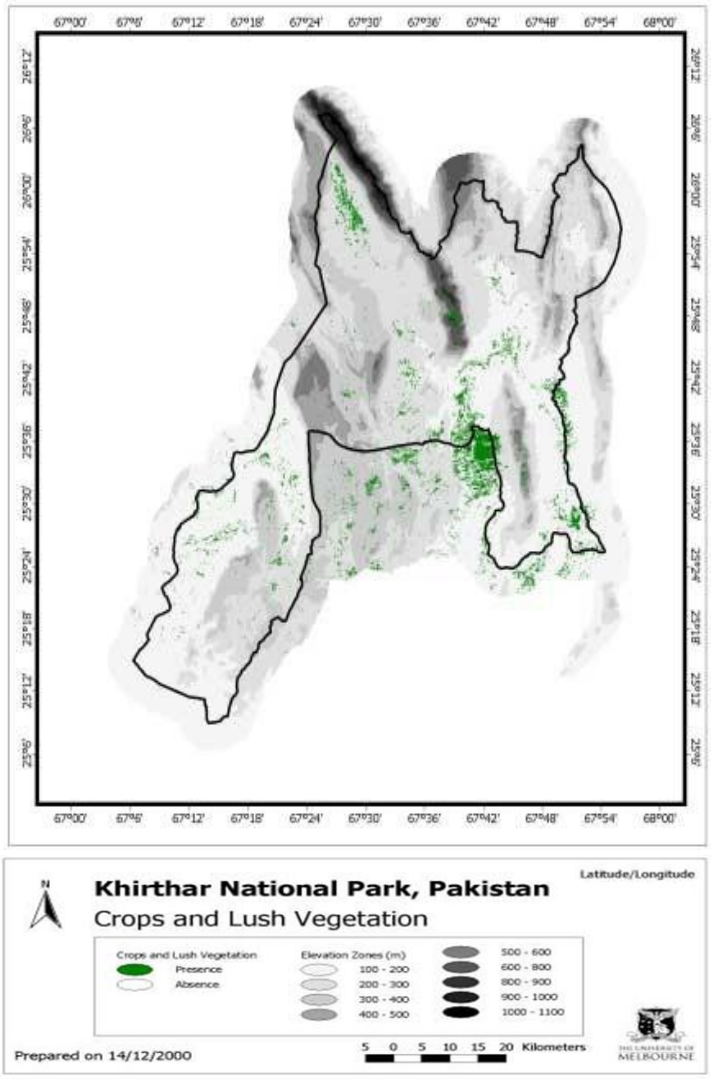


Figure 5-14: Spread of natural vegetation in and around KNP

Water usage in Kirthar National Park The baseline study tried to estimate water consumption for human, animal, and wildlife needs, as well as water lost through irrigation. Previous assessments of water usage are unavailable. Domestic Water Use In 2000, the park's population was about 70,000, projected to rise to 100,000 post-monsoons. Domestic water usage per capita is estimated between 25 to 36 liters per day (Ld-1). Thus, domestic water drawn from wells and springs is approximately 800 million liters per year (MLy-1) and could increase to 1100 MLy-1 after monsoon rains. Water Consumption by Farm Animals In early 2000, the park housed 74,000 goats, 21,000 sheep, 13,200 cattle, 2600 donkeys, and 1300 camels. Total water consumption by farm animals is estimated at around 430 MLy-1, with cattle using nearly 50% and goats/sheep around 40%. Water Consumption by Wild Animals In September 2000, wild animal populations included approximately 13,200 Sindh Ibex, 10,400 Urial, and 1060 Chinkara. Total drinking water consumption by wild animals is estimated at around 30 MLy-1. Irrigation Water Use Water diverted or pumped within the park is not regulated. The irrigated area ranges from 8,000 to 15,000 hectares, with a

minimum of 3,000 hectares irrigated during winter 1999/2000 and 1,000 hectares or less in the subsequent summer.

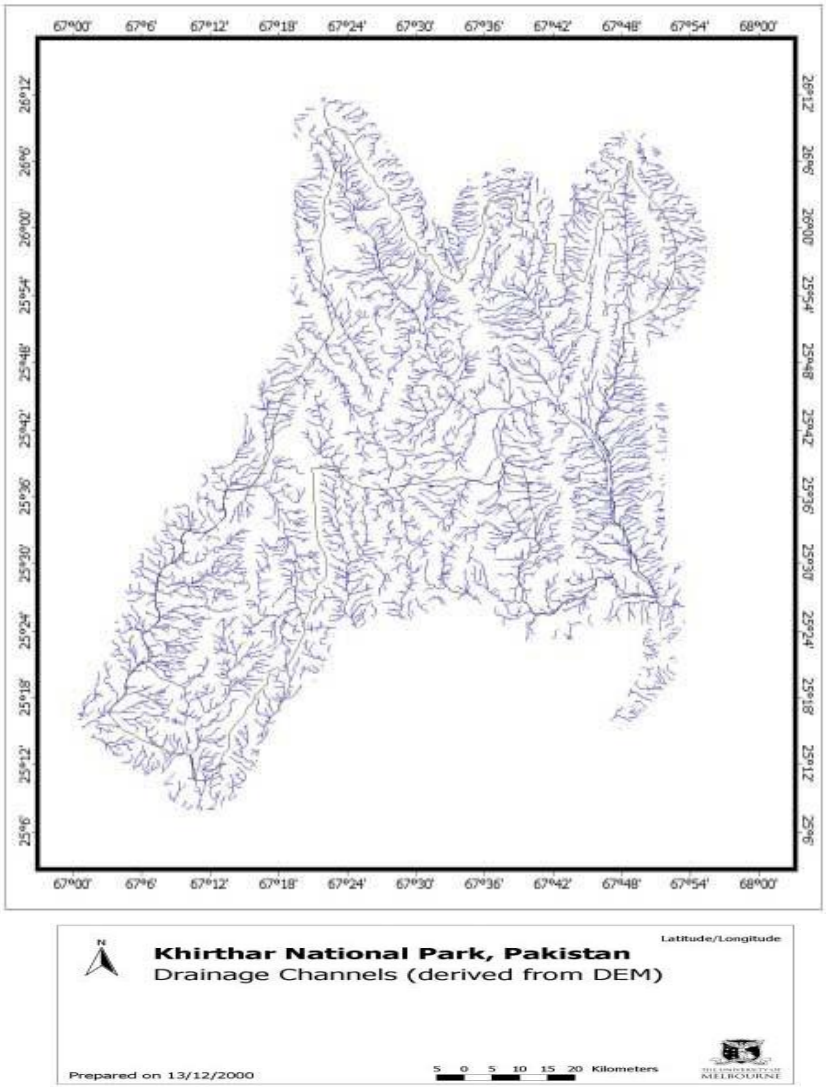


Figure 5-15: Spread of drainage channels in and around KNP

Upon a thorough examination of the data collected in baseline studies on KNP by Melbourne Enterprises International Ltd during the baseline study, several intriguing findings about KNP have surfaced. One notable discovery is the abundance of natural springs and waterfalls scattered throughout the area; a fact bolstered by the extensive drainage network present across KNP. The convergence of these elements suggests an opportunity for rainwater harvesting, which could have a beneficial effect on the ecosystem's health. Ghalib et al. (2013), in their research on avifauna, have provided corroborating evidence for this assertion refr to grapgh in Figure 5-16.

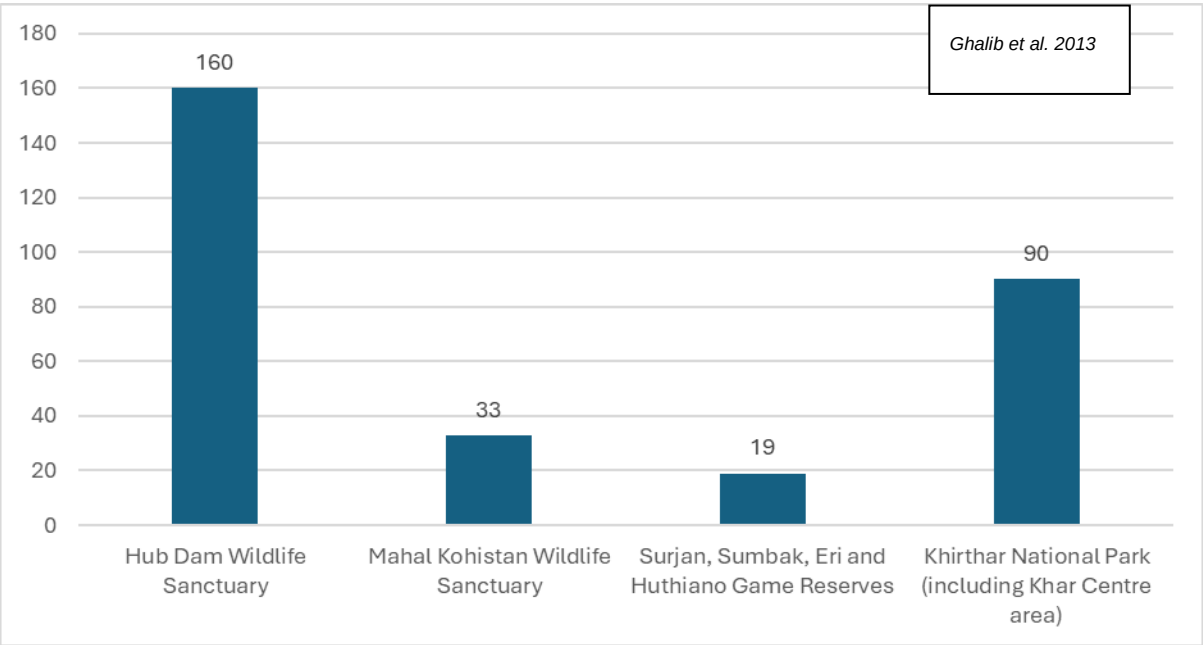


Figure 5-16: Habitat-wise distribution of avifauna in KNP complex

The wetland site, situated above the water body, recorded the highest bird count, comprising more than 62% of the total. This observation underscores the significant role of water bodies, particularly during periods of drought. The proposed construction of 59 dams within KNP presents an opportunity to harness this natural resource without imposing any environmental burden on the ecosystem. Instead, it has the potential to enhance the resilience of the KNP ecosystem, especially in challenging circumstances

5.6.1 Endemic and Endangered Species

Sindh Ibex (*Capra agaggrusblathii*) is the main key species of the KNP it is protected by Sindh wildlife protection ordinance 1972, Wild sheep, Oriual (*Ovis vignie*) is a vulnerable VU with decreasing population and Chinkara deer (*Gazella bennettii*) is the least concern LC with decreasing wild population.

As far as the sub-project area is concerned, none of the endemic or endangered species of both flora and fauna have been recorded from sub-project sites nor is even the habitat for these species the part of proposed project area.

5.6.2 Trees

Since the subproject area lies in the arid zone, there is a general scarcity of water, vegetation is scarce and consists of stunted scrub and bushes. The main natural ground cover is provided by grasses, which are nutritive and palatable fodder for livestock. The trees present around the proposed dam structures were counted during the field survey as shown in Table 5-9.

Table 5-9: Trees Identified on the Sub-projects.

Sr. No	Name of Proposed Small Dam	Name of Species		Plant type	IUCN Status	Mature (Girth more than 24")		Immature (Girth less than 24")	
		Common	Scientific			Existing	To be cut	Existing	To be cut
1	Kal	Kandi	*Prosopis cinereria*	*Tree*	*NA*	10	0	12	4
		Sindhi babur	*Acacia nilotica*	Tree	LC	5	0	10	2
2	Garrouk	Sindhi babur	*Acacia nilotica*	*Tree*	LC	2	0	5	3
		Lai	*Tamarix indica*	Shrub	NA	5	0	10	2
		Kandi	*Prosopis cinereria*	*Tree*	NA	4	0	15	5
3	Kotharo	Sindhi babur	*Acacia nilotica*	Tree	LC	5	2	10	0
4	Mehboob	Kandi	*Prosopis cinereria*	*Tree*	*NA*	5	0	5	2
5	Shamm	Kikar	*Prosopis juliflora*	Tree	NA	8	0	10	3
6	Talango	Kandi	*Prosopis cinereria*	*Tree*	*NA*	5	0	5	2
7	Sangar Nadi 2	Sindhi babur	*Acacia nilotica*	*Tree*	LC	2	0	5	5
		Lai	*Tamarix indica*	Shrub	NA	5	0	10	5
		Ber	*Ziziphus mauritiana*	Tree	NA	4	0	5	3
8	Mathal	Lai	*Tamarix indica*	Shrub	NA	8	0	10	3
		Sindhi babur	*Acacia nilotica*	*Tree*	LC	8	0	10	5
9	Haji Imam Baksh	Kandi	*Prosopis cinereria*	*Tree*	*NA*	5	0	0	0
		Jar/Peroon	*Salvadora oleoides*	*Tree*	*NA*	8	2	0	0
10	Saan-2	Kikar	*Prosopis juliflora*	Tree	NA	8	0	10	2
		Ber	*Ziziphus mauritiana*	Tree	NA	4	0	5	2
11	Moidan Nadi	Lai	*Tamarix indica*	Shrub	NA	5	0	8	3
		Jar/Peroon	*Salvadora oleoides*	*Tree*	NA	2	0	5	0
12	Moidan-2	Kikar	*Prosopis juliflora*	Tree	NA	15	0	5	3
		Lai	*Tamarix indica*	Shrub	NA	8	0	10	2
		Sindhi babur	*Acacia nilotica*	*Tree*	LC	8	0	10	5
13	Vaan Khand	Sindhi babur	*Acacia nilotica*	Tree	LC	5	0	5	2
		Kandi	*Prosopis cinereria*	*Tree*	*NA*	5	0	5	0
		Ber	*Ziziphus mauritiana*	Tree	NA	8	0	5	2
14	National Park	Kandi	*Prosopis cinereria*	*Tree*	*NA*	4	0	5	2
		Sindhi babur	*Acacia nilotica*	Tree	LC	5	0	10	2
15	Sanyasi	Lai	*Tamarix indica*	Shrub	NA	8	2	0	0
		Kandi	*Prosopis cinereria*	*Tree*	*NA*	5	0	5	3
16	Thado Nai	Lai	*Tamarix indica*	Shrub	NA	5	0	8	4
		Jar/Peroon	*Salvadora oleoides*	*Tree*	NA	2	2	5	0
17	Sundi Nai	Kandi	*Prosopis cinereria*	*Tree*	NA	5	2	6	2
18	Dhani Bakhsh Bikak	Sindhi babur	*Acacia nilotica*	*Tree*	LC	2	0	5	2
		Lai	*Tamarix indica*	Shrub	NA	5	0	10	4
		Kandi	*Prosopis cinereria*	*Tree*	NA	4	0	5	3
19	Aatho	Kikar	*Prosopis juliflora*	Tree	NA	8	0	10	2
		Ber	*Ziziphus mauritiana*	Tree	NA	4	0	5	2
20	Abdullah Kanro	Kikar	*Prosopis juliflora*	Tree	NA	4	2	5	2
21	Babu Khan	Kandi	*Prosopis cinereria*	*Tree*	NA	5	0	8	2
		Kikar	*Prosopis juliflora*	Tree	NA	15	2	5	0
		Lai	*Tamarix indica*	Shrub	NA	8	0	10	3
		Sindhi babur	*Acacia nilotica*	*Tree*	LC	8	0	10	4
22	Chanari and Veer	Kandi	*Prosopis cinereria*	*Tree*	*NA*	8	0	5	3
23	Muhammad Yousuf	Kikar	*Prosopis juliflora*	Tree	NA	10	0	5	3
		Kandi	*Prosopis cinereria*	*Tree*	NA	5	2	0	0
24	Khakhar	Kikar	*Prosopis juliflora*	Tree	NA	4	0	10	5
		Ber	*Ziziphus mauritiana*	Tree	NA	5	0	5	2
25	Mol-00	Lai	*Tamarix indica*	Shrub	NA	8	0	10	0
		Kikar	*Prosopis juliflora*	Tree	NA	8	0	8	2
		Ber	*Ziziphus mauritiana*	Tree	NA	5	0	5	0
26	Mol-01	Kikar	*Prosopis juliflora*	Tree	NA	10	0	5	3
Total Number of Existing Trees (Mature Girthmore than 24")						317			
Total Number of Existing Trees (Immature Girthless than 24")						355			
Total Number of Existing Trees						**672**			
Total Number of to be cut Trees (Mature Girthmore than 24")						16			
Total Number of to be cut Trees (Immature Girthless than 24")						120			
Total Number of to be Trees						**136**			

LC= Least Concern, NA= Not Assessed

6. SOCIO-ECONOMIC PROFILE OF THE SUB-PROJECT AREA

6.1 Methodology

This section describes the socio-economic condition of the sub-project area. The socio-economic survey and social impacts assessment was carried out during the months of July and September 2022, December 2023, January, and May 2024. The team used a questionnaire and checklist for Focus Group Discussions (FGDs). To have comprehensive detailed information, consultation meetings were held with the stakeholders and general public. The main objectives of consultation were to provide a platform to the stakeholders, to voice their concerns and extend their suggestions to the project team and to develop a sense of collective ownership for the activities of sub project. The participants of the consultation meetings and focus group discussions actively provided support in data collection and understanding the socio- economic fabric of the people living in the sub-project area.

6.2 Demographic Information of Sub-Project Area

6.2.1 Family system and Population

There was a mix system of joint family and nucleus system in sub project area. In village Wadero Muhammad Umer Lalani (Chanari and Veer) out of total 50 families 20 were reported as joint families and 30 as nucleus families. in village Babu Khan (subproject Babu Khan, out of total 55 families 40 families were reported as joint families and 15 as nucleus families. In subproject Kal ie village Hassan Shehno out of total 300 families 130 were reported as joint families and 170 were reported as nucleus families. In village Abdul Hakeem (subproject Sangar Nadi 2) out of total 40 families, 25 families were said to be joint and 15 as nucleus families. In village Haji Laong (sub project Haji Foto old Mehboob), out of total 70 families 10 were joint and 60 were nucleus families. In village Faqir Muhammad Khoso (Sub-project Shaam), out of total 40 families, 20 were reported to be joint families and 20 nucleus families. In village Ali Khan Chhuto (subproject Kathoro), out of total 47 families, 30 were living in joint family system and 17 in nucleus family system. In village Muhammad Juman Chhuto (subproject Khakhar), out of total 62 families, 22 were reported as joint families and 40 as nucleus families. In village Shah Muhammad Sheno (subproject Garrouk) out of 300 families, 230 were joint families and 40 were reported as nucleus families. In village Shah Muhammad Chutto (subproject Talango) out of total 50 families 20 were joint families and 30 were nucleus families. in village Muhammad Yousuf Chhuto (subproject Muhammad Yousuf Chhuto), out of total 45 families 15 were joint families and 30 were nucleus families. In village Razaque Dino Burfat (subproject Mathal Dam), out of total 25 families, 20 were joint and 5 were as nucleus families. In subproject village Imam Bux, out of total 300 families 50 were reported joint families and 250 nucleus families. In subproject shaan 2, village Ghulam Qadir out of total 25 families 10 were reported joint families and 15 as nucleus families. In village Attur Khan (subproject Moidan-1) out of total 300 families, 200 were reported joint families and 100 as nucleus families. in subproject Moidan 2 (village Haji Warial Bandejo), out of total of total 40 families, 10 were reportedly living in joint families and 30 in nucleus families. Total population of the 25 subproject was 19070.5 from 2781

households. In subproject Vaan Khand, village Mureed Burfat 40 families 35 were joint families and only 5 were nucleus families.

6.2.2 Population

The population in surveyed villages is homogeneous, as the inhabitants, living in the villages belongs to Muslim religion. The social harmony is prevalent in the area people maintain their social relations and participate in each other's social events. The majority of the population in the area is derived from basic amenities of the life; poverty and low literacy rate are common social issues. The main source of the livelihood of the people of the subproject area is rain-fed agriculture and livestock rearing followed by daily wages earning. In the absence of monsoon rainfall people move to irrigated area before start of drought season in order to avoid adverse effects drought and return after drought impacts are minimized. The area has no irrigation system and fall in arid zone, where life and livelihoods are depended on rainfall.

Total population in 25 subproject villages was 19,266 in 2,809 households. In subproject Kal and Garrouk, people belonged to Shehno tribe. In subproject Kotharo, village Ali Khan Chhuto, residents belonged to Chhuto tribe, in subproject Haji Fhoto (old Mehboob) village Haji Laong, people belonged to Kanro and Khaskhali tribes, in subproject Shaam, village Faqir Muhammad Khoso, residents belonged to Khoso Tribe, in subproject Talango, village Shah Muhammad Chhuto, residents belonged to Chhuto tribe. In village Imam Bux residents belonged to Bikak tribe, in village Ghulam Qadir (subproject Shaan 2) people from Khaksar tribe lived, in village Attur Khan (subproject Moidan1) residents from Bikak tirbe lived and in village Haji Warial Bandejo (subproject Moidan 2) people from Bandeja tribe lived. In village Mureed Burfat (Subproject Vaan Khand) residents belonged to Burfat tribe and in village Abdul Hakeem (Subproject Sangar Nadi 2) Shehno Tribe. In other sub project villages people from Lalani and Hamlani. Jokhio and Barejo also live. The details of the populations and tribes in sub-project areas are given in Table 6-1.

Table 6-1: Population and tribes in subproject villages

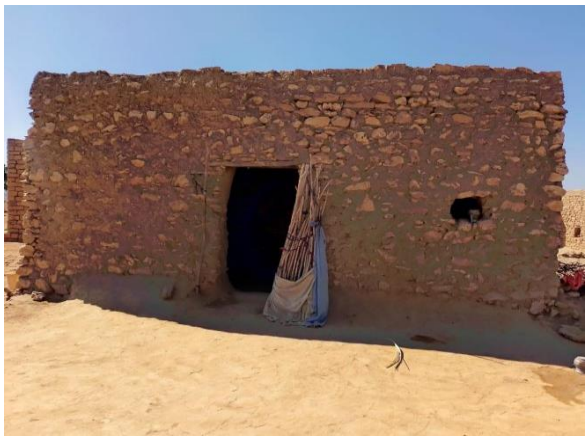
S #	Name of Sub-Project	Village	Tribes	Religion	Households	Population	Average Family size
1	Chanari and Veer	Wadero Muhammad UmerLalani	Lalani	Islam	50	350	7
2	Babu Khan	Babu Khan	Burfat & Hamlani		55	385	7
3	Kal	Hassan Shehno	Shehno	Muslim	300	2100	7
4	Sangar Nadi 2	Abdul Hakeem	Shehno	Muslim	40	280	7
5	Haji Foto	Haji Laong	Kanro & Khaskhali	Muslim	70	490	7
6	Shaam	Faqir Muhammad Khoso	Khoso & Burfat	Muslim	40	280	7
7	Kotharo	Ali Khan Chhuto	Chhuto	Muslim	47	329	7
8	Khakhar	Muhammad	Chhuto	Islam	62	434	7

S #	Name of Sub-Project	Village	Tribes	Religion	Households	Population	Average Family size
		Juman Chhuto					
9	Garrouk	Shah Muhammad Shehno	Shehno	Muslim	300	2100	7
10	Talango	Shah Muhammad Chhuto	Chhuto	Muslim	50	350	7
11	Muhammad Yousuf	Muhammad Yousuf Chhuto	Chhuto	Islam	45	315	7
12	Mathal Dam	Razaq Dino Burfat	Burfat	Muslim	25	175	7
13	Haji Imam Bux	Haji Imam Bux	Bikak	Muslim	300	2100	7
14	AthoNadi Dam	Pathan Goth	Jokhio	Islam	350	2275	6.5
15	Sanyasi Dam	Sanyasi alias Kandani		Islam	110	715	6.5
16	National Park	Khan Muhammad Khaskheli	KhasKhili	Islam	135	878.5	6.5
17	DhaniBuxBikak	Dhani Bux Bikak	Bikak	Islam	35	227.5	6.5
18	Sundo Nia	Bhai Khan Burfat	Burfat	Islam	165	1072.5	6.5
19	ThadoNai	Chhuto Goth	Kanro		132	924	7
20	Abdullah Kanro	Abdullah Kanro	Kanro	Islam	50	350	7
21	Moidan 2	Haji Warial Bandejo	Bandeja	Muslim	40	280	7
22	Moidan Nadi	Attur Khan	Bikak	Muslim	300	2100	7
23	Vaan Khand	Mureed Burfat	Burfat	Muslim	40	280	7
24	Shaan 2	Ghulam Qadir	Khaskhar	Muslim	25	175	7
25	Mole-01	Ghulam Barejo	Barejo	Islam	15	105	7
26	Mole-00 (Murad Bariji)	Mangnio Barejo	Barejo	Islam	28	196	7
				Total	**2,809**	**19,266.5**	

6.2.3 Housing

The majority of the population in the sub project area resides in small settlements of 15 to larger settlements of 350 houses. The all the sub project household shared that they owned the houses. The structure of the houses in the majority of cases is kacha and straw made. However, a small number of the relatively well-to-do families also own paka houses. The walls of kacha houses are mud made or made from unbaked bricks and their roofs are made from wood and straw. The straw made homes are made from wood and straw collected

mostly from surroundings. The housing pattern in the sub project area is shown in Figure 6-1.



House Pattern in village Muraad Barejo (Subproject Mol-1)

House pattern in village Abdul Hakeem (Subproject Sangar Nadi)

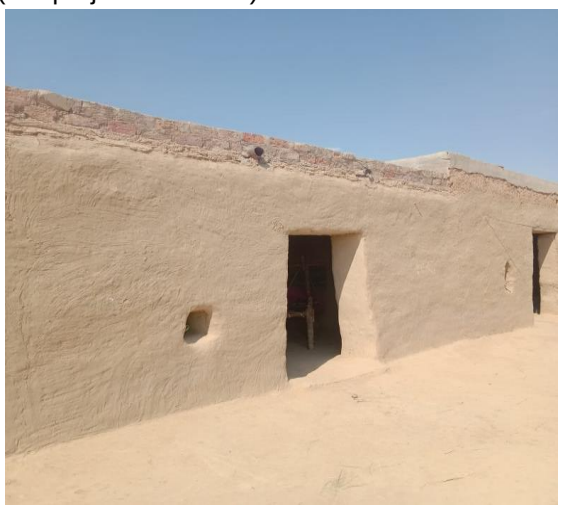
house pattern in village Faqir Muhammad Khoso (subproject Shaam)

house pattern in village Haji Laong subproject Haji Fhoto (old Mehboob)

House pattern in village Shah Muhammad Chhuto (subproject Talango)

House pattern in village Attur Khan (Subproject Moidan 1)

House pattren in subproject village Babu Khan



House pattren in village Jumman Chhutton (subproject Khakhar)

House pattren in village Wader Muhammad Umer Lalani (Subroject Chanari and Veer)

House Pattern in village Mureed Burfat, Subproject Vaan Khand

Figure 6-1: Housing pattern in the Sub-Project Area

6.3 Socio-Cultural Information of Sub-Project Area

6.3.1 Social Cohesion and Conflict

The tribal system is strong in the subproject area. Social organization in all the villages is strongly based on the tribal system, where almost every tribe has a tribal leader. The family and community disputes are resolved by tribal chiefs of the concerned tribe. However, in the villages of sub-project areas most of the people from different tribes live together and there is a single leader of the entire village, which is recognized by all tribes.

The tribe leaders are mostly landlords and politically influential. The families living in the same villages have strong interactions with one another. Marriages are usually arranged within the same tribe. During the survey it was found that most communities had built their own mosques and maintenance of these is the joint responsibility of community.

During community consultation, the participants shared that as majority of the residents depend on rain fed agriculture and livestock and in case of no or low rain only source of the livelihood for the residents is livestock but there is no livestock theft. During community consultation, the participants shared that crime rate is low and there is no theft of household valuables or stealing of motorbikes and mobile phones. People from different tribes live in cultural harmony and the majority of the disputes are solved at village level and the rest of the disputes go to the tribal chief who is acceptable to all tribes.

According to the socio-economic survey, no major conflict was found in the subproject area. The minor conflicts like disputes related to marriages, petty property disputes at village level are settled by the village head and the conflict of similar nature among tribes are resolved by tribal chief. According to survey findings 99 percent of minor conflicts were settled at village level. The people accept the mediation and decisions of the village head and tribal chief as village heads and tribal chief are being held in high esteem by the local population.

In rare cases when parties to dispute do not agree on the decision of village head or tribal chief, the matter is taken to police and a court of law. The police and the courts of law are the last resort, and this option is rarely exercised.

6.3.2 Social Vulnerability

Social vulnerability refers to inequality in social systems that discriminate against and marginalize certain groups of people from accessing resources and services. People who have been marginalized in social, economic, or political terms are vulnerable. Disasters, poverty and vulnerability are interlinked as it has been observed that poor people are most vulnerable to natural disasters as they have low or no resilience to cope with the natural calamities. In the surveyed villages, the heavy rain, and floods 2022 has further aggravated poverty and vulnerability of the population in subproject areas. The meager assets of the people who form the majority in the subproject area have been damaged and their traditional income sources from agriculture and livestock disrupted.

6.3.3 Languages

Sindhi is the dominant language spoken in the project areas, as 100% of the population speaks Sindhi. Moreover, people of the area also speak Balochi, and Seraiki, languages. National language Urdu is spoken and understood by the majority of the people in the sub-project area.

6.3.4 Religious Affiliation

During the socioeconomic field survey, it was observed that in the sub-project area only Muslim population lives within the same villages, 100-precent population belongs to Muslim religion. However, in Mole and Sari sub towns of Jamshoro district, large number of the non-Muslims, mostly Hindu reside. There is complete religious harmony among Hindus and Muslims in these sub towns. The Hindu go to their Mandirs (temples) for offering prayers. There are several mosques in the sub-project area. The Participants of the FGDs shared that the villagers jointly contribute more to construction, repair and renovation of the mosques. Eid prayers are held in Eid Gah or in mosques, the juma prayer is also after in the mosques were large number of the faithful gather; after offering prayer, they also have opportunity to interact on social and family issues. Photos of religious structures in subdirectory villages are given in Figure 6-2.

Mosque in village Mureed Burfat, subproject Vaan Khand

mosque in village Faqir Muhammad Khoso, sub project Shaam

Mosque in village Haji Laong sub project Haji Fhoto (old Mehboob)

Mosque in village Shah Muhammad sub project Talango

Mosque in village Ali Khan Chutto (subproject Kotharo)

Mosque in village Haji Warial Bandejo (Subproject Moidan 2)

Mosque in village Pathan Goth (Subproject Atho Nadi)

Mosque in village Muhammad Muhammad Juman Chhuto (Subproject Khakhar)

Figure 6-2: Mosques in the Sub-Project area.

5.4 Occupations, Sources of Livelihood, and Income Levels

Within the study area of sub-projects, rain- fed agriculture, and livestock are the main sources of income for the people. During FDGs, the participants shared that the residents have different occupations and are also directly or indirectly involved in livestock and rain fed agriculture. To elaborate on this point further they shared that a government employee must have few livestock heads for milk and extra source of income. The farmers, besides cultivating land also keep sufficient heads of livestock. Thus, it is very difficult to count the people on the basis of their profession. However, the question was re-farmed that the persons who predominantly depended on certain livelihood source can be counted in that category. Thus 3,719 persons from sub project area were said to be engaged in rain feed agriculture, 91 persons were government employees, 2,517 persons earned their living from livestock raring, 987 persons depended solely on daily wage. Agriculture depends on rainfall,

which is often erratic and mostly falls between July and September. After the rains, the subsoil aquifers are recharged, and the pasture lands are regenerated. However, by February, the aquifers are often depleted, and the pastureland dries up. The community has been practicing agriculture through rainwater harvesting at a small scale. It was stated by community members that after the construction of small dams their livelihood sources would improve.

The proposed small dams would recharge the aquifers in the area and would bring positive changes on ground water availability, crop diversity and increase the yield.

Mostly, livestock feeds on grass grown naturally and on crop residues. Women besides performing household chores also contribute to livestock rearing and work on handicrafts to complement in their family income generation.

Average livestock head per household was 25 in the sub-project areas as almost all families in sub project besides earning their livelihood from rain feed agriculture also keep some heads of cattle and earn their living as daily wage when there is no rain, whereas landholding is very low i.e. 12 acres on average.

The lowest family monthly income was recorded as PKR 19,000, while maximum family income was recorded as 24000 in sub project area.

6.4 Social Aspect for Study

The social economic survey was undertaken for collecting the following information:

- Demographic data, (population and literacy levels)
- Socio –Cultural fabric (Ethnicity, Language, religion, and vulnerability).
- Access to civic facilities (water, sanitation, health, education, and communication)
- Assessment of the impact of the proposed sub-project on the subject population
- In case of negative impacts exposed, suggest mitigation measures.
- Occupations. Source of Livelihood and Income Levels

A survey and consultation were carried out in 26 subproject villages (Table 6-2) in the months of July and September 2022, December 2023, January and May 2024.

The information gained will assist in the measurement and determination of the impacts (positive and negative) on social services, livelihood and cultural pattern of the population under study. Qualitative data through focus group discussions (FGDs) was also collected to make the analysis more compelling.

These FGDs were attended by village elders, community activists, farmers, herders, and religious leaders (Imams). Separate male and female FGDs were conducted in each village to ensure that gender dimensions of vulnerability were captured.

Table 6-2: Villages Visited for Socio-Economic Baseline Data

Sr. No	Name of Sub-Project	Village	Distance from proposed site (km)	Union Council	Taluka	District	Coordinates	
							Northing	Easting
1	Chanari and Veer	Wadero Muhammad Umeralani	2 KMs	Thano Ahmed Khan	Thano Bula Khan	Jamshoro	25°22'56.01"N	67°40'42.58"E
2	Babu Khan	Babu Khan	3 KMs	Mol	Thano Bula Khan	Jamshoro	25° 26' 43.1757" N	67° 28' 23.330" E
3	Kal	Hassan Shano	2 KMs	Mol	Thano Bula Khan	Jamshoro	25° 27' 35.09910" N	67° 34' 0630" E
4	Sangar Nadi	Abdul Hakeem	2 KMs	Mole	Thano Bula Khan	Jamshoro	25° 32' 29.94110" N	67° 29' 59.120" E
5	Haji Fhoto (old Mehboob)	Haji Laong	1.5 KMs	Arab Khan	Thano Bula Khan	Jamshoro	25° 43' 00.00000" N	67° 44' 00.0" E
6	Shaam	Faqir Muhammad Khoso	4. KM	Arab Khan	Thano Bula Khan	Jamshoro	25° 43' 48.7450" N	67° 49' 55.2" E
7	Kotharo	Ali Khan Chhuto	3KM	Taong	Thano Bula Khan	Jamshoro	25° 45' 49.1167" N	67° 31' 08.2" E
8	Khakhar	Muhammad JumanChhuto	3.6 KMs	Taong	Thano Bula Khan	Jamshoro	25° 47' 36.8230" N	25° 47' 36.0" N
9	Garrouk	Shah Muhammad Chhuto	2 KMs	Taong	Thano Bula Khan	Jamshoro	25° 48' 45.2120" N	67° 27' 21.2" E
10	Talango	Shah Muhammad Chhutto	1 KMs	Taong	Thano Bula Khan	Jamshoro	25° 49' 51.6300" N	67° 26' 45.0" E
11	Muhammad Yousuf	Muhammad Yousuf chhuto	5KM	Taong	Thano Bula Khan	Jamshoro	25° 50' 11.064" N	67° 32' 46." E
12	Mathal	Razaq Dino Burfat	3.5 KMs	Moidan/ Gadap Deh Shoring	Gadap	Malir	25° 14' 03.030" N	67° 12' 47." E
13	Haji Imam Bux	Haji Imam Bux	1.5	Moidan/ Gadap	Gadap	Malir	25° 16' 07.210" N	67° 10' 25." E
14	Atho Nadi Dam	Pathan Goth	3.7KMs	Moidan	Gadap	Malir	25° 18' 00.544" N	67° 17' 57." E
15	Sanyasi Dam	Sanyasi alias Kandani	5KMs	Moidan/Gadap	Gadap	Malir	25° 18' 19.679" N	67° 16' 11." E
16	National Park	Khan Muhammad Khaskhili	5KMs	Moidan	Gadap	Malir	25° 19' 36.80" N	67° 12' 22." E
17	Dhani Bux Bikak	Dhani Bux Bikak	4 KMs	Moidan/ Gadap	Gadap	Malir	25° 19' 57.60" N	67° 12' 07." E

18	Sundi Nai	Bhai Khan Burfat	4KMs	Moidan/ Gadap	Gadap/ Malir	Malir	25° 21' 30.067" N	67° 16' 30." E
19	Thado Nai	Chutto Goth	4KMs	Check from Affidavit	Gadap	Malir	25° 23' 54.54" N	67° 19' 36." E
20	Adullah Kanro	Abdullah Kanro	2.5 KMs	Moidan/G adap	Gadap	Malir	25° 24' 44.512" N	67° 22' 45." E
21	Moidan 2	Haji Warial Bandejo	1 KMs	Moidan	Gadap	Malir	25° 26' 43.22" N	7° 12' 540" E
22	Moidan	Attur Khan	2 KMs	Gadap	Gadap	Malir	25° 27' 00.00" N	67° 15' 00." E
23	Vaan Khand	Mureed Burfat	2.5 KMs	Moidan	Gadap	Malir	25° 27' 18.40" N	67° 22' 40" E
24	Shaan 2	Ghulam Qadir	1.5 KMs	Gadap	Gadap	Malir	25° 28' 36.60" N	67° 14' 20" E
25	Mole-01	Ghulam Barejo	2	Mole	Thano Bula Khan	Jamshoro	25° 40' 17.70" N	67° 25' 31." E
26	Mole-00 (Murad Barijo	Mangnio Barejo	4	Mole	Thano Bula Khan	Jamshoro	25° 42' 23.9200" N	67° 24' 48.0" E

6.5 Utilities (Drinking water & sanitation, electricity and gas facility, transportation Facility or alternate sources)

6.5.1 Drinking water facilities

There are no proper drinking water and sanitation facilities in the sub project area. People have to fetch water on motorbikes or animals from tube wells where ground water is sweet. Ground water sub-project villages is found at the depth of 100 to 300 feet and there were some 180 tube-wells in this sub project areas which were being used for both irrigation and drinking water purpose. These tub-wells are used for drinking and irrigation purposes and hand pumps are used for drinking and washing purposes. The ground water in village Faqir Muhammad Khoso is found at the depth of 90 to 100 feet. In village Shah Muhammad and other surrounding villages of sub project Talango ground water was brackish and people have to walk long distance or use motorbikes for fetching water for drinking. In village Haji Laong, of Sub project Haji Fhoto (old Mehboob), there were 5 hand pumps and 6 solar run tube-wells. Ground water is found at depths of 150 to 200 feet. In most parts of the sub project area, ground water is brackish therefore there are no tube wells or hand pumps in such subproject area. In Shaan sub project area ground water is 250 deep. In sub project area of Moidan 1, ground water table was reported 230 feet. In the sub project area of Moidan2, ground water was said to be found at 50 feet. In subproject area of sanagar Nadi ground water was found at 100 to 170 feet, in Vaan Khand ground water was found at 170 feet and in subproject area of Nooeji/Sanhri and Khalifani, ground water was found at 100 to 140 feet. There was no proper drainage system. The majority of the houses neither have sewerage system nor do have latrines, only few pakka houses have proper latrines. The majority of the residents reported open defecation in nearby bushes around the village. Electricity and gas were not available in almost all sub project villages.

6.5.2 Education facilities in subproject area:

The sub-project area is a far-flung area, where education faces quality and quality issues. The overall literacy rate is very low. In case of female population, the literacy rate is abysmally low. The main root causes spelled out by the community include accessibility, absence of infrastructure, and punctuality of the teachers and poor monitoring due to remoteness of the area.

In subproject village of Shamm the only primary boy's school was reported dysfunctional due to unavailability of the teachers. And in another subproject villages Haji photo, the participants of the community consultation shared that the primary boy's school remained closed.

Out of total 25 main subproject villages, primary boy's schools were available in only 14 villages with total enrolment of 980 (both boys and girls) where total 17 teachers were teaching in coeducation system. Out of total 25 subproject villages, girls' primary school was functioning in just one subproject village ie in village Haji Imam Bux with 1 female teacher and having total enrolment of 60 girls Thus 11 subproject villages have no school at all. Out of total 25 subproject villages, only one subproject village ie Babu Khan has 1 middle school with 4 teachers and total enrolment of 250. Due to poverty, lack of awareness among parents, long distance, non-availability and shortage of local teachers, particularity female teachers, most of the children from sub project area remained deprived from education. During tehsil and district level consultation with education department, Taluak Education Officer Thano Bula Khan and District Education Officer Jamshoro shared that due to retirement of majority of the teachers, education department faces acute shortage of the local teachers. They further shared that majority of the newly appointed teachers who are non-locals are unwilling to serve in remote sub project areas. The education officers shared that with the support of local NGO Mehran Development Organization, they are approaching local philanthropists to support in salaries of local teachers, and they have succeeded in running 12 such schools which were previously closed. The Education Officers said that they are making concentrated efforts to open all closed schools. In village Adul Hakeem (subproject Sangar Nadi), according to community members, one primary boys school remains closed since last 30 years and in village Mureed Burfat subproject Vaan Khand one primary boys school remains closed for long time. Table 6-3: Education Facilities in the Sub Project Area and Figure 6-3 shows image of school buildings in sub project villages.

Table 6-3: Education Facilities in the Sub-Project Area

Name of sub-project	Boys Primary School	Teachers	Enrollment	Girls Primary School	Teachers	Enrollment	Boys Middle School	Teachers	Enrollment	Girls Middles School	Teachers	Enrollment
Chanari and Veer	1	**1**	**60**	0	0	0	0	0	0	0	0	0

Babu Khan	1	1	35	0	0	0	1	4	250	0	0	0
Kal	0	0	0	0	0	0	0	0	0	0	0	0
Sangar Nadi 2	0	0	0	0	0	0	0	0	0	0	0	0
Haji Fhoto	0	0	0	0	0	0	0	0	0	0	0	0
Shaam	0	0	0	0	0	0	0	0	0	0	0	0
Kotharo	0	0	0	0	0	0	0	0	0	0	0	0
Khakhar	0	0	0	0	0	0	0	0	0	0	0	0
Garrouk	1	1	40	0	0	0	0	0	0	0	0	0
Talango	1	1	25	0	0	0	0	0	0	0	0	0
Muhammad Yousuf	0	0	0	0	0	0	0	0	0	0	0	0
Mathal Dam	1	1	35	0	0	0	0	0	0	0	0	0
Haji Imam Bux	1	03	140	1	1	65	0	0	0	0	0	0
Atho Nadi	1	1	110	0	0	0	0	0	0	0	0	0
Sanyasi	1	02	100	0	0	0	0	0	0	0	0	0
National Park	1	2	0	0	0	0	0	0	0	0	0	0
DhaniBuxBi kak	1	0	0	0	0	0	0	0	0	0	0	0
SundiNai	1	1	150	0	0	0	0	0	0	0	0	0
ThadoNai	1	1	60	0	0	0	0	0	0	0	0	0
Abdullah Kanro	1	1	40	0	0	0	0	0	0	0	0	0
Moidan 2	0	0	0	0	0	0	0	0	0	0	0	0
Moidan	1	1	185	0	0	0	0	0	0	0	0	0
Shaan	0	0	0	0	0	0	0	0	0	0	0	0
Vaan Khand	0	0	0	0	0	0	0	0	0	0	0	0
Mol-01	0	0	0	0	0	0	0	0	0	0	0	0
Mol-00	0	0	0	0	0	0	0	0	0	0	0	0
Total	**14**	**17**	**980**	**01**	**01**	**65**	**01**	**04**	**250**	**0**	**0**	**0**

School building in village Attur Khan, subproject Moidan

School building in Faqir Muhammad Khoso, subproject sham

School building in village Abdullah Kanro (Subproject Abdullah Kanro)

The school building of the dysfunctional school in village Abdul Hakeem, subproject Sangar Nadi

Figure 6-3: School building in sub-project area.

6.5.3 Sanitation Facilities:

There are also no proper sanitation facilities in the subproject area. Only few paka houses have latrines. There is no drainage system in almost all subproject villages. The rural community members use nearby bushes for relieving themselves.

6.5.4 Electricity, natural gas and alternatives energy

Out of total 25 subproject villages, electricity was available in only 7 villages, the remaining 18 subproject villages were reported without electricity. Due to poverty, the majority of the residents from subproject villages don't use alternative energy like solar at household level. However, few rich use solar panels for household purposes. The gas is not available in all subproject villages. The firewood is collected from the nearby jungle and used for cooking purposes. The trend of using solar energy for irrigation purposes is increasing and a large number of tube wells on solar are being installed where ground water is sweet. The oil or diesel run tube wells are also being replaced with solar. The solar-run tube wells, besides

helping in irrigation of the land are also providing water for dirking and washing purposes to the nearby population.

Figure 6-4: The main sources of the water in Sub-Project Area

6.6 Health Facilities

Diseases like malaria, eye problems, skin diseases, diarrhea and other ailments are prevalent in the area. The lack of health facilities was reported by the community members during FGDs. The residents from Sub project village Shah Muhammad (sup Project Talango) and other big and smaller surrounding villages must go to Durjai Basic Health facility which is at the distance of 14 KMs. The residents of village Haji Laong (sub project Haji Photo) have a private clinic in their village and get treatment and medicines from the private clinic. The inhabitants from Sub project Moidan 1 (Attur Khan Village) travel to taluka hospital at the distance of 50 KMs to avail treatment. Residents from Sub project Moidan-2 (village Haji Warial Bandejo) must cover 80 KMs to reach taluka Hospital or hospital in Karachi to get treatment. The residents of village Mureed Burfat (subproject Vaan Khand must travel 40 KMs to avail treatment from nearest BHU and in case of emergency they have to travel 80 KMs to avail treatment from Health facilities in Karachi. Residents from village Abdul Hakeem (subproject Sangar Nadi 2) must travel 30 KMs to avail treatment from nearest BHU at Sari. For emergency treatment in Taluka or district hospitals the residents of the sub project villages must hire jeeps and have to incur heavy expenses. For this the FGD participants said that the poorest must sell livestock head (s) and other family assets to avail treatment in case of serious illness. The FDGs participants shared that for common diseases like fever, influenza, skin diseases and bouts of malaria and diarrhea etc, the average expenses incurred on common diseases was cited as 15,000 to 20,000 monthly and in case of emergency like serious illness, delivery etc they have to spend PKR 100,000 or more depending on the seriousness of the ailments. The participants shared that due to difficult and long distance some of the serious patients die on the way to hospital or on reaching hospital their condition further aggravates due to difficult way.

6.7 Transport Facilities in subproject area.

The majority of the residents said during FGDs that they use private transport like buses, pickups and Rikshaws for commuting in the sub project area or travailing to taluka and district headquarters. Almost all sub project villages don't have link roads. The area is sandy and mountainous. Jeeps are used in areas with unpaved ways and the majority use motorbikes as the only viable and affordable mode of transport in such areas. Few wealthy families have their own cars. The majority of the residents also widely use motorbikes for short distance travailing. There were 26 vans and pickups, 11 trucks and buses, 09 cars, 23 Rickshaws, 07 tractors and 630 motorbikes in the sub project villages. Figure 6-5 shows photos of transportation facilitate in sub project area and Table 6-4 transport facilities in the Sub-Project Area

Table 6-4: Transport facilities in the Sub-Project Area

Name of sub-project	Van/Pickup	Bus/ Truck	Car	Rikshaws	Tractors	Motor Bike	Distance from Village to Main Road (km)
Chanari and Veer	0	2	0	0	0	100	10
Babu Khan	2	0	0	0	0	05	13
Kal	0	0	0	4	1	73	13
Sangar Nadi 2	0	0	0	0	0	05	8
Haji Fhoto (old Mehboob)	10	6	4	1	0	10	50
Shaam	1	0	1	0	1	6	60
Kotharo	0	0	0	1	0	20	12
Khakhar	0	0	0	0	0	03	19
Garrouk	0	0	0	10	0	6	9
Talango	0	0	0	0	0	105	10
Muhammad Yousuf	0	0	0	0	0	10	23
Mathal Dam	0	0	0	0	0	09	24
Haji Imam Bux	0	0	1	4	2	40	11
Atho Nadi (Pathan Goth)	3	2	0	0	0	45	24
Sanyasi	5	0	0	0	0	60	55
National Park	1	0	0	1	0	14	22
DhaniBuxBikak	1	0	0	0	1	02	20
Sundi Nai	1	0	0	0	0	25	18
Thado Nai	1	0	1	1	0	13	32
Abdullah Kanro	1	0	0	0	0	10	42
Moidan 2	0	0	0	0	0	13	57
Moidan	0	0	1	0	01	18	43
Shaan 2	0	0	0	0	0	03	44
Vaan Khand	0	0	1	0	1	20	24
Mole-01	0	1	0	1	0	15	25
Mole-00 (Murad Barijo)	0	0	0	0	25	70	14
Total	**26**	**11**	**09**	**23**	**32**	**700**	

Transport facliites in subproejct area

Figure 6-5: Transportation Facilities in the Sub-Project Area

6.8 Priority Needs of Community

During consultation meetings with the male and female groups, they prioritized their needs. The ranking of prioritized needs is derived from the individual rankings of priorities generated from the discussion with the separate groups in each village. Priority needs of the community, which may not be relevant to the project), but were identified are summarized as follows.

- making the existing dysfunctional schools functional
- Provision of mobile phone coverage
- Provision of water supply facilities through pipeline in the village where ground water is brackish.
- Provision of Basic health facilities for the population of subproject villages
- Provision of male vocational centers for the youth
- construction of road pavement and link roads
- provision of education facilities and opening the closed schools in the subproject villages
- prevision of solar run tub wells for dirking water purposes

6.9 Archaeological and Cultural Heritage

Saint and shrines are highly respected by the local communities during baseline survey no archaeological sites were found in the impact zone of dam sites and no graveyard is situated within the sub-projects impact area. However, at district level the area has a rich cultural and historical background with various ancient sites.

7. STAKEHOLDER CONSULTATION AND INFORMATION DISCLOSURE

Stakeholder consultations have been conducted according to the Stakeholder Engagement Plan (SEP) of the SCRP. The objective of conducting stakeholder consultations during the ESMP process was to inform all the stakeholders about the project, take into account their opinions, suggestions and concerns, and establish confidence amongst the project stakeholders that the project was developed in a responsible way. This was achieved by informing the stakeholders in a timely manner about the proposed project, its potential consequences on the environment and local community, and by seeking their informed input.

The objective of conducting stakeholder consultations during the ESMP process was to inform all the stakeholders about the project, consider their opinions, suggestions and concerns, and establish confidence amongst the project stakeholders that the project was developed in a responsible way. This was achieved by informing the stakeholders in a timely manner about the proposed project, its potential consequences on the environment and local community, and by seeking their informed input.

7.1 Consultation

This section provides the objectives, process and outcome of the stakeholder consultation conducted as part of the ESIA. The main objective of consultations was to disseminate the subproject information and to incorporate recommendations/ concerns of the stakeholder's particularly the local communities in the subproject design and implementation plan. Subproject stakeholders were identified through an initial social impact assessment of each subproject. Stakeholder consultations were carried out during the preparation of the subproject through community meetings, focused group discussions and interviews of the key informants.

7.2 Stakeholder Selection

There are two types of stakeholders, i.e. primary and secondary stakeholders. In accordance with the World Bank guidelines, the primary stakeholders are the initial stakeholders, such as households being affected by the sub-project and local people including women located in and around the sub-project area. The secondary stakeholders for the sub-project are the representatives of Government Departments/agencies involved in the planning, design, implementation, and operation of the sub-project, including various provincial government departments such as City/District Administration, Environment Protection Agency Revenue Department, Irrigation Department, Public Health Engineering and Social Welfare Department etc.

7.2.1 List of stakeholders

a) Provincial Disaster Management Authority (PDMA)

b) Sindh Environmental Protection Agency (SEPA)

c) Sindh Irrigation & Drainage Authority (SIDA)

d) Sindh Barrage Improvement Project

e) Worldwide Fund for Nature (WWF)

f) District Administration

g) Sindh Wildlife Department

h) Male community members including farmers, herders, local religious leaders, school teachers and persons from other various fields of life inculcating affected persons and from vulnerable sections of the population in sub-project area.

i) Female community members

7.2.2 Engagement Approach

A site visit was carried out to identify all stakeholders that either reside or work in the project vicinity and conduct an initial identification of potential positive and negative impacts. The primary stakeholders are the local communities living in and around the nearby project sites that will face direct significant impacts. The secondary stakeholders include representatives of relevant local, provincial, and federal government departments, utility companies, and NGOs.

For the community-level consultations, three days before the consultations, representatives from different walks of life and community leaders from the community were approached to invite them to the consultations to ensure their active participation in the consultation sessions. During this invitation process, the location, date, and time of the consultation were shared with the stakeholders.

7.3 Community Consultation with male community members from Sub-Projects areas.

The consultation was carried out during field visits conducted in July and September 2022, December 2023, January and May 2024. Meetings were arranged in open locations or rooms with cross ventilation. Face-to-face community interaction was conducted in small groups in suitable locations allowing for light, air, and for participants to sit at a reasonable distance. Field team comprising on the Environment and Social Safeguard Consultants along with staff of concerned sub-divisions of Sindh Irrigation Department visited the nearby villages of dams' sub-projects to get the views of the people of the sub-project, who are going to be affected and beneficiaries. The communities' representatives and other key stakeholders appreciated the Sindh Irrigation Department for taking up the initiative for building small dams to recharge groundwater. The community was eager to have small dams in their areas. According to the community, these small dams would serve water requirements for human population, agriculture, and livestock. Detailed consultation has been conducted with these villages.

Total 401 male from sub project villages took part in community consultation. The communities' representatives and other key stakeholders appreciated the Sindh Irrigation Department for taking up the initiative construction of a small dam in their area. The list of Villages, date of consultation and number of participants in Consultations with male community members is provided in Table7-1: and photos of consultation meeting with male are provided in Figure 7-1.

Table 7-1: List of Villages and Consultations (Male)

S #	Name of the Sub-Project	Name of the village	Date of Consultation	No of Participants
1	Chanari and Veer	Wadero Muhammad UmerLalani	18/09/2022	24
2	Babu Khan	Babu Khan	14/09/2022	15
3	Kal	Hassan Shehno	02/09/2022	16
4	Sangar Nadi 2	Abdul Hakim	11/05/2024	15
5	Haji Fhoto (old Mehboob)	Haji Laong	11/12/2023	17
6	Shaam	Faqir Muhammad Khoso	11/12/2023	14
7	Kotharo	Ali Khan Chhuto	06/09/2022	15
8	Khakhar	Muhammad JumanChhuto	11/09/2022	21
9	Garrouk	Shah Muhammad Chuto	06/09/2022	12
10	Talango	Shah Muhammad Chhutto	22/12/2023	13
11	Muhammad Yousuf	Muhammad Yousuf chhuto	19/09/2022	23
12	Mathal	Razaq Dino Burfat	28/07/2022	16
13	Haji Imam Bux	Haji Imam Bux	28/07/2022	16
14	Atho Nadi	Pathan Goth	27/07/2022	21
15	Sanyasi Dam	Sanyasi alias Kandani	23/07/2022	22
16	National Park	Jan Muhammad Khaskhaili	28/07/2022	15
17	Dhani Bux Bikak	Dhani Bux Bikak	28/07/2022	10
18	Sunda Nadi	Bhai Khan goth	28/07/2022	14
19	Thadho Nadi	Gazi Khan Buro	08/09/2022	21
20	Abdullah Kanro	Abdullah Kanro	27/07/2022	17
21	Shaan 2	Ghulam Qadir	21/12/2024	11
22	Moidan	Attur Khan	12/12/2023	10
23	Moidan 2	Haji Warial Bandejo	12/12/2023	9
24	Vaan Khand	Mureed Burfat	12/5/2024	14
25	Mole-01 Dam	Ghulam Barejo	03/01/2024	07
26	Mole-00 Dam	Mangnio Barejo	10-12-2023	13
	Total			**401**

Consultation with male in village Haji Loang (sub project Haji Fhoto, old Mehboob)

Community consultation with male community members at village Shah Muhammad Chhuto (sub project Talango)

Community consultation with male at village Ghulam Barejo (Sub project Mol-1)

Community consultation with male community members at village Faqir Muhammad Khoso (Sub project Shaam)

Consultation with community members in village Pathan Goth (subproject Autho Nadi)

Community consultation with male community members in village Abdullah Kanro (subproject Abdullah Kanro)

Community consultation with male community members in village Bhai Khan Burfat (Subproject Sundi Nai)

Community consutlation with male Community members in subproject Sanyasi Dam

Community consultation with male in village Haji Imam bux (Subproject Haji Imam Bux)

Community consultation with male in village Ghulam Qadir (subproject Shaan2)

Community consultation with male in village Attur Khan (subproject Moidan 1)

Community consutlation with male in village Haji Warial Bandejo (Subproject Moidan 2)

Community consultation with male in village Razaque Dino Burfat (Subproject Mathal)

Community consutlation with male community members in village Abdul Hakeem, Subproject Sangar Nadi

Community consultation with male community members in village Mureed Burfat, Subproject Vaan Khand

Community consultation with male community members in village Dhani Bux Bikak (Subproejct Dhani Bux Bikak)

Figure 7-1: Public Consultations with male community members at Sub-Project Area

7.4 Community Consultations with Females of the Sub Project Areas

During the survey, consultations with women were also conducted, where local males were discouraged from attending. Sessions were conducted with women in 26 sub-project areas, while total attendees were 320. In some subproject villages, due to their traditional constraints and in some villages' consultation with female was allowed but taking of photos was prohibited. The details of the project were described and explained using simple language. During the meetings the women were encouraged to ask questions and share their views and concerns related to the project, which were noted accordingly. They were informed that with the successful completion of the sub-projects, these will boost the living standard of the inhabitants through conservation of the flood flows and to utilize the same for irrigation and other purposes etc. They were happy and shared that these sub-projects are most important for their better livelihood and also help them during drought period. They also told that these sub-projects will leave positive impacts on women and their livestock. Table

7-2: List of villages visited during the women consultation whereas Figure 7-2: Female Community Consultation Meetings in the Sub-Project Area.

Table 7-2: List of Villages and Consultations (Female)

S #	Name of the Sub-Project	Name of the village	Date of Consultation	No of Participants
1	Chanari and Veer	Wadero Muhammad Umer Lalani	18/09/2022	14
2	Babu Khan	Babu Khan	14/09/2022	11
3	Kal	Hassan Shehno	02/09/2022	19
4	Sangar Nadi 2	Abdul Hakim	11/05/2024	12
5	Haji Foto	Haji Laong	11/12/2023	15
6	Shaam	Faqir Muhammad Khoso	11/12/2023	14
7	Kotharo	Ali Khan Chhuto	06/09/2022	12
8	Khakhar	Muhammad Juman Chhuto	11/09/2022	10
9	Garrouk	Shah Muhammad Chuto	06/09/2022	13
10	Talango	Shah Muhammad Chhutto	22/12/2023	9
11	Muhammad Yousuf	Muhammad Yousuf chhuto	19/09/2022	20
12	Mathal	Razaq Dino Burfat	28/07/2022	12
13	Haji Imam Bux	Haji Imam Bux	28/07/2022	9
14	Atho Nadi	Pathan Goth	27/07/2022	12
15	Sanyasi Dam	Sanyasi alias Kandani	23/07/2022	14
16	National Park	Jan Muhammad Khaskhaili	28/07/2022	12
17	Dhani Bux Bikak	Dhani Bux Bikak	28/07/2022	19
18	Sunda Nadi	Bhai Khan goth	28/07/2022	9
19	Thadho Nadi	Gazi Khan Buro	08/09/2022	18
20	Abdullah Kanro	Abdullah Kanro	27/07/2022	11
21	Shaan 2	Ghulam Qadir	21/12/2024	13
22	Moidan	Attur Khan	12/12/2023	9
23	Moidan 2	Haji Warial Bandejo	12/12/2023	9
24	Vaan Khand	Mureed Burfat	12/5/2024	8
25	Mole-01 Dam	Ghulam Barejo	03/01/2024	9
26	Mole-00 Dam	Mangnio Barejo	10-12-2023	07
			Total	**320**

Community consultation with females at village Pthan Goth (Subproject Atho Nadi)

Community consultation with females at village Abdullah Kanro (Subproject Abdullah Kanro)

Consultation with female community members in village Faqir Muhammad Khoso (Sub project Shaam)

Consultation with female community members in village Haji Laong (Subproject Haji Fhoto old Mehboob)

Community consultation with women at village Abdullah Kanro (subproject Abdullah Kanro)

Community consultation with women at village Pathan Goth (subproject Atho Nadi)

Figure 7-2: Female Community Consultation Meetings in the Sub-Project Area

During consultation process, the participants were briefed that the barren land/ excavated earth will be used for borrowing material and contractor will be bound to take borrow material from nearby areas from proposed small dam sites. If material borrowed from private land or someone want to sell the material, the contractor will have to have a written agreement with the landowner and after completion, the contractor will restore the land as per approved site-specific environmental management plan. They were also informed that continuous liaison with the local community will be maintained to update them about the status of sub-projects implementation. Their complaints, if any, will be redressed through the Grievances Redress Mechanism. It will provide the local community with a chance to address their concerns during construction activities. During public consultation/ interviews, the people of the sub-project areas were fully involved, and they came up with positive conclusion: Some comments/observations with actions/ responses from the community (male and female) are as follows.

Comments /Observations	Action /Response
There are no restrictions of women mobility in the sub project area, and they freely and fearlessly collect firewood, take care of livestock and fetch water. With the influx of outsider labor, this free women mobility is supposed to be interfered. And thus, women mobility might be restricted by community.	Imparting cultural sensitization training under the induction program for new employees would be undertaken and ensured. Furthermore, specific clause would be made part of contract/biding document, specifying no interaction of labor with women and children.
The community members repeatedly requested provision of basic facilities like education, health and electrically	Noted
There is poverty and unemployment in the area. The Local unemployed labor should be given employment opportunity. This request was strongly made by participants during community consultation meeting from sub project area.	During community consultation meetings and FGDs the participants were briefed about the sub project with specific reference to the preference that preference would be given to hire local labor
The area is an arid zone and drinking water as well as water for livestock is the main problems of the area. he said that due to shortage of the water, large number of the local residents have migrated to other area and the after the constriction of the dam they are expected to return	appreciated
Participants of community consultation meeting expressed their view that they should be shared with proper information about the salient features of the sub projects	Participants were briefed about the sub-project in detail during focus group discussion, interviews, and consultation meeting for preparing ESIA's ESMP. They were informed that community members are on board and are aware about the sub-projects, while the interaction between sub project and community would be ongoing process throughout sub project life.
The participants from village Abdul Hakeem (subproject Sangar Nadi) suggested that, if possible, the site of the dame should be shifted to more suitable location, or another dam should also be constructed on other nearby site which would also benefit the villagers of the surround villages.	Noted

Keeping in view of the comments and responses, it is essential that the concerns of people may be addressed by applying good governance and management practices before and during the construction work.

7.5 Consultation with taluka and District level stakeholders

A meeting was held with the following stakeholders at Taluka headquarter Thano Bula Khan. The stakeholders were requested in advance to spare time for the consultation, and the purpose of the consultation meeting was also shared with them in advance.

The during consultation meeting, president of the Mehran Development organization said that his organization is striving for community empowerment through education, health facilities and helping them during natural disaster like drought. He said that he provided food ration during covid-19 related lockdown to Muslim and non-Muslim. He said that his organization is coordinating with Education departments to revive and revamp education.

TEOs primary and elementary, when their attention was drawn to the community priority needs during community consultation, where education facilities was prioritized as one of the main need, the TEOs said that due to retirement of large number of the teachers, the education department is facing acute shortage of local teachers. They said that they have noted the needs of the communities and would take steps to provide education facilities to the sub project villages. They said that before mobilizing government teachers, they have been making efforts to also mobilize philanthropists to open schools and hitherto they have succeeded in mobilizing resources for 12 schools from private and philanthropist's entities and individuals.

The district level stakeholders were approached in advance individually and were invited/requested for time for the consultation, during invitation process; they were briefed about the sub project. On the manually agreed date, time and venue, the meetings were held with main NGOs working in sub project villages and concerned District department.

Mr Ali Muhammad Kallar, senior Program Manager Thardeeep Rural Development Program (TRDP). said that his organization has worked in the past on rural development initiatives in the sub project area and at present, the enumerators in the sub-project area are validating the survey data under Sindh flood Emergency Housing Construction Project. Representatives of IRC NGO said that his organization is working on education with support of Sindh Education foundation in the area. He said that although his organization has no intervention in the sub project villages but would include the villages in future. Both the representatives of NGOs thanked the shared community need and information about the project, they appreciated Sindh Irrigation Department for launching small dam initiatives in the area where these are most needed. The women development department in charge said that her department has established shelter home where victims of violence against women are shelter and provided required support.

The livestock department said that due to scattered population and difficult terrain, there is only one veterinary facility in the sub project area and that too faces staff punctuality problems. The representatives of the livestock department said that they are involving local NGOs and volunteers to provided vaccination and other treatment services for livestock through series of livestock camps.

The population welfare department representatives shared that their department is creating awareness and services though their centers as well as through medical camp where besides provide population planning consultation and services, the checkup and medicine for other ailments is also provide. They said that the population welfare department is also providing skill development to youth for enabling them for decent livelihood.

Consultation meeting with TEO, primary and elementary (male) at Thano Bula Khan

Consultation with President Mehran Development Organization (NGO) at Thano Bula Khan

Figure 7-3: Shows Consultation with Taluka level stakeholders.

Consultation with TRDP, NGO

Consultation with IRC, NGO

Consultation with local Educationist

Consultation with Livestock department

Consultation with Social Welfare Department

Consultation with PPHI, Jamshoro

Consultation with population Department

Consultation meeting with women Development Department

Figure 7-4: Shows consultation with District level stakeholders.

Meeting with DC Malir

Consultation meeting with HANDS, NGO Malir

Consultation with Public School Gadap, Malir by Sindh Graduate Association, (SGA)

Meeting with staff of Government College, Gadap, Malir

Meeting with PPHI staff Gadap, Malir

Figure 7-5: Shows consultation with Taluka and District level stakeholders at Malir.

7.6 NGOs working in the Sub-Projects Area

7.6.1 Health & Nutrition Development Society (HANDS)

HANDS is a national NGO working mainly in the health and education sectors in the sub-project area. The organization is working on several projects including community midwifery

school, rural health Centre (RHC), rural based community schools, SEF assisted schools and take a child to school project.

7.6.2 The Sindh Graduates Association (SGA)

Sindh Graduate Association (SGA) is a nonprofit social organization working for the uplift of the society and striving for the promotion of education for the poorest people of the Sindh province. SGA is operating Public School in the subproject area.

7.6.3 Thardeep Rural Development Program (TRDP)

Thardeep Rural Development Programme (TRDP) is a not-for-profit integrated rural development programme. TRDP works with poor and vulnerable segments of society particularly women in the most deprived and remote areas of Sindh Province.

Social mobilization is the foundation of the TRDP program. With participation of community institutions, TRDP implements activities under five major themes: 1) sustainable livelihoods, enterprise development and poverty graduation, 2) elementary education with focus on girl's education, 3) mother and child health, 4) food security and nutrition improvement and 5) disaster preparedness, management, and water & sanitation.

Table 7-3: List of Stakeholders with the date of consultation

Stakeholders	Date of Consultation
Health and Nutrition Development Society (HANDS)	September 26,2022
Sindh Graduate Associate (SGA)	September 27,2022
Thardeep Rural Development Program, Hyderabad @ Jamshoro	September 27,2022
Indus Resources Center (IRC), Jamshoro	January 1, 2024
Women Development Department, Jamshoro	January 1, 2024
Education Department, Jamshoro	January 1, 2024
Livestock Department Jamshoro	January 1, 2024
Population welfare Department Jamshoro	January 1, 2024
Social Welfare Department Jamshoro	January 1, 2024
Consultation with PPHI, Jamshoro	January 1, 2024
Consultation with Principal of Public school Gadap	February 27.2024
Consultation with HANDS NGO, Gadap, Malir	February 27.2024
Consultation with BHU Gadap, Malir	February 27.2024
Consultation with staff of Govt College Gadap, Malir	February 27.2024
Taluka Education Officer (Male), Thano Bula Khan	December 11, 2023
Taluka Education officer, Elementary (Male)	December 11, 2023
President of Mehran Development Organization Thano Bula Khan	December 11, 2023

Table 7-4: Summary of concerns raised by stakeholders.

Comments/Observations	*Actions Responses*
The stakolders pointed out the construction of roads to the villages as one of the most important need.	It was responded that there is no provision of the construction of the roads under sub-projects. and it was suggested that the representatives of the villages should apraoch the concerned government depratment for construction of the roads to the villages.
The stakeholders apreciated Sindh Irrigation Department for consturction of the small dams and shared about shortage of the water as main problem in sub-project area. Thus they stated that after the construction of the dams, undergound water would rise and help in sloving water shortage problme. .	Noted
The stakeholders sugested that locals should be involved at all stages of subprojects, that they can feell sense of ownership and take care of the subprojects, after their completion	Noted and shared that community consulation is ongoing processs with the communtiy and local stakehodlers and they are invovlved in the subproject at every stage by seeking their sugesetion and coopration for the implmention and sustaiabliity of the subprojects
The stakeholders suggested that camp sites should be established on reasonal distance from the villages popualtion to aviod any inconvinvence to the female in their moblity to collect fire wood/grass and fethcing water etc. The stakeholdrs also suggested repecting of the local tradtions.	The stakeholerds were assured that local cultural values and traditions will be fully respected and the labor camps would be estbslihed away from Villalges
The stakeholders suggested for sharing the list of the proposed dams alongwith beneficiary villages So that they may also cover these villages through their interventions.	The list was shared with stakeholders, This will help in covering these Villages with intervention by the NGOs.

7.7 Additional Consultation with Institutional Stakeholders

An additional round of institutional consultations was conducted with the representatives of government departments such as the Sindh Forest Department, Sindh Wildlife Department, Social Welfare Department, Women Development Department, and major NGOs working for environmental conservation including IUCN and WWF. In these stakeholder consultations, the identified institutional stakeholders were briefed about the salient features of proposed sub-projects and their opinions about the sub-projects were requested. The list of identified institutional stakeholders and the date of consultations with their representatives are given in Table – 7-5.

Table 7-5: List of Additional Consultation with Institutional Stakeholders

Stakeholder	*Date of Consultation*
IUCN	March 10, 2023
WWF	March 10, 2023
Sindh Forest Department	March 10, 2023
Sindh Wildlife Department	March 10, 2023

Stakeholder	*Date of Consultation*
Social Welfare Department	March 11, 2023
Women Development Department	March 11, 2023

Table 7-6: Summary of Concerns Raised by Institutional Stakeholders And suggested extended by them during Additional Consultation

Comments/Observations	*Actions Responses*
It was suggested by the stakeholders that during the construction phase, local traditions and customs need to be valued and respected. The camp office should be established away from the villages/settlements.	It was assured that local cultural values and traditions will be given full consideration and site camps will be established away from the villages.
The stakeholders pointed out that currently, women from sub-project areas walk long distances to fetch drinking water.	They were informed that with the construction of the small dams in the sub-project area, the groundwater in the area will be recharged and subsequently it would help the women have easy access to drinking water.
The stakeholders from basic health facilities in the subproject area said that due to frequent droughts, groundwater has gone down and has turned brackish in subproject villages, therefore there has been a recurring outbreak of waterborne and other related diseases.	They were informed that with the construction of the small dams, the groundwater would be recharged, which will improve drinking water quality and result in the reduction of water-borne and other ailments. this they said would improve the health of the people in the sub-project area and result in reducing medical expenses and this will help in reducing poverty.
The stakeholders sugested that community needs like health, educaiton, road communication and other missing faclites should be noted and shared with concerned deparements and relvevent stakholdhers	The stakehodlers during the consulation meetings were informed that this is being done during community consulation and the needs are shared with relvavnt deparments during taluka and district level stakehodlers.
The stakeholders were of the view that the sub-project area is arid and during the drought period trees and other vegetation is highly affected. They said that such type of small dams would not only benefit the area people but bring positive impacts on the overall environmental conditions.	They were informed that these small dams would also benefit the wildlife species including bird populations and the flora of the area.
The stakeholders suggested that the construction camp must be established outside the hotspot areas with the fence to avoid wildlife encounters.	Barricaded camps have been proposed for all small dams. Camp activities will be kept confined within the boundary area, activities will not be allowed from dawn to dusk timing.
The stakeholders suggested that the construction of small dams would lead to improvement in overall socioeconomic conditions in the sub-project areas.	Noted
The stakeholders suggested that lower riparian of small dams should not be affected	The small dams will recharge the groundwater and percolation would take place towards downstream areas. As a result, the downstream communities would be major beneficiaries of the dams.
The stakeholders suggested that, construction of local road pavements for the local communities as they can easily move.	Though this is not in the purview of the project. However, the communities may approach relevant departments.

Comments/Observations	*Actions Responses*
The stakeholders expressed that small dams are much more beneficial as compared to large dams and such small dams must be constructed on a priority basis in water-scarce areas.	The small dams provide a simple, reliable and manageable solution to water scarcity.
The majority of the stakeholders expressed their positive views related to the construction of small dams.	The construction of small dams will ensure the availability of water. The construction of the small dam in this area will supplement and further enhance the wild habitat, which ultimately supports food and shelter, particularly for fauna and flora.

7.8 Information Disclosure

As disclosure requirement, the environmental and social management framework (ESMF) has been uploaded on the SRP Sindh irrigation department website, while an executive summary of ESIA of the reported sub-projects will be translated into Sindhi after approval from the World Bank same will also be uploaded on the website of SCRP irrigation department. In addition to this, ESIA documents will be made available at the campsites.

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8. ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATIONS

8.1 Major Social & Environmental Impacts and Mitigations

The reconnaissance field visit was carried out to assess the social and environmental impacts of the activities to be undertaken for the construction of Small Dams/Weirs. A checklist showing rapid assessment of potential environmental and social impacts, mitigation measures and residual impacts after mitigation reveals that the project activities will not cause significant disturbance and inconvenience to the local community and natural environment of the area. All the impacts that have been identified during the reconnaissance are associated with the construction phase and minor to moderate in risk and can easily be mitigated through planning or adopting appropriate management measures that are included in this ESIA. The minor impacts can be resolved through the best management practices. Social impacts such as getting borrow pit area, hiring laborers and setting up of labour camp will be mitigated according to applicable policies and procedures. The sub-projects will be highly beneficial for the inhabitants of water-scarce areas of lower Kohistan. The nature and scope of the construction activities would bring a number of associated potential social and environmental impacts.

8.1.1 Impact Characteristics[5] (Assessment of Significance)

The assessment of effects and identification of residual significance takes account of any incorporated mitigation measures adopted due to any impact of Project activities and is largely dependent on the extent and duration of change, the number of people or size of the resource affected, and their sensitivity to the change. Impacts can be both adverse and beneficial and the methodology defined below has been applied to define both beneficial and adverse impacts of the project. The criteria for determining significance are specific for each environmental and social aspect but generally, the magnitude of each impact is defined along with the sensitivity of the receptor. Generic criteria for defining magnitude and sensitivity are summarized below:

8.1.1.1 Magnitude

The assessment of magnitude will be undertaken in two steps. Firstly, the key issues associated with the Project are categorized as beneficial or adverse. Secondly, impacts will be categorized as major, moderate, minor, or negligible based on consideration of the parameters such as:

- Duration of the impact.
- The spatial extent of the impact.
- Reversibility.
- Likelihood (something probable)

8.1.1.2 Sensitivity

The sensitivity of a receptor will be determined based on the review of the population (including proximity/numbers/vulnerability) and the presence of strategic/sensitive features

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

on the site or in the surrounding area. The significance of impacts will generally be identified according to the categories outlined in Table 8-1.

Table 8-1: Impact Significance Criteria

Impact Characteristics	Category
Nature of the Impact	**Direct**: The environmental parameter is directly changed by the project. **Indirect:** The environmental parameter changes as a result of the change in another parameter.
Duration of the impact	**Short term:** Lasting only till the duration of the project such as noise from the construction activities. **Medium-term:** Lasting for a period of a few months to a year after the project before naturally reverting to the original condition such as contamination of soil or water by fuels or oil. **Long term:** Lasting for a period much greater than medium-term impacts before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical Location of the impact	**Local:** Within the area of the project i.e. operation site and access road. **Regional:** Within the boundaries of the project area. **National:** Within the boundaries of the country.
Timing	**Construction** **Operation**
Likelihood of the impact	Qualitatively measured on a scale of: **Almost certain:** Impact is expected to occur under most circumstances. **Likely:** Impact will probably occur under most circumstances. **Possibly:** Impact may occur at some time. **Unlikely:** Impact could occur at some time. **Rare:** Impact may occur but only under exceptional circumstances.
Consequence severity of impact	Rated as: **Major:** When an activity causes irreversible damage to a unique environmental feature; affects an entire population or species of flora or fauna in sufficient magnitude so as to cause a decline in abundance or change in distribution over more than one generation; has long-term effects (years) on socio-cultural or economic activities of regional significance. **Moderate:** When an activity causes long-term (period of years) reversible damage to a unique environmental feature; affects a portion of a population of flora or fauna causing reversible damage or change in abundance or distribution over one generation; has short term effects (months) on socio-cultural or economic activities of regional significance. **Minor:** When an activity causes short term (period of few months) reversible damage to an environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period of time; has short-term (months) effects on socio-cultural or economic activities of local significance. **Negligible:** When no measurable damage to the physical, socio-economic, or biological environment above the existing level of impacts occurs.
Significance of the impact	Categorized as **High, Medium, or Low** Based on the consequence, likelihood, reversibility, geographical extent, duration, level of public concern and conformance with legislative or statutory requirements.

A- MAJOR ENVIRONMENTAL IMPACTS AND MITIGATIONS

It is estimated that 136 trees need to be removed for the construction of the 26 small dams none of them is endangered as per the IUCN list. During the baseline survey of the sub-project area, no endemic or rare species were observed in the primary impact zone as well as the secondary impact zone. All species recorded during the field survey have a wide range of distribution. Since the campsite will occupy small areas and will be located in existing clearings, the impacts are reversible and localized by adopting mitigation measures.

In Table 8-2 all the anticipated environmental and social risks and impacts of sub-project activities are based the on the significance criteria given above.

Table 8-2: Environmental and Social Risks and Impacts

Anticipated E&S Risks and Impacts		Significance		
		High	Medium	Low
1	Land Acquisition, Resettlement (LAR), and Compensation			Low
2	Air Pollution		Medium	
3	Installation and Operation of Batching Plant	High		
4	Water Pollution			Low
5	Noise Pollution			Low
6	Waste Management	High		
7	Watershed Erosion and Sedimentation			Low
8	Traffic Management	High		
9	Impacts on Biodiversity/ Disturbance on Ecosystems	High		
10	Anticipated Impacts on Aquatic and Terrestrial Fauna			Low
11	Dam Breach Study		Medium	
12	Occupational Health & Safety	High		
13	Community Health & Safety		Medium	
14	Land Use Changes			Low
15	Cultural Heritage			Low
16	Labour Influx		Medium	
17	Gender Base Violence (GBV), Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH		Medium	
18	Child Labour		Medium	
19	Lack of Community Engagement		Medium	
20	Cumulative Impacts on Valued Ecosystem Components		Medium	

8.2 Land Acquisition, Resettlement (LAR), and Compensation

No land acquisition has been envisaged as the proposed sub-project area. Interventions will be carried out on government-owned land.

8.2.1 Mitigation Measures for LAR

No land acquisition is envisaged. Efforts will be made to minimize unforeseen LAR and economic resettlement issues.

8.3 Air Pollution

8.3.1 Impacts of Air Pollution

During the construction phase of the proposed sub-project, some adverse impacts on the ambient air by suspended dust and noise are foreseen. As per ESS3 of ESF 2018, the

contractor must comply with the requirements for resource efficiency and pollution management and prevention. To meet this requirement, the contractor will prepare a Pollution Prevention and Management Plan (focusing on dust) before the start of the construction activities.

The batch plant will require cement and dry sand gravel to be fed into a mixing chamber, and the addition of water to make concrete. Considerable fine dust will be emitted when bagged cement is loaded manually into the batch plant hopper, as well as with the conveyor system bringing the materials to the plant.

Air quality would be disturbed during the construction stage due to vehicular movement, and the release of particulate matter $PM_{2.5}$ from vehicular emission. Construction activities will generate dust and pollute the surrounding area. The emission from the machinery used in earthwork activities will also degrade the air quality of the site. The exhaust of noxious gases from the movement of heavy machinery will further pollute the air, which will adversely affect the health and vigor of plants. Smoke emissions from vehicular movement and heavy machinery would slightly cause the smoke problem in the nearby villages, which are located near the construction areas.

8.3.2 Air Pollution Mitigation Measures

Dust from the cement work will be avoided by using bulk cement brought to the plants in large tanker trucks and transferred to the plant hoppers via a closed system. Batch plant/s will need to be equipped with dust suppression equipment, now standard on most such facilities, or which can be easily retrofitted.

- Air pollution has to be effectively mitigated by adopting the following preventive measures. In accordance with ESS3 of ESF 2018, the contractor is obligated to adhere to resource efficiency and pollution management and prevention guidelines. To fulfill this mandate, the contractor will create a Pollution Prevention and Management Plan, with a specific focus on addressing dust-related concerns, prior to commencing any construction activities. The Contractor will be required to have approval (from The Construction Supervision Consultant) for the dust abatement plan/Pollution Prevention Plan.
- Regular spraying of water should be undertaken to minimize dust pollution. The water would be obtained from tube wells installed by the Contractors or maybe grey water from the camp areas and reuse of wastewater from the batching plant.
- All vehicles, machinery, equipment, and generators used during construction activities will be kept in good working condition to minimize exhaust emissions & limit the idling time of construction vehicles to 2 minutes to minimize local air pollution.
- Enforce the maximum speed limit to 10km/h for vehicles to reduce dust emissions.
- Native species trees shall be planted, and no rapidly growing trees, shrubs and grasses in the sub-project area shall be allowed during the operation stage of the sub-project with the collaboration of the Forest department.
- Conduct ambient air quality monitoring as per SEQS periodically as per the Environmental Management Plan (EMP).

8.4 Installation and Operation of Batching Plant

8.4.1 Adverse Environmental Impact:

The dust emission could cause skin and respiratory diseases e.g. skin rashes, lungs problem, etc.

8.4.2 Mitigation Measures:

- Air quality should be monitored as per EMP near the plant.
- The plant should be located at least 500m away from any settlement. The plant should not be operated outside working hours.
- Regular spraying of water should be carried out to minimize dust pollution.
- The fitness certificate must be produced by the Contractor to avoid unacceptable emissions. CO and smoke emission & noise monitoring tests will be carried out.
- Proper PPEs should be issued to the site workers and measures should be adopted to ensure that the workers will wear the PPEs properly when working on-site.
- The following additional control measures need to be implemented regarding KNP.
    - The plant must be a **Zero zero-emission plant** installing a new plant/ computerized and automatic plant. This will include using washed aggregated and enclosed cyclones with an automatic injection system of the material into the mixing chamber.
    - The plant area should be constructed and maintained on an impermeable layer to prevent contamination of water bodies from surface runoff.

8.5 Water Pollution

8.5.1 Water Related Impacts

During the construction stage, different types of activities such as cutting, earthwork, and concrete work would alternately result in deteriorating the surface water quality, over-extraction, water table impacts, and increased salinization.

A secondary adverse impact is the potential spillage of chemicals, hydrocarbons and other pollutants as part of the construction process as well as contamination arising from the improper disposal of wastes (organic and inorganic) at the camp and work sites. The groundwater, which is a source of drinking in subproject areas, may be potentially contaminated by the release of untreated sewage from construction camps. Water contamination due to spillage of liquid waste can also occur.

8.5.2 Water-Related Mitigations

The contractor will make his arrangements for drinking water and water for other uses, and will not rely on existing community resources, and will not extract from sources currently used by the community. After the mobilization of the contractor, the Contractor will identify the sources of water currently in use by communities and will mention the same in CESMP and this will also be monitored under the Resources Efficiency Standard.

The Contractor must provide the following facilities at each campsite: Latrines; lined washing areas; septic tanks, and soaking pits for toilet waste. Key mitigation measures are listed below.

- There should be proper septic tanks and soaking pits for sewage treatment and disposal, sewage/sanitation at camps and proper wastewater collection facilities. Wastewater effluent from contractors will be passed through an oil skimmer and to gravel/sand beds to remove oil/grease contaminants before discharging it into the water body/stream bed. The Septic tank and soak pit shall be covered properly to avoid any obnoxious smell in the surrounding areas. The soak pit will be built in absorbent soil and located 300 meters away from drinking water sources. Soak pits will be designed to accommodate wastewater generated during the total operation. Soak pit will be constructed such that surface runoff cannot enter the pits. At the time of restoration, septic tanks will be dismantled in place and backfilled with at least a 1m soil cover keeping in view the landscape of the surrounding natural surface.
- To overcome the drinking water contamination issue, at the construction camp/s, the contractor shall install a solar-operated domestic water filter/150GDP with Ultraviolet (UV) to ensure safe and healthy drinking water for the workforce.
- The contractor shall prepare and implement a spoils management plan under the supervision of PIU.
- The E & S team of PIC shall carry out regular monitoring of water quality and PIU will ensure regular reporting.
- Wastewater from laundry, kitchen washings and showers will be disposed of in separate soak pits.
- In case the soak pits are filled, greywater will be sprinkled over access tracks. A sprinkling of greywater will be done in a manner such that ponding of water is avoided.
- Water consumption will be monitored during the construction stage and records will be maintained to avoid any wastage.
- Diesel, oil, and lubricants should be properly stored following petroleum regulations. This will be the responsibility of the contractor.
- Appropriate arrangements will be made to stop stones and soil from slipping into the river water.
- Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets.
- Dispose of any wastes generated by construction activities in designated sites.
- Conduct surface quality inspection according to the Environmental Management Plan (EMP) while adhering to SEQS 2016.
- Community liaison will be maintained and GRM will be established at each sub-project site to address complaints related to waste disposal.

8.6 Noise Pollution

8.6.1 Impacts of Noise Pollution

An increase in ambient noise and vibration is expected due to the operation of heavy construction machinery such as bulldozers, excavators, pneumatic machinery, etc. Noise pollution generated by the activities is likely to have impacts on sensitive receptors located within 500 meters of the construction area. High ambient noise can have adverse psychological and physiological effects (increased blood pressure, sleep disturbance, etc.)

on communities near construction sites, and can also cause significant disturbance to local wildlife.

8.6.2 Noise Related Mitigation

Construction vehicles and machinery will be kept in good working condition and be properly tuned and maintained throughout construction work to minimize excessive noise/vibration.

Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach. The mitigations shall be to limit working hours to between 9 am and 5 pm, six days a week. Noisy construction work will be limited to normal working hours to minimize disturbance to nearby communities. When possible, noisy construction activities (e.g., concrete mixing) will be displaced from the construction sites to a distance of at least 2 kilometers from the nearest sensitive receptors. Construction schedules will be disclosed to communities in a 2-kilometer vicinity of proposed project intervention sites before beginning construction work. Ambient noise will be regularly measured to ensure that the thresholds set in the SEQS are not exceeded. Despite this, the affected communities will also demand to carry out noise monitoring in case of any complaint. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible.

8.7 Waste Management

8.7.1 Impacts of Waste (including Construction Waste Management & Disposal)

Proper management of waste is also important because of the risk that improper waste handling and disposal poses to human health and environmental degradation. Careless and indiscriminate open dumping of wastes can create unsightly and unsanitary conditions within the subproject area.

The total quantity of domestic waste generated will vary depending on the strength of labor that the contractor poses to use. Most of the laborers will be locals who will return to their homes at the end of the working day. A maximum of about 25 % of labour comprising mainly skilled labour will reside at construction camps at the peak of the works.

The contractor will never stockpile huge quantities of construction material within the working limits to reduce chaos in the sub-project area. The contractor will dispose of waste material on an immediate basis. The contractor will submit the construction waste management plan to a supervisory consultant for review and approval.

8.7.2 Mitigation for Waste

The waste dumping locations will be designated for construction debris and nonhazardous solid waste with the consultation of the respective Taluka Municipal.

The hazardous waste will be managed as part of the Waste Management Plan and disposed of through Sindh EPA-approved waste contractor under section 13 of the Sindh Environment Protection Act 2014. For solid wastes, the following mitigation measures are recommended:

- No waste will be disposed of in the field. All waste will be disposed of in the waste bins provided within the working area.

- Combustible noncombustible and hazardous waste will be temporarily stored on-site in the designated locations and handed over to approved waste contractors for recycling purposes and safe disposal.
- The labour (skilled and unskilled) will be provided with relevant training, and they will be encouraged to reduce and reuse waste wherever possible.
- The waste from camps will be collected regularly and transferred to the designated storage area at the sub-project site. This waste will then be transferred for final disposal with the cooperation of local admiration.
- The Waste Management Plan (WMP) will be drafted and approved by PIU. This will include detailed procedures for the collection and disposal of waste with each waste stream separately.
- The waste generated from the works shall be disposed of through SEPA certified vendor.

8.8 Watershed Erosion and Sedimentation

8.8.1 Impacts

As there would be no intervention in the watershed area, therefore no erosion is expected due to the construction activities of the dams. However, during the operation stage watershed erosion may result in the accumulation of silt in the reservoir resulting in the effective life of the dams. Proper watershed management is, therefore, required in the catchment area.

8.8.2 Mitigation for Sedimentation

The low-level outlet provided at the spillway will flush out sediment during high floods, serving as the sediment control system.

8.9 Impacts of Borrowing Area/Site

8.9.1 Adverse Environmental Impact:

The additional soil required for the embankments will be excavated from the site selected by the contractor and approved by the PIU. The excavating activities could place adverse environmental impacts including soil erosion, drainage problems, existing structure stability and the health and safety of the workers and the local population.

8.9.2 Mitigation Measures:

- Earth required for embankments and other works would be used out of the available government land. When the earth is required to be lifted from private own land, then the owner(s) of the land would be duly compensated. The land will not be taken until a prior written agreement (with local tradition) and documentation of relevant details of compensation (on prevailing market rates) are signed between the owner/s and relevant authorities.
- The contractor will not leave the borrow pits in such a condition that they are unusable and could be filled with rainwater and cause problems for the community e.g. breeding places for mosquitoes etc.
- The contractor will ensure that selected borrow areas are demarcated, including the allowable depth of the excavation, before starting any soil removal.

- The edges of the pits should be given flat slopes, and the area should be leveled as far as possible after the excavation.
- The barren or unfertile land will be preferred to use as a borrowing area than the agricultural land.
- If the agricultural land needs to be used as a borrowing area, then the following additional measurements will be undertaken by the contractor.
    - Excavate at least 50m away from the toe of the embankments.
    - Remove 6 inches of the topsoil and keep it separate on-site for its re-spread back on the leveled borrow area.
    - Excavate up to a maximum of 3feet.
    - Level slops as far as possible.
    - Place the topsoil back on a reasonably leveled area.

8.10 Traffic Management

8.10.1 Traffic diversion and/or road closure.

The construction of proposed small dams may impact traffic movement. This should be avoided as far as possible by proper planning of construction works. If traffic diversion and/or road closure is required for the proposed works, prior consent from the traffic department will be required and prior information to affected areas and the public should be disseminated through consultations. Proper road signage and traffic aids should be provided at the site. Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. The potential impact is negative but short-term and reversible by mitigation measures.

8.10.2 Traffic/Access-Related Mitigations

The construction contractor will be required to:

i. Prepare and implement a Traffic Management Plan;
ii. Locate entry and exit points in areas where there is low potential for traffic congestion.
iii. Keep the site free from all unnecessary obstructions.
iv. Coordinate with Traffic/Local Police for temporary road diversions and provision of traffic aids if transportation activities cannot be avoided during peak hours.
v. Proper road signage and traffic aids should be provided at the site. Use all necessary safety precautions including signboards, temporary signals, skilled traffic guides, traffic diversions, electric lights, demarcation of construction work lanes/worksites/excavation areas, construction equipment/plant/machinery, separate active/live traffic lane from the active construction work sites,
vi. Proactively update the signage well in advance based on planned construction activity.
vii. Notify socially sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
viii. Increase workforce in the areas with predominantly institutions, places of worship, business establishments, hospitals, and schools; consult businesses and institutions regarding operating hours and factor this into work schedules. Outreach to nearby communities informing them of road closures and

construction schedules. Conduct an awareness program on the nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions, and dos and don'ts, and to the communities.

8.11 Biodiversity

8.11.1 Impacts on Biodiversity/ Disturbance on Ecosystems

ESS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources. The objectives of this standard are to protect and conserve biodiversity and habitats and avoid adverse impacts on biodiversity and habitats because of project activities. The following mitigation measures will adhere to comply ESS6.

8.11.2 Mitigations for Biodiversity

During the baseline survey of the sub-project area, no endemic or rare species were observed in the primary impact zone as well as the secondary impact zone. All species recorded during the field survey have a wide range of distribution. Since the campsite will occupy small areas and will be in existing clearings, the impacts are reversible and localized by adopting mitigation measures.

Sites for construction camps and storage areas will be chosen to minimize vegetation removal and land clearing. No hunting, harassment, or netting of wildlife will be permitted. No clearing of bushes will be allowed during the nesting/breeding season of birds. Maximum effort will be made to save rodent colonies during construction.

The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, waste from the camps will be properly disposed of to prevent them from being eaten by wild animals. Staff working on the project should be given clear orders, not to shoot, snare or trap any bird.

8.11.3 Mitigation & Monitoring Measure for Kirthar National Park

In addition to the above-mentioned measures, the following additional measures must be adhered to for the protection and conservation of biodiversity in the sub-project area. The wildlife hotspots for large endangered species (Sindh Ibex, Chinkara, and Urial) are reported at Karchat & Khar Centers. The endangered wildlife hotspots Khar & Karchat are located outside of primary and secondary impact zones of proposed dam sites; even though all proposed small dams are located within Kirthar National Park (KNP), none of them are situated in or near the hotspot area. The closest proposed dam is 3 km away from the hotspot area, while the average distance of the other sites is 25 km. A map regarding the subproject area with wildlife hotspot area has been given in Figure 8-1 shows the aerial distances from the proposed small dams. During the field survey and stakeholder consultation with the Wildlife Department, the approximate distances have been confirmed.

However, mitigation measures mentioned in Table 8-3 have been suggested and are also integrated with the ESMP Table, which will be dovetailed and implemented with the Kirthar National Park management plan. After the creation of reservoirs diverse wildlife including migratory birds may be attracted.

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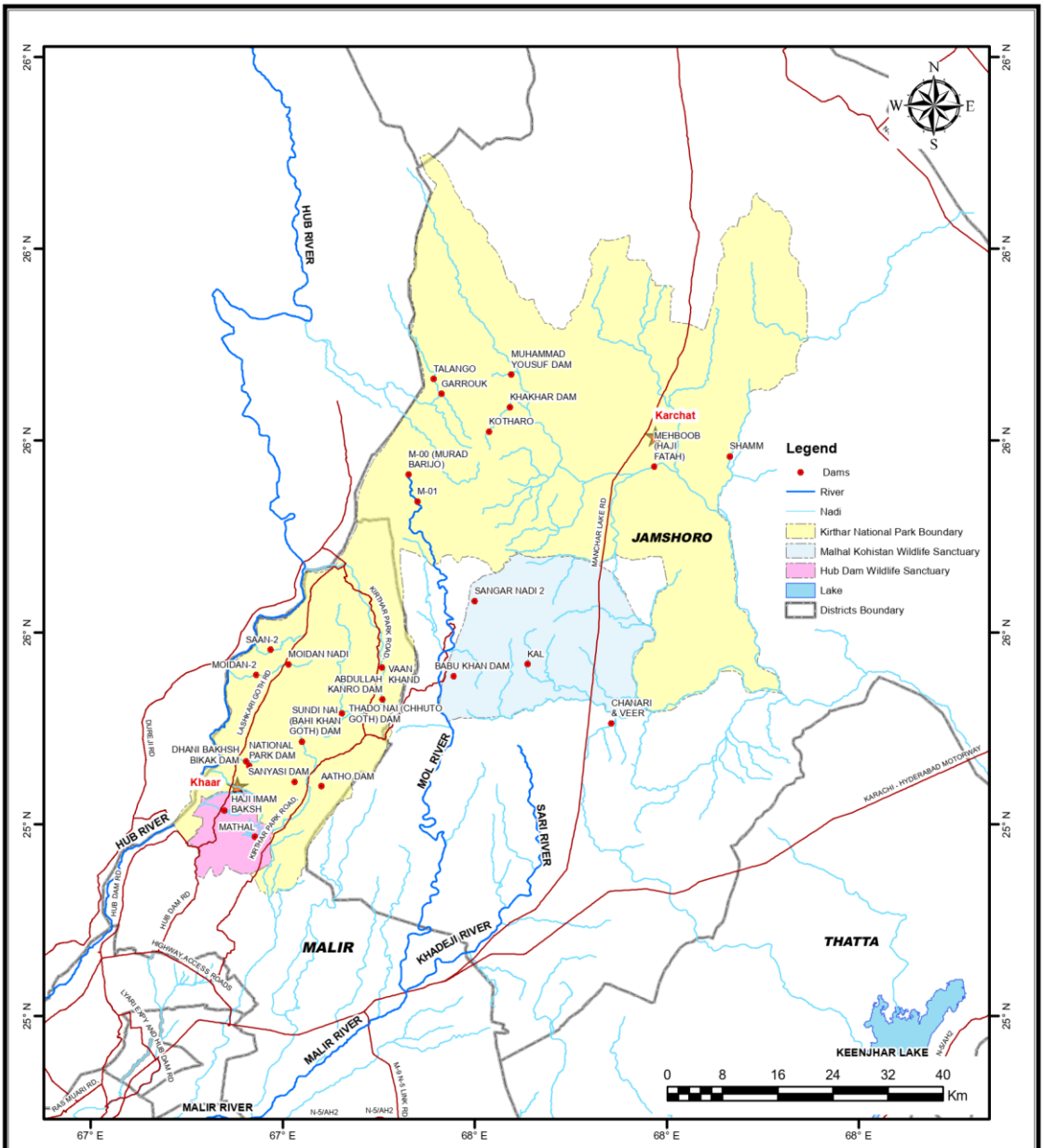


Sr. No	NAME	DISTRICT	Approximate Aeral Distance (KM) From Wildlife Hot Spot Area	Sr. No	NAME	DISTRICT	Approximate Aeral Distance (KM) From Wildlife Hot Spot Area
1	Kal	Jamshoro	Kirthar National Park - 41.90km from Khaar center	14	Aatho Dam	Malir	Kirthar National Park - 13.71.00km from Khaar center
2	Sangar Nadi 2	Jamshoro	Kirthar National Park - 41.90km from Karchat	15	Sanyasi Dam	Malir	Kirthar National Park - 7.50.00km from Khaar center
3	Mehboob (Haji Fatah)	Jamshoro	Kirthar National Park - 4.38km from Karchat	16	National Park Dam	Malir	Kirthar National Park - 3.30.00km from Khaar center
4	Shamm	Jamshoro	Kirthar National Park - 10.15km from Karchat	17	Dhani Bakhsh Bikak Dam	Malir	Kirthar National Park - 3.75.00km from Khaar center
5	Kotharo	Jamshoro	Kirthar National Park - 21.71km from Karchat	18	Sundi Nai (Bahi Khan Goth) Dam	Malir	Kirthar National Park - 10.74km from Khaar center
6	Garrouk	Jamshoro	Kirthar National Park - 28.55km from Karchat	19	Thado Nai (Chhuto Goth) Dam	Malir	Kirthar National Park - 17.94km from Khaar center
7	Talango	Jamshoro	Kirthar National Park - 30.10km from Karchat	20	Abdullah Kanro Dam	Malir	Kirthar National Park - 22.74km from Khaar center
8	M-00 (Murad Barijo) Flood Dam	Jamshoro	Kirthar National Park - 33.68km from Karchat	21	Mathal	Malir	Kirthar National Park - 7.60km from Khaar center
9	M-01 Flood Dam	Jamshoro	Kirthar National Park - 55.66km from Karchat	22	Haji Imam Baksh	Malir	Kirthar National Park - 3.090m from Khaar center
10	Chanari And Veer Dam	Jamshoro	Kirthar National Park - 41.83km from Karchat	23	Moidan-2	Malir	Kirthar National Park - 16.23km from Khaar center
11	Babu Khan Dam	Jamshoro	Kirthar National Park - 32.43km from Khaar center	24	Moidan Nadi	Malir	Kirthar National Park - 17.60km from Khaar center
12	Khakhar Dam	Jamshoro	Kirthar National Park - 19.41km from Khaar center	25	Vaan Khand	Malir	Kirthar National Park - 25.52km from Khaar center
13	Muhammad Yousuf Dam	Jamshoro	Kirthar National Park - 20.80km from Khaar center	26	Saan-2	Malir	Kirthar National Park - 20.14Km from Khaar center

Figure 8-1: Map showing the Arial distance (KM) from Wildlife Hot Spot Area

Table 8-3: Mitigation & Monitoring Measure for Kirthar National Park

Area	Mitigation & Monitoring Measure	Responsibility	
		Implementation	Supervision
Construction Mitigation Measures	Construction activities will be confined to the designated areas like where the dam/weir will be constructed and barricaded camp area. Before entry into the park, heavy equipment will be cleaned to prevent the importation of non-native plant species, hydraulic fittings will be tightened, and it will be ensured that hydraulic hoses are in good condition and shall be replaced and repaired if petroleum leaks are observed.	Contractor,	PIC and PIU as well as SWD
	Major project activities will be completed before the arrival of migratory birds. No clearing of bushes will be allowed during the nesting/breeding season of birds	Contractor,	PIC and PIU as well as SWD
	It will be ensured and implemented that the project remains within the parameters of Sindh Environmental Quality Standards.	Contractor,	PIC and PIU
	The orientation of the project activities in the form of Toolbox Talk (TBT) will be provided regularly to all construction workers to increase their understanding and sensitivity to the challenges of the special environment in which they will be working.	Contractor,	PIC and PIU as well as SWD
	Proper and timely maintenance will be provided for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns	Contractor,	PIC and PIU
	It will be ensured that all construction equipment has functional exhaust/muffler systems.	Contractor,	PIC and PIU
	Truck and related construction equipment speeds will be limited in active construction areas to a maximum of 10 KM/hr and strictly adhering to park regulations and posted speed limits in other areas while inside park boundaries.	Contractor,	PIC and PIU
	Water bowsers will be used to control excess airborne particulates at staging areas, active construction zones, and unpaved access roads leading to/from active construction areas.	Contractor,	PIC and PIU
Near Wildlife Habitats	Effects of light and noise on adjacent habitats shall be limited through controls on construction equipment.	Contractor,	PIC and PIU as well as SWD
	Adequate education will be provided and enforcement to limit construction worker activities that are destructive to wildlife and habitats.	Contractor,	PIC and PIU as well as SWD
	Firing any gun or doing any other activities which may disturb any animal or bird shall be prohibited which interferes with the breeding places.	Contractor,	PIC and PIU as well as SWD
	Noisy work shall be performed (such as the operation of heavy equipment) between the hours of 8:00 a.m. and 6:00 p.m. to minimize disruption	Contractor,	PIC and PIU as well as SWD
Waste Management Measures	Trash will be properly secured during the workday and all trash shall be removed from the site at the end of each workday. The waste will be disposed of according to its nature as non-hazardous waste shall be buried in a deep pit	Contractor,	PIC and PIU

Area	Mitigation & Monitoring Measure	Responsibility	
		Implementation	Supervision
	away from the campsite, wildlife, and settlements whereas the contractor through a third-party waste management contractor approved by Sindh EPA shall dispose of hazardous waste.		
Breaking up of Land	It will be ensured that project activities will remain isolated as per design excavations; no other activities will be permitted.	Contractor,	PIC and PIU
Polluting water flowing in and through the National Park	Potential impacts related to water pollution sources will be identified and their mitigation measures proposed in the Contractor's CESMP.	Contractor,	PIC and PIU as well as SWD
Operation Phase disturbance to wildlife	Potential risk related to hunting and poaching of wildlife during the operation phase have been identified, and their mitigation measure has been proposed in ESMP and will be updated in the Contractor's CESMP. During the operation phase, flora and fauna will flourish, and this has been observed on other dams completed so far in the first phase. National Park is well protected by the Sindh Wildlife Department in collaboration with the local community. Hunting is prohibited, which is ensured through community and surveillance staff of the Sindh Wildlife Department	PIU	Sindh Wildlife Department / Local Community

It is estimated that 136 trees need to be removed for the construction of the 26 small dams none of them is endangered as per the IUCN list. The replanting of 680 trees will be done with a ratio of 1:5 trees against a single cut. Tree inventory of the felling of the tree shall be maintained during the construction period.

The above-mentioned KNP Management Plan will be implemented by the Contractor and supervised by the Ecologist of PIC (supervision consultants). Furthermore, specific training of the staff related to wildlife aspects (Conservation & Protection) has been incorporated into the training plan. The term of reference for the Ecologist has been annexed as Annexure – V.

8.11.4 Anticipated Impacts on Aquatic and Terrestrial Fauna

Impacts on aquatic and terrestrial life, during the construction stage, have been given below.

- **Impact on Reservoir Area**

The Reservoir areas house a low population of plants, animal habitats, and reptile animals except for fish fauna which is not reported due to the non-perennial nature of the stream. Reservoir areas of proposed 26 small dams are not exceeding 6.3 Sq.km (1485 acres); however, KPAC is widespread over 3087 sq. km. Keeping in view the small/negligible area (0.19% of total area of KNP) involved in construction it may be inferred that the wildlife of KPAC would migrate naturally. In addition to that, it will be ensured that construction activities will be confined to the designated area. Therefore, there would be no major effect on them during the construction stage.

After the construction of the dams, a positive impact on plants, animal habitats, fish fauna, and reptile animals in the reservoir area is anticipated. It is expected that reservoirs will retain water for four to eight weeks.

8.11.5 Impact on Command/Lower Riparian

The primary purpose of these dams is to slow down the flow of water during heavy rainfall and prevent downstream flooding. This shall be achieved by holding the flood water in the dams and releasing it gradually, thus reducing the peak flow of water downstream. These dams are designed to mitigate the adverse effects of flooding in the area by regulating the flow of water, reducing the risk of flooding, and protecting the habitat, population and infrastructure. The construction of a cascade of small dams and weirs is an effective method for flood control (USACE, 2014). While small dams have already been constructed in the project area, additional dams are needed on high-flooding streams to provide effective flood mitigation measures. This was also confirmed in the 'Performance Evaluation Study of Small Dams in Sindh Province', which stated that 'the locals also informed that water was spilled from the spillway of dams 2-3 times in monsoon season'.

8.12 Dam Breach Study

A spillway has been provided as the first line of defense to ensure the safety of the proposed small Dams. The spillway has been designed to safely discharge excess floods up to the 100-yr flood with a freeboard[6] of 4 ft. The freeboard has been set considering the reservoir fetch length and corresponding wave height.

A dam break study was conducted as part of the detailed design process. The study concluded that the reservoir area for each of the 26 small dams is relatively small, not exceeding 5.8 square kilometers (1,433 acres). In a dam breach scenario, which includes the combined volume of a dam breach and a 100-year flood, the total inundated area would be 316 square miles (819 square kilometers), with the exception of the Garrouk dam, which alone would affect an area of 62 square miles (160 square kilometers). In the worst-case scenario, the number of people affected would be 138,846, with Chanari and Veer dams potentially impacting 85,442 people**.** Maps of the area inundated, and the population affected are attached as Annexure - VI. An emergency preparedness plan will be prepared before the completion of civil work for all dams.

[6] Freeboard is the vertical distance from water surface to the lowest elevation at which water would flow over a dam at a section not to be overflowed. Source: Basic Terms of Dam Construction, New Hampshire Department of Environmental Sciences, www.des.nh.gov.

Table 8-4: Summary of Dam Break Study

Parameters	Kal	Sangar Nadi 2	Haji Foto	Shamm	Kotharo	Garrouk	Talango	M-00 (Murad Barijo)	M-01	Chanari & Veer Dam	Babu Khan Dam	Khakhar Dam	Muhammad Yousuf Dam	Aatho Dam	Sanyasi Dam	National Park Dam	Dhani Bakhsh Bikak Dam	Sundi Nai (Bahi Khan Goth) Dam	Thado Nai (Chhuto Goth) Dam	Abdullah Kanro Dam	Mathal	Haji Imam Baksh	Moidan-2	Moidan Nadi	Vaan Khand	Saan-2
Flood Volumes: (Acre-ft)																										
Reservoir Volume at Normal Reservoir Level	176	107	608	223	140	135	486	346	117	448	150	147	130	60	47	23	50	237	59	214	26	131	1,548	473	400	108
Design (100-year) Flood Hydrograph Volume	881	2,832	2,222	24	266	571	120	7,829	4,304	11,464	180	2,102	663	2,916	212	281	451	3,007	3,104	20,076	63	626	1,350	1,000	194	43
Combined volume: Dam Breach+100-year Flood	2,263	3,098	88,998	15,812	753	8,896	276	8,175	4,421	11,912	330	2,249	793	2,976	259	304	501	3,244	3,163	20,290	645	1,000	17,702	14,714	20,100	7,166
Discharge Peaks: (cfs)																										
Case 2: Design (100 year) Flood Peak (cfs)	5,044	3,000	22,326	22,681	2,613	21,051	3,310	7,802	13,267	35,896	1,968	14,982	6,538	18,815	3,994	3,607	6,226	18,291	21,896	62,433	4,913	2,725	16,998	12,180	5,053	3,575
Case 3: Combined : Dam Breach + 100 year Flood (cfs)	5,724	3,200	61,518	29,039	4,844	22,937	13,045	606	6,354	17,564	678	7,037	2,794	8,901	1,415	1,840	2,881	9,166	10,779	30,799	5,157	4,175	16,837	13,918	24,762	7,790
Inundated Area (Sq.Miles):																										
Case 3: Combined : Dam Breach + 100 year Flood	26.00	6.00	43.00	22.43	35.20	62.00	13.60	-	-	10.69	0.90	6.04	1.31	4.00	1.16	0.15	0.10	9.10	4.79	10.18	6.43	2.10	13.50	13.50	21.13	3.20
Estimated population at risk according to Land Scan Population Grid:																										
Combined volume: Dam Breach+100-year Flood	4,456	1,557	3,918	2,187	3,485	4,813	1,794	11,422	342	85,442	1,661	1,984	1,860	976	703	121	54	2,015	1,306	1,661	1,092	401	1,884	1,303	1,771	638

8.13 Occupational Health & Safety

8.13.1 Impacts on Construction Workers

The health and safety risks that could impact on the construction workers are primarily associated with the construction activities of the sub-project. The typical risks include exposure to the physical hazards of using the construction equipment, working near running traffic, operating equipment, working on and near scaffolding, tripping and falling, handling bitumen, burns, exposure to noise and dust, falling objects, traffic hazards associated with the operation of project-related vehicles, exposure to hazardous materials and exposure to electrical hazards related to the use of tools and machines as well as the prevalence of the incidence of respiratory diseases as a result of dust and emissions..

8.13.2 Health and Safety-Related Mitigations

The following steps are suggested for the proper management of occupational health & Safety within the sub-project area:

- The specific Labour Management Plan, OH&S Plan and Community H&S Plan will be developed according to Sindh Occupational Safety and Health Act 2017 while adhering to the ESS2 – Labor and Working Conditions as well as Labour Management Procedure (LMP) and will submit to the PIU for review and approval. When approved, the contractor will implement the plan during the construction period. This plan will need to describe all jobs, their risks, and the controls that will reduce risks; these controls may include PPEs, restrictions on activities or locations, and other measures. The plan also needs to describe what type of training will be given to the workers. Those who work near water, at heights, and with heavy equipment will need special training so those hazards can be managed and minimized.
- The contractor will train his crews on the aspects covered in the above-described Plan;
- The contractor shall fence the working area and unauthorized shall not be allowed to enter the area.
- The contractor will hire an HSE officer with adequate experience to address the above impacts.
- The Contractor will display signboards and banners about traffic diversion at places on detour routes.
- Provision of speed breakers at appropriate places in consultation with/approval of the Engineer which should be removed after completion of the project.
- Establish and obey speed limits.
- The Contractor will maintain workers' hygienic conditions in labour camps.
- The Contractor shall make available the first aid kit, snake bite kits, Oral Rehydration Salts (ORS), and bandages at all times and all the sites. Moreover, paramedic staff will be available on-site and the cost of hiring will be a part of the BOQ item. The location of these kits shall be marked and shall be easy to access for all.
- No private property without permission of the owner will be used for transportation.
- Drivers will fix the net on containers while transporting stones and sand etc.

- Community liaison will be maintained during the construction stage and GRM will be established to address complaints related to safety hazards.

The contractor will also prepare an emergency response plan to address events such as urban floods, fires, earthquakes, injury/death, and accidents.

B- SOCIAL IMPACTS AND MITIGATIONS OF SUB-PROJECT ACTIVITIES

Many positive impacts like socio-economic uplift by reducing the flood damage as well as groundwater recharge are expected. The creation of job opportunities for the local people is envisaged during the construction and operation stages of the sub-project. The groundwater table around the command area will rise and will be utilized for drinking and irrigation purposes. In other conditions, flooding of the downstream area will be less as compared to past situations. An increase in per capita income and other opportunities and general uplift of the area is expected.

8.14 Community Health & Safety

8.14.1 Impacts Due to Project Activities.

The potential impacts shall be direct, such as being struck by moving vehicles within and outside the sub-project area and indirect through the decrease in air quality surrounding the sub-project area. The air quality will reduce because of increased dust generated from construction and on transport routes, as well as due to emissions from plants and vehicles. The impact will continue for the duration of the work.

8.14.2 Potential Mitigation Measures.

- Ensure that the site is restricted from the entry of irrelevant people, particularly children.
- Timely public notification on planned construction works.
- Provision of proper safety and diversion signage, particularly at socially sensitive receptors areas.
- Setting up speed limits; and
- During construction work, pedestrian and vehicular passages shall be provided for crossing near the settlement.
- Open trenches and deeply excavated shall be protected by a fence/barricade to avoid any accident.

8.15 Access to local Communities during operation

8.15.1 Impacts

During the operation period, four dirt roads will be temporarily inundated due to damming activity, particularly during monsoon seasons.

8.15.2 Mitigation Measures

An alternative access route will be provided for all temporary blockage locations, and adequate cost has been incorporated in BOQ documents.

8.16 Vulnerable Households

Disadvantaged or vulnerable individuals or groups are those people or groups highly vulnerable to potential project impacts and often do not have a voice to express their concerns or understand the impact and risk of the project. They may be disproportionately impacted or further disadvantaged by the project as compared with any other groups due to their vulnerable status, and usually require special arrangements to ensure their equal representation in the consultation and decision-making process associated with the project. Their vulnerability may stem from a person's origin, gender, age, health condition, disability, economic deficiency and financial insecurity, disadvantaged status in the community (e.g. ethnic and religious minority groups, Indigenous peoples), dependence on other individuals or natural resources, etc.

Mitigation measures

Awareness raising and stakeholder engagement with disadvantaged or vulnerable individuals or groups must consider such groups 'or individuals 'sensitivities, concerns and cultural differences to ensure a full understanding of project activities and benefits. Engagement with vulnerable groups and individuals would require the application of specific measures and assistance aimed at the facilitation of their participation in the project-related decision-making so that their awareness of and input to the overall process are commensurate to those of the other stakeholders.

8.17 Land Use Changes

During the construction of the proposed small dams and associated works some technical staff, workers and officials would be staying near the dam site and would require land for their residences such as contractor's camp, staff residences, etc. During the construction stage, necessary localized arrangements for electric power and communication means are needed as the area is lacking these two facilities. During the construction stage, the clearing of vegetation or land use changes will only be anticipated at dam axis points and the camp areas. These have been proposed for already cleared/barren land. Moreover, no permanent or temporary road will be constructed existing alignment will be used. The operation phase of the proposed small dams will create a positive impact on land use and ecology in terms of enhanced vegetation cover & habitat restoration due to the availability of water. With reference to a research paper published in Civil Engineering Journal on Land Covers Change Assessment After Small Dam's Construction Based on the Satellite Data (Accepted 08 March 2019). It has been concluded that the constructions of small dams have a positive impact not only on land cover changes but also on livelihood resources directly and indirectly and reduces the wastage of water and stores the water for future needs.

8.18 Cultural Heritage

There is little likelihood of buried archaeological sites as no archeological or cultural heritage has been identified within the secondary impact zone.

8.18.1 Chance Find Strategy

The sites or items of heritage significance could be found in the course of development work. The "chance finds" procedure covers the actions to be taken from the discovery of a heritage

site or item to its investigation and assessment for siting and designing a project to avoid significant adverse impacts to the culture the client is responsible for heritage. It would be ensured that any chance to find further is not disturbed until an assessment by competent professionals is made and actions consistent with the requirements of ESS8 – Cultural Heritage. This standard sets out measures to protect cultural heritage throughout the lifecycle of the project.

i. In the case of a chance finding, the contractor will secure the site and report immediately to PIU. Works may not recommence until the Engineer approves.
ii. Meanwhile, the contractor will cease their operations and due caution will be ensured for archaeological remains.
iii. Site visits of the Archaeological Department will be facilitated by the contractor. Further works will be carried out on such sites only after obtaining clearance from the Archeological Department.

8.19 Labour Influx

8.19.1 Impacts of Labour Employed from Outside

Some adverse social impacts could arise due to labour influx. There may also be a risk to community health from HIV/AIDS / communicable diseases (including Covid 19) or other transmitted infections as a result of the presence of migrant construction labour. There could be the risk of gender-based violence from migrant labour, which often remain away from home on the site. This may lead to inappropriate behavior including sexual harassment of women, girls and boys in the local community. This could especially be relevant in case the nearby population is from any marginalized group e.g. Hindu community.

8.19.2 Mitigation Labour Influx

A large-scale labor influx is not expected due to the availability of local labor supply in the subproject area and the scale of works anticipated under the subproject. Except for a limited number of managers, supervisors and skilled workers, most workers may be sourced locally or from nearby areas within the district. The priority for local labor (dependent on skill, and experience capacity) is expected to minimize the risk of labor influx, where there is a requirement for special skills. As part of the mitigation process, the contractors shall locate/ construct camps for their staff at least 500 meters away from communities and their sources of water/fields and paths of daily use, to avoid social conflict as well as to avoid the possible adverse impacts of the construction camps on the surrounding communities. Fencing will be provided around the campsite and the Contractor will provide security. The camp layout plan and workers' code of conduct will be prepared by the contractor and will be submitted for review and approval by the Engineer.

The contractor shall include proposals for worker's training plan which must include training and awareness sessions about HIV/AIDS/COVID-19/Gender Based Violence (GBV)/sexual harassment, child abuse, and human trafficking and the spread of sexually transmitted diseases. The contractor shall also develop a code of conduct for workers along with the worker's training plan.

8.20 Gender Base Violence (GBV), Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH)

8.20.1 Impacts related to GBV/SEA/SH

Although the influx of workers will be minimal as discussed earlier, new workers (outside of their social spheres) may form close social relationships with local communities. This can lead to unacceptable and/or illegal behavior, ranging from unwanted aggressive advances, SEA/SH against women and children.

8.20.2 Mitigations related to GBV/SEA/SH

As part of the mitigation strategy, training/orientation sessions will be conducted to sensitize PIU and the Contractor's staff/workers on the importance of addressing GBV/SEA/SH risks at the project level. The contractor will be required to have a written contract with their workers materially consistent with the objective of ESS2, following the procedures as specified in the World Bank's Procurement Regulations. The workers will be required to sign a Code of Conduct (CoC) prepared by the Contractors and reviewed and approved by PIU.

8.21 Child Labour

8.21.1 Impacts Related to Child Labour

Although the risks of child labor are anticipated on the lower side, there may be instances when Contractors hire persons under the age of 18 years. Children hired at labor sites are susceptible to unfair treatment, exploitation, and violence because their hiring may be depicted as a favor to them, and they may be talked into not raising complaints for fear of losing a much-needed source of income.

8.21.2 Mitigations Related to Child Labour

Only persons above the age of 18 years will be hired at construction sites, and their age will be confirmed by checking their government-issued Computerized National Identity Card (CNIC) which is only provided to persons above 18 years. Moreover, the Sindh Prohibition of Employment of Children Act 2017 shall be followed, to prohibit child labour in the hazardous work areas. According to this act, the hazardous area worker must be 18 years old and above. However, if other labor-related risks arise during project implementation, the PIU will develop procedures to prevent other impacts. This will include training/awareness-raising sessions, which will be conducted regularly in the communities to sensitize on prohibition and the negative impacts of child and forced Labor.

8.22 Lack of Community Engagement

Inadequate and meaningless consultation will lead to social conflict and hence meaningful consultation is the only effective tool to adequately engage with communities and to ensure sustainable participation.

8.23 Human Resource Development

The local population would get unskilled and semi-skilled labor jobs during the construction phase of the proposed project. The contractor would ensure that unskilled and skilled laborers got their wages as notified by the Government of Sindh. Their interaction with skilled labor can develop their skills for their future endeavors.

C- CUMULATIVE IMPACTS OF THE PROJECT

8.24 Cumulative Impacts on Valued Ecosystem Components (VECs)

The proposed 26 dams under SCRP and the already constructed dam in the sub-project area will have mostly positive and some negative impacts in the subproject area. The cumulative impacts have been evaluated for the construction and operation phases. Cumulative Impacts are focused on Valued Ecosystem Components (VECs) which include the biodiversity component i.e., valued fauna and flora, Ecological component i.e., Ecosystem's flow regulation ability, Social Component i.e. Project Affected People (PAP), Economic component i.e., Government and private/local Revenues.

Valued flora and fauna may have temporary and reversible impacts on habitat and wildlife within the subproject area. The first could be the loss of habitat due to the clearing of vegetation and the other one is a sensory disturbance to wildlife species due to the physical presence of people, vehicles, and equipment at proposed small dam sites.

In terms of valued flora and fauna of VECs, the impacts of small dams will be mitigated through appropriate measures such as the clearing of habitat will only be done at proposed dam axis points moreover, and the camp areas have been proposed at already cleared/barren land. A total of 120 Immature & only 16 mature trees are expected to be damaged/uprooted during the construction phase. All species are widespread in the vicinity of the subproject areas furthermore, all of the impacted flora have the Least Concern status as per IUCN.

No permanent or temporary road will be constructed, and existing alignments will be used. In terms of other terrestrial wildlife species, previous studies have shown the effect of sensory disturbance during the construction of projects on small mammals, reptiles, and birds to be insignificant. Large mammals have a large home range and therefore, disturbance during construction may only result in short-term displacement from the immediate work areas, not having any impact on the survival of the species. The construction activities at the proposed small dams might be completed before the arrival of winter migrants or suggested to be done in phases. Khirthar Protected Area Complex (KPAC) is the key feature of the area and impacts on this will be minimized by minimizing the duration of activities in their vicinity and restricting it to the summer season. Moreover, the camps will be properly fenced and gated to prohibit the entry of wild animals in search of eatable goods. All these mitigation measures will be strictly implemented by the contractor's environmentalist and monitored by the supervisory consultant.

The operation phase of proposed dams, in addition to the other already constructed and planned dams, may create a positive impact on VECs in terms of habitat restoration and vegetation cover enhancement, which ultimately support the fauna of the area. This was also evaluated in the 'Performance Evaluation Study of Small Dams in Sindh Province' report that after the construction of small recharge dams in the area the biodiversity/habitat (trees and vegetation) increased. A good number of forest trees, including Acacia nilotica, Prosopis Cinereria, Tamarix gallica, herbs, and shrubs, were observed growing in the vicinity of dams. Since all nais/streams are non-perennial, there is no fish farming practice observed, so the impacts on aquatic fauna will be insignificant or negligible.

The VECs will be improved due to the availability of groundwater in a sustainable manner. Regarding a research paper published in Civil Engineering Journal on Land Covers Change Assessment After Small Dam's Construction Based on the Satellite Data (Accepted 08 March 2019). It has been concluded that the constructions of small dams have a positive impact not only on land cover changes but also on livelihood resources directly and indirectly and reduces the wastage of water and stores the water for future needs[7].

Previous rainfall has led to flash floods. People confirmed that there were high flash floods in 2022. The floodwater flushes to low-level areas and finally enters the stream carrier channel (Nai), so the soil is dried up to 5 to 6 hrs. While construction of small dams in the area will reduce the effects of the flood by a control/holding the rainwater at its upstream for 4-8 weeks depending upon soil permeability, the water available upstream of a dam becomes very much beneficial for the drinking of livestock and other domestic needs. Importantly groundwater aquifer is also recharged.

The dams (SCRP) will have a synergistic impact on overall water conservation and rainwater harvesting during the operation phase. Cumulatively, due to the construction of proposed small dams, the groundwater level both in upper and lower riparians will be increased. The recharging of groundwater aquifers will also improve water quality from very poor to good. Currently, the groundwater level near all proposed dam sites ranges from 150 to 350 ft and it would be increased and available for a longer period as well. Moreover, as referred to earlier "Performance Evaluation Study of Small Dams in Sindh Province-" of previously constructed small dams in Sindh Province also concludes that to construction of small dams in the area has positive impacts on groundwater recharge. For instance, in one case, the water table depth before the construction of the dam was 250 feet, which was raised after the construction of the dam 50-65 feet and groundwater quality was poor which improved after the dam construction of the small dam. Moreover, during droughts, the water level in wells drops up to 45 feet but is available for the whole of the year, which dries up completely before the dam.

During the project's construction, the social component of the VECs may have some adverse impacts due to the labor influx, transportation of material and machinery movement. The presence of outside construction workers inevitably causes some degree of social disruption in the local community because of social/cultural differences. During the operation phase, human migration influx may be expected due to the availability of water, and agriculture activity may also increase.

Keeping in view the terrain and topography and available facilities in the project area, there are very few chances of human migration influx (reverse migration) or enhanced agriculture activity due to the unavailability of water. A recent study conducted in April 2020 conducted in the project area, shows that, before the construction of small dams, the community of 53% migrated to other areas due to the unavailability of water. Out of these 37% resettled back (reverse migration) to their villages after rainwater availability but 16% did not come back and settled in other places. However, locals of 31% of after the construction of small dams never migrated in drought conditions because of groundwater availability. Therefore, the

[7] Land Covers Change Assessment After Small Dam's Construction Based on the Satellite Data (researchgate.net)

migration ratio has decreased due to the construction of small dams in the area and the reverse migration ratio has increased.

VECs concerning economic components i.e., Government and private Revenues will increase due to the development activities in the area. Construction of these proposed small dams will invite entrepreneurs which ultimately bring much-needed revenue to the country ‘s economy from a broader perspective. Small dams are very important for the local economy because the construction of such dams enables the sustainability of livelihood for local communities related to livestock rearing & increase in agriculture yield. The dam holds rainwater upstream for a few times depending upon soil permeability, from where livestock drinking, and other domestic needs of local communities are completed. Most importantly, the aquifer is also recharged. Since rearing livestock is the only source of local livelihood and water upstream is also available for almost a whole year, livestock is increased in the sub-project areas.

Hence, in light of the above discussion, it has been concluded that cumulative impacts will be positive because due to the construction & operation of these small dams, the shortage of water for domestic and livestock use is reduced. Moreover, the Small Dams Organization of Sindh Irrigation Department conducted a study in April 2020 through consulting firm for 32 Small dams namely “Performance Evaluation Study of Small Dams in Sindh Province-” of previously constructed small dams in Sindh Province. This study also concludes that due to construction of small recharge dams in the area has positive impacts on Valued Ecosystem Components (VECs) which include the biodiversity component, Ecological component, Social Component, and Economic component.

8.25 Cumulative Environmental & Social Impact Assessment (C-ESIA)

Furthermore, a separate study has been recommended for the Cumulative Environmental and Social Impact Assessment (C-ESIA). The overall goal of the C-ESIA is to identify environmental and social impacts and risks associated with the context of existing, planned, and reasonably predictable developments, which may generate cumulative impacts that could jeopardize the overall long-term environmental, social, and economic sustainability of the watersheds of proposed small dams. The TOR for the study has been formulated and annexed as Annexure - VII.

9. GRIEVANCE REDRESS MECHANISM (GRM)

9.1 Grievance Redress Mechanism (GRM)

The grievance redress mechanism (GRM) is an institutional arrangement that allows stakeholders to address grievances related to the project through a timely, transparent, and predictable process. A grievance is defined as any formal communication that expresses dissatisfaction about an action or lack of action, about the standard of services, works or policy, deficiency of service, works or policy of the project management and its implementation mechanism. During project execution, different issues and constraints may arise. In this situation, if stakeholders have inadequate means to voice and resolve grievances, they may turn to other venues, which may be cumbersome and lengthy, leading to delays in the project. Alternatively, if their grievances remain unresolved or ignored over time, it may lead to inflexibility, stalemate, and delays for the project to meet its sustainable development goals.

The SCRP GRM will be gender-responsive, culturally appropriate, and readily accessible to the stakeholders at no cost and without retribution. It will enable Project Affected Persons (PAPs), local communities, employees, and other affected stakeholders to raise grievances and provide suggestions vis the sub-projects, with the project proponents and contractors, and seek redress when they perceive a negative impact arising from the activities. This mechanism serves as a platform to promptly resolve and address community concerns, reduce risks, and strengthen systems and processes, thereby contributing to positive service delivery. Therefore, the complaints/grievances should be addressed through a well-organized Grievance Redress Mechanism (GRM) covering all activities under the project.

9.2 Objective and Composition of GRM:

The principal objective of GRM is to implement and maintain a procedure for handling the environmental and social concerns of the project stakeholders. This procedure will include a redressal mechanism scaled to the project's identified risks and adverse impacts, focusing on stakeholders. Standard Operating Procedures (SOPs) and informational material will be prepared for the SCRP GRM in Urdu, Sindhi and English and made publicly available as soon as the Project begins implementation and before contractors mobilize to sites.

9.2.1 Specific Objectives:

i. To provide effective communication methods and systematic process for complaints registration and to provide a prompt, transparent and fair response and resolution without reprisals for the environmental and socially affected stakeholders of the sub-project area;
ii. To provide project staff with practical suggestions/feedback that allows them to be more effective, accountable, transparent, and responsive to beneficiaries;
iii. To demonstrate responsibility towards the local community for their environmental well-being by preventing and mitigating any adverse environmental effects caused by the sub-project activities.

iv. Increasing stakeholder involvement in the project. To provide free and fair access to diverse members of the local community, including more vulnerable groups such as women and youth, keeping confidentiality and privacy of complainants.

The GRM is expected to address 4 types of complaints: *Compensation*; *Environmental issues* (e.g., noise, pollution, solid waste management, flora/fauna, etc.); *Social issues* (Exclusion, Inclusion); *Gender Based Violence (GBV)*; and *others.*

9.3 GRM structure

The SCRP grievance redressal mechanism (GRM) is established at three levels starting from the site, PIU and Project Steering Committee (PSC). The process at each level is defined as under:

9.3.1 Site-level Grievance Redress Cell (GR Cell)

At the site level, a GR cell will be established to enter the PAPs concerns/grievances. The Community Liaison Officer (CLO) appointed by the Contractor will be its Focal Person/Convener and be responsible for registering grievances and maintaining all records. Grievance Focal Points (GFPs) will be nominated by the community at each sub-project site. These will be men and women whom the community can easily approach. Grievances can be received by GFPs or the CLO in writing or by word of mouth and recorded in the grievance register by the CLO. The Grievance Register contents will be kept updated by the CLO and s/he will share the monthly Grievance Register with the Grievance Redress Committee (GRC) at PIU level so that the GRC can maintain a consolidated record of all Project sites grievances. The contractor and the project manager are responsible for resolving site-level grievances. If a grievance remains unresolved, it will be sent in writing by the project manager of each sub-project to GRC.

The responsibilities of GR Cell shall include the following:

1. Review, consider and resolve grievances site level.
2. Conduct fact-finding pertaining to grievances.
3. Resolve grievances within a period of one week.
4. Undertake analysis of data on grievances and use this to make informed decisions.
5. Maintain confidentiality of complainants wish to remain confidential.
6. Maintain an updated GRM database/ Complaints Log.

During the complaint investigation, the GRC works with the Contractor and the PIC. If mitigation measures are identified in the investigation, the Contractor promptly carries out the mitigation. PIC is responsible for ensuring that the Contractor carries out the measures.

9.3.2 Grievance Focal Points (GFPs)

The GFPs will be men and women from each community who will assist and facilitate the community members in reporting grievances resulting from project activities. The GFPs will be provided training by the PIU/PIC in facilitating grievance redress.

GFPs will be identified by the relevant community in consultation with the Social Safeguard team of PIU (SCRP), PIC and CLO. The GFP would be responsible for making the community aware of the following components:

- Inform people about the GRM and how it works, and their options depending on the types of complaint.
- Types of grievances not acceptable/eligible to the GRM.
- Intake channels at the GRM, e.g., phone numbers, postal and email addresses, and website and information that should be included in a complaint.
- Inform the Complainant of the investigation results and the action taken, and the option of appeal to PSC if not satisfied with the outcome.
- Two GFPs (a female and a male) will be selected for each sub-project site.

9.3.3 PIU Level GRM

A Grievance Redress Committee (GRC) has been established at the SCRP PIU office which shall resolve the grievances of affected persons/parties received at the PIU level. If a grievance remains unresolved at the PIU level despite making best efforts till the stipulated time of 21 days, it will either be retained for another 21 days with the prior agreement of the Project Director and the complainant or sent to the Project Steering Committee (PSC) for resolution, depending on the GRC's assessment on which is the best option to facilitate a resolution.

The GRC will function as a dedicated body that ensures the grievance redress process is effective and efficient. It will comprise Environmental, Social Safeguard and Gender Specialists of PIU, a Representative of the District Commissioner's office, and community/civil society members from sub-project areas. Its Focal Person/Convener will be the Social Safeguards Specialist. Decisions or findings taken in the GRC would be binding upon the contractor.

The PIU will issue public notices to inform the public about the Grievance Redress Mechanism (GRM) sub-project area. The contractor will also display prominent signage containing the contact details of GRC in the Sindhi language. The complainant(s) can lodge their grievances through a project email, phone (021-99332368), and fax number (021-99332367) at GRC based at PIU.

These phone and fax numbers and email ID will be managed by GRC based at PIU. The Social Safeguard Specialist will be the designated focal person to receive a complaint(s) in writing, through calls, fax and emails. The Social Safeguard Specialist will have resources and facilities to maintain a complaints database which will be digitized and available online and will communicate with the contractor, Site Engineers, and PIC.

Given that female community members have restricted mobility outside their villages and homes, the female PIU staff (Gender Specialists) will be required to visit the local communities to record grievances. The frequency of visits will depend on the nature and magnitude of activity in an area and the frequency of grievances.

The responsibilities of the GRC at PIU are:

1. The Social Safeguard & Resettlement Specialist shall be the focal person for GRC, which is responsible for logging the complaint and date of receipt onto the complaint database and informing the PIC and the Contractor.
2. The GRC will coordinate with local government to receive project-related complaints made directly to them.

3. The GRC shall review, consider and resolve grievances related to environmental and social issues during implementation received at the PIU level.
4. The GRC, with the PIC, is responsible for investigating the complaint to determine its validity and assess whether the source of the problem is due to project activities and identifying appropriate corrective measures. If corrective measures are necessary, GRC, through the PIC, will instruct the Contractor to take necessary action.
5. Resolve grievances presented to the GRC within a period of two weeks.
6. Inform the Complainant of the investigation results and the action taken.
7. Undertake analysis of data on grievances and use this to make informed decisions.
8. GRC decisions, if not acceptable to the complainant(s), can be appealed to the PSC.
9. Maintain an updated online GRM database/Complaints Log.

9.3.4 Appeals at the Project Steering Committee (PSC) Level

The PSC will meet on a quarterly basis to hear grievance cases during its regular meetings and will be convened for special grievance redressal meetings as needed. PSC members and the Secretary of Irrigation will address the grievance with a viable resolution. The below flow chart 9-1 shows the grievance entry points:

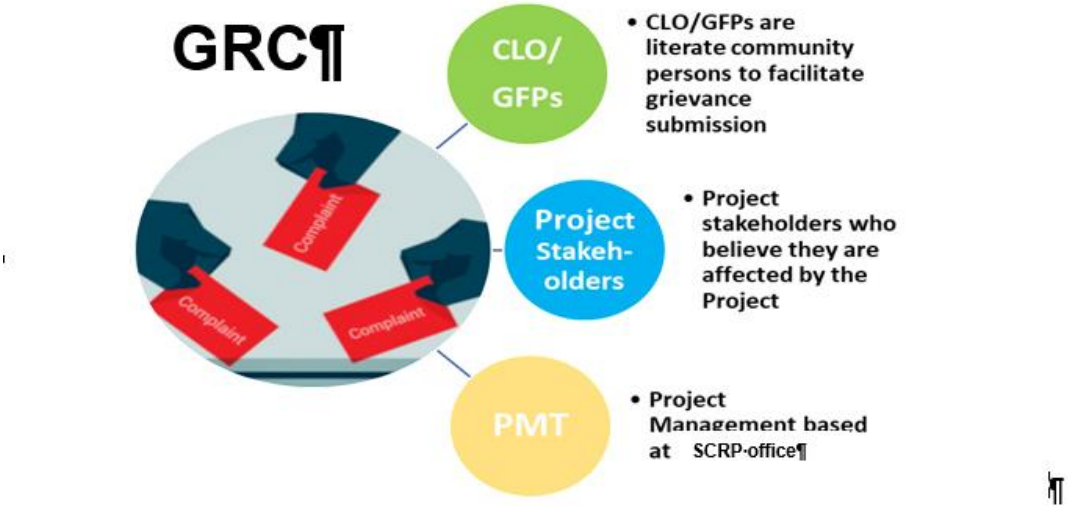


Figure 9-1: SCRP Grievances Processes

The GRC composition at different levels is given below.

SITE Composition

- Community Liaison Officer (CLO) - Convener
- Grievance Focal Points (GFPs)
- Contractor
- Project Manager
- Co-opted Members

GRC PIU Composition

- Additional Director
- Social Development Specialist - Convener
- Environment Specialist
- Gender Specialist
- PIC Representative

PSC Composition

- Secretary Irrigation
- Project Director
- Representative of relevant Deputy Commissioner
- E&S Specialists
- Gender Specialist

Grievance Entry Points for Complaint

9.4 GRM for workers

The Community Liaison Officer (CLO) will serve as Grievance Focal Point (GFP) for labor/workers complaints at the site level. If the issue is successfully resolved, no further follow-up is required, and the case shall be documented and closed. In case the grievance is unresolved at the site/contractor level, the workers may directly approach GRC about their grievance. The prominent signage containing the contact details of GRC in the Sindhi language will be displayed at each site.

9.5 Grievance Redress Mechanisms for GBV and SEA/SH

Grievance Redress Mechanisms (GRM) will integrate mechanisms to track complaints related to SEA/GBV, including a feedback system for regular and timely feedback on actions taken to respond to complaints. These mechanisms will protect the confidentiality of individuals without compromising access to justice.

Grievances related to GBV and SEA/SH will always be escalated to the PIU and will be dealt with by the PIU designated GBV specialist. GBV/SEA-related complaints will be communicated to the World Bank no later than 48 hours after being received by the GR Cell (site level) or by the GRC (PIU level).

The GRC/PIU will assist GBV survivors by referring them to GBV Services Provider(s) for support immediately after receiving a complaint directly from a survivor. A list of GBV service providers will already be available with the GRC before project work commences. In general, the timeframe for resolution of complaints shall not exceed 21 days.

Grievances related to GBV and SEA/SH will be forwarded to the staff specifically trained to handle these types of complaints. The Social Specialist (as GRC Focal Person) and the Gender Specialist at the PIU will receive the necessary training to handle such sensitive cases.

The GRC will develop specific procedures to ensure complainants are able to register their grievances anonymously, and in a survivor-centered and discreet manner. The GRC will assist GBV survivors by referring them to GBV Services Provider(s) for support immediately after receiving a complaint directly from a survivor.

9.6 Role of Contractor in GRM Complaints Register

The Contractor will maintain a complaint register at the campsite office to document all complaints received from the local communities. The register will also record the measures taken to mitigate these concerns. The final report regarding complaint closing will be communicated to PIC, the project manager is responsible for providing the record to GRC/PIU. The PIU shall carry out the monitoring of the implementation of measures for the eradication of complaints.

9.7 Reporting and Monitoring

The GR Cell will enter the PAPs concerns/grievances at the site level. The PIU gender specialist will be responsible for managing GBV and SEA/SH-related complaints at the project/PIU level. SCRP PIU will develop specific procedures to ensure complainants can register their grievances confidentially, and in a discreet manner. GBV/SEA-related complaints will be communicated to World Bank no later than 48 hours after being received by the GR Cell (site level) or by the GRC (PIU level).

The GRC will record the complaint, investigation, and subsequent actions and results in the monthly Environmental Management and Monitoring reports. In the construction and initial operational periods covered by loan covenants, the PIU will periodically report progress to the World Bank, including reporting complaints and their resolution. The tracking and documenting of grievance resolutions within the GRC and or PIU will include the following elements:

i. tracking forms and procedures for gathering information from project personnel and complainant(s);
ii. computerized grievance database with dedicated staff to update the database routinely.
iii. systems with the capacity to analyze information to recognize grievance patterns, identify any systemic causes of grievances, promote transparency, publicize how complaints are being handled, and periodically evaluate the overall functioning of the mechanism.
iv. processes for informing stakeholders about the status of a case; and
v. procedures to retrieve data for reporting purposes, including the periodic reports to the PIU and GRC, reports into the monthly ESMP Compliance monitoring report to the World Bank.
vi. An annual qualitative review of all complaints processed (ensuring filters such as gender, type of complaint, resolution status, time taken, intake channel, district/site, etc.) will also be undertaken to analyze the efficacy of the system.

The GRM will be provided with the necessary budget required for its efficient functioning.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

10.1 Objectives

The purpose of the Environmental and Social Management and Monitoring Plan is to ensure that all necessary identified measures have been adopted to protect the environment and social situations and to comply with the country's environmental and social legislation and applicable World Bank ESS.

10.2 Institutional Arrangements

10.2.1 Project Management Responsibilities

Implementation of the ESMP will be a contractual obligation between the Contractor and the Project Implementation Unit (PIU), SCRP. The Contractor shall engage full-time technical staff capable of carrying out the monitoring activities as proposed in the ESMP (refer to Table 38) as contractual obligations under the contract agreement.

Environmental and Social Team – PIU will carry out monitoring activities related to the project during the construction phase by using checklists and notify the Contractor of any violations of the ESMP, check the progress reports, advise the client and contractor regarding any violations that require further action and maintain a record of events and surveys for reference.

The overall responsibility for the SCRP project as well as the Environmental and Social Team will rest with the PIU. Besides, the PIU will be supported during ESMP implementation by E&S team to be established within PIU respectively.

10.2.2 Project Implementation Unit (PIU)

The overall responsibility for the supervision of the Environmental & Social Management Plan will rest with the PIU under SCRP will act as the apex body of the project to take care of Social/Gender and environmental issues and to make policy decisions at the project level. An Environmental and Social Management team (E&S Team) will be hired within Key positions within the E&S Team including Environment Specialist, Social Safeguard/Resettlement Specialist and Gender Specialist

The E&S Team shall be responsible for the supervision of implementing and monitoring the ESMP including GRM. The team shall be answerable to the Project Director (PD) SCRP. The team shall be responsible for the monitoring defined in the ESMP as part of their overall monitoring of social and environmental management. Furthermore, the PIU must ensure that the Suggested Due Diligence measure, which has been annexed in Annexure – VIII, be included in the contract/s.

10.2.3 Project Implementation Consultant (PIC)

The project proponent will engage the PIC, is responsible for the monitoring of the ESMP on behalf of the PIU during the execution of the Civil Works for sub-projects under the SCRP and shall submit periodic reports. In general, the PIC has the following responsibilities regarding the environmental aspects of the project:

- Review the documents prepared by the Contractor regarding E&S implementation.
- Monitor the implementation of ESMP regularly during the execution of civil works by the Contractor. The PIC must have the following key positions:

a) Environmental Specialist/HSE Expert
b) Ecologist
c) Social and Resettlement Specialist

10.2.4 Contractor Responsibilities

The Contractor will be responsible for the on-field implementation of the ESMP as well as maintaining responsibility for environmental protection liabilities under the Sindh Environmental Protection Act (SEPA), 2014, World Bank ESF 2018, Contractor's code of conduct and other applicable national as well as provincial policies and regulations. Besides, the contractor has to comply with the suggested measure in ESMP Plan.

Furthermore, the contractor will be required to fill in the particulars of employment which have been given in Annexure – IX. The Contractor will also be responsible for training his crews on all aspects and implementation of the ESMP. The bid should include an environmental and social mitigation budget as part of the engineering costs of the respective works. The key positions to be filled within the contractor's staff for implementation of the ESMP include:

Environmental/Labour Officer; Occupational Health and Safety (OHS) Officers; Ecologist, and Social Expert as Community Liaison Officer.

10.3 Contractor's Environmental and Social Management Plan

Contractors' ESMP has been prepared before the Contract award, and therefore, certain mitigations, which are dependent upon the methodology chosen by any Contractor to deliver the project, could not be specified in it. For example, haulage routes are dependent upon the exact campsite locations chosen by the Contractor. Therefore, it is required that the Contractor shall prepare plans before mobilization and implement the plans described below with the help of mitigation measures. Once approved by the CSC Environment Specialist & PIU, these documents will become part of the Contract. Sample C-ESMPs have been annexed (refer to Annexure X).

10.3.1 Labour Management Plan

The contractor shall be prepared and get approval from PIU for the LMP which has camp layout as well. The LMP will adhere to Labour Management Procedure, which has been approved for SCRP. These procedures have been developed to manage risks under the SCRP funded by the World Bank. The LMP will set out the project's approach consistent with national requirements as well as the objectives of the relevant World Bank's Environmental and Social Standards on Labor and Working Conditions (ESS2).

10.3.2 Camp Management Plan

The contractor camp management shall provide all details of social facilities, including dormitories, washrooms for labor, cooking areas, dining facilities, prayer areas, septic tanks, drinking water, and other necessary facilities.

10.3.3 Pollution (air, land, and water) Control Plan

The Contractor shall provide details of the principal pollution control facilities proposed and of contingency plans in the event of failure of these facilities. The contractor must follow ESS3 – Resource Efficiency and Pollution Prevention and Management while formulating the plan before the start of civil work.

The plan shall include the details of the designated and licensed tip, oil treatment facilities and hazardous waste disposal sites that shall be used to dispose of waste. The plan shall also include Environmental effects monitoring.

10.3.4 Waste Management Plan

The Contractor shall include details of the procedures for the collection and disposal of wastes. The Plan shall deal with each waste stream separately. WMP will be prepared and implemented by the Contractor based on WBG EHS Guidelines (2007), as well as the mitigation plans given in the report. The Plan will include the camp layout, and details of various facilities including supplies, storage, and disposal.

10.3.5 Traffic Management Plan

The basis of the Contractor's Traffic Management Plan and further information is to be provided. The Contractor is required to provide further details once camp/worksite locations and material sources are finalized. The Traffic Management Plan must include details of the proposed access routes to the project area as well as haulage and access routes throughout the project area (including access to and from borrow pits).

10.3.6 Plan for Handling of Hazardous Materials

The Contractor shall identify control measures to ensure no environmental or health impacts from the handling of hazardous materials and the collection and safe disposal of hazardous materials (this may be included within the Pollution Control Plan).

10.3.7 Occupational Health and Safety

Upon mobilization, the Contractor shall prepare an Occupational Health and Safety Plan following ESS4 – Community Health and Safety & Sindh Occupational Safety and Health Act 2017, which shall be relevant to his chosen methodology. This plan shall detail the following:

- Health and safety management structure, responsibilities, supervision and reporting scheme.
- Health and safety goals for the project
- Identification of potential hazards (health risks, safety risks)
- Proposed measures to reduce the risk of identified hazards.
- Arrangements to implement such measures.
- A system for reporting and investigating accidents, incidents and near misses.
- A plan for emergency transfer of staff or public from the site to medical facilities
- Fire and emergency procedures.
- Site security.

10.3.8 Environmental and Social Awareness Training Plan

This shall include details of the Contractor's environmental and social awareness training program proposed for the workforce. Details are given in Table 10-1 given below.

Table 10-1: Environmental and Social Awareness Training Plan

Areas of Training	Key Aspects to be Covered	Target Group	Frequency	Budget.
Environment /HSE, Social Safeguards Biodiversity Awareness	**a.** Environmental and social awareness. **b.** Key environmental and social issues associated with the project and subprojects ESIA and findings. **c.** Subproject monitoring and reporting. **d.** Occupational Health and Safety Issues associated with Construction. **e.** Grievance Redress Mechanism implementation **f.** Gender-Based Violence (GBV)/SEA/SH **g.** Child Labor **h. B**iodiversity conservation and management **i.** Resource Efficiency and Conservation. **j.** Water conservation and optimal resource use, Awareness regarding open defecation and better WASH practices for relevant community **k.** Identifications, conservation, and precautionary measures of wildlife.	PIU, Contractor staff as well as relevant communities.	Before project/physical works commencement, during construction and after construction.	A total of eleven types of training for the proposed sub-project is to be conducted.

10.3.9 Emergency Preparedness & Response Plan

The contractor will prepare the emergency plan to address emergencies/events such as fire, floods, earthquakes, accidents, and death/injury. These plans must be ready/disclosed before the start of civil works. The Plan will include the following details:

- Contacting the relevant agency (e.g., Fire Brigade)
- Procedure for the shutdown of the site.
- Indicators on-site that shall prompt the shutdown of areas of work (linked to natural events)
- Emergency evacuation procedure of staff and members of the public within range of likely impact.)

10.3.10 Tree Plantation and Maintenance Plan

The Contractor is required to prepare an inventory of the trees to be cut/uprooted/shifted before the commencement of the physical works in the presence of PIU staff, submit a detailed tree plantation plan, and define the proposed plantation methodology, species and

plantation locations. Sindh Forest Department, the PIU shall approve the plantation location. All trees to be planted shall be of native species as they have more chances of survival and plantation of invasive species shall be prohibited. The Contractor shall be responsible for the aftercare of the saplings/plantation for one year.

10.4 Compliance and Effects Monitoring

PIU shall carry out monitoring within the sub-project area using the monitoring checklists to be prepared based on this mitigation and monitoring plan (refer to Table 39) to aid the monitoring process, the Contractor will complete the following:

- The construction staff will be trained for the implementation of the EMP of this ESIA and safety measures.
- Periodic progress reports will be submitted to the Environmental and Social Specialists of PIU.

Progress Reports will include the various issues related to the HSE, including but not limited to the following.

- OHS Measures adopted (OHS statistics)
- Fuel and hazardous material consumption.
- Workforce statistics (employment/deployment etc.)
- Compliance monitoring to check whether the actions proposed in the ESMMP are being carried out.
- Effects monitoring to record the impacts of mitigation measures.

The effects monitoring shall be the responsibility of CSC. Examples of compliance and effects monitoring parameters are included in Box – 1 below. Both approaches will be conducted using the monitoring parameters by visual observation, photographic documentation, and measurement where necessary. A record of events and surveys will be maintained.

10.5 Environmental Non-compliances and Corrective Measures

The Contractor will be notified of any violations of the ESMP, as well as any corrective actions required. Outlined below are some steps, relating to the increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

Step 1. PIU and Contractor to work out mitigations together and record the facts and the decision implemented.

Step 2. A more serious infringement is observed, and PIU notifies the Contractor of the issues in writing, with a deadline by which the problem must be rectified. All costs will be borne by the Contractor.

Step 3. PIU shall order the Contractor to suspend part, or all, of the works. The suspension will be enforced until the offending parties, procedure, or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all costs will be borne by the Contractor.

Step 4. Breach of contract - One of the possible consequences of this is the removal of a Contractor and/or equipment and/or the termination of the contract. Such measures will not replace any legal proceedings that PIU may institute against the Contractor.

10.6 Communication Reporting and Documentation

The following environmental meetings are proposed:

- Primary meetings between the E & S team of PIU and the Contractor for setting out the format for the regular meetings shall be held before the commencement of the project.
- Scheduled Environmental and Social Progress Review Meeting (ESRPM) meetings between the team PIU and the Contractor shall be done every regular interval.

The purpose of the meetings is to discuss the conduct of the operation, non–compliances noted by the environmental and social teams and measures recommended for their remedy. The Contractor and PIU will produce monthly, quarterly and work completion reports of the sub-projects based on social and environmental issues. The distribution of the reports shall be to PIU and World Bank.

Box 10.1

(i) Compliance Monitoring:

- Frequency of anti-dust water sprays during construction period.
- Installation of signage regarding community health and safety
- Safety at workplaces and working hours during construction.
- Incidence of liquid/solid waste in the vicinity of work camps (type and amount of waste, amount, interference with local residents, fauna, flora and crops).
- Plantation of saplings of new trees against trees cut.
- Survival rate of saplings of new trees
- Arrangements made at construction sites for protection of floral and faunal resources.
- Assurance of installation of signage regarding community health and safety

(ii) Environmental Effects Monitoring

- Ambient air quality (Particulate matter) during construction phase.
- Surface water quality during construction phase especially at diversion sites
- Ground water quality at camp sites.
- Ground water table at construction sites.
- Number of patients suffering from malaria, cholera, diarrhea, respiratory ailments during construction phase
- Noise levels (in dBA), monitored at fixed locations and planed schedule during construction.
- Extent and degree of functionality of diversion channels to ensure un-interrupted water supply.

(iii) Social Effects Monitoring

- Number of local people recruited on project works.
- Incidence of child labour and disproportionate wages
- Conflict at community level
- Chance finds archaeological site.
- Grievance redressal mechanism is in place.
- Health screening of labour at site
- Contractor's staff sensitized on Gender base violence (GBV)

(iv) Biodiversity/Ecological Monitoring

- Vegetation cover and flora shall be monitored before start of construction.
- Weekly / monthly basis checklist for the monitoring of flora shall be filled.
- Weekly / monthly basis checklist for the damage monitoring of fauna shall be filled including small, large animal, reptiles and birds.

A photographic record of the project area shall be kept. The contractor, E&S-PIU will take photographs at key locations using a digital camera of the project area in a walkthrough survey the following data shall be recorded for each photograph:

- Shot number.
- All the photographs will be referenced with GPS Coordinates
- Title of photograph
- Date and Time, and
- Photographic features.

The photographic record shall be incorporated into the monthly reports.

Complaints Register. The Contractor will maintain a complaint register at the campsite and workplaces to document all complaints received from the local communities. The register will also record the measures taken to mitigate the reported concerns. The final report will be communicated to the E&S team of PIU. All complaints/issues of the community will be reported in the monthly progress report of the following month along with the status of the last month's complaints and will be reviewed by the E&S team of PIU.

Moreover, telephone numbers and addresses of all concerned tiers within the GRM would be displayed in Sindhi and Urdu at all sites, and the same would be distributed in community training/meetings.

Complaints Register Ties in with the Project GRM

The stakeholder's or affected people's concerns, complaints and grievances about sub-the project's environmental & social performance will be received, recorded and replied to in a systematic way using an understandable and transparent process that is gender-responsive, culturally appropriate and readily accessible to all segments of the affected people at no cost and without retribution.

Change Record Register. A review of this ESMP will be triggered in two scenarios:

- A change to the designs deviates from the parameters that are safeguarded in this ESMP.
- A discovery in the baseline socio-environmental conditions, which is not recognized or covered by this ESMP.

In the event of either scenario, the ESMP shall be updated and reissued accordingly. The Contractor and PIU to document any change in the project design/operation shall maintain the design change record.

10.7 Environmental and Social Management and Monitoring Cost

It is estimated that 136 trees will need to be relocated for the construction of the above-mentioned 26 small dams none of them be endangered as per the IUCN list. The replanting of 5 times trees (680) against the number of cuts down trees would cost Rs **2,040,000/-** considering the rate of Rs 3,000/- per tree.

A separate budget of Rs **347,305,200/-**has been allocated for the implementation of the ESMP. For general community support an amount of Rs. 5,000,000/ has been allocated for

each proposed site. This has been incorporated as a provisional sum item in the ESMP bill of each small dam and BOQ. Details are given in Table 10-2 below.

Table 10-2: Cost of Environmental/Social Management & Monitoring

Items	Unit	Quantity	Rate	Amount
1. Kal				
Training (two times during construction period)	Nos	68	3,500	238,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavy Equipment fitness Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (average 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	30	3,000	90,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,264,000**
			Contingency Cost 10%	**1,226,400**
			Total	**13,490,400**
2. Sangar Nadi 2				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000

Items	Unit	Quantity	Rate	Amount
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	65	3,000	195,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,180,000**
			Contingency Cost 10%	**1,218,000**
			Total	**13,398,000**
3. Haji Foto				
Training (two times during construction period)	Nos	72	3,500	252,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	10	3,000	30,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,092,000**
			Contingency Cost 10%	**1,209,200**
			Total	**13,301,200**
4. Shamm				
Training (two times during construction period)	Nos	70	3,500	245,000

Items	Unit	Quantity	Rate	Amount
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	15	3,000	45,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,058,000**
			Contingency Cost 10%	**1,205,800**
			Total	**13,263,800**
5. Kotharo				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	10	3,000	30,000

Items	Unit	Quantity	Rate	Amount
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,183,000**
			Contingency Cost 10%	**1,218,300**
			Total	**13,401,300**
6. Garrouk				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	50	3,000	150,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,177,000**
			Contingency Cost 10%	**1,217,700**
			Total	**13,394,700**
7. Talango				
Training (two times during construction period)	Nos	68	3,500	238,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and	Nos			

Items	Unit	Quantity	Rate	Amount
refilling (10 Kg each)		5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	10	3,000	30,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,078,000**
			Contingency Cost 10%	**1,207,800**
			Total	**13,285,800**
8. M-00 (Murad Barijo)				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	10	3,000	30,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,183,000**
			Contingency Cost 10%	**1,218,300**
			Total	**13,401,300**

Items	Unit	Quantity	Rate	Amount
9. M-01				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	15	3,000	45,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,030,000**
			Contingency Cost 10%	**1,203,000**
			Total	**13,233,000**
10. Chanari & Veer Dam				
Training (two times during construction period)	Nos	70	3,500	245,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at	Month			

Items	Unit	Quantity	Rate	Amount
one construction location.		15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	15	3,000	45,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,226,000**
			Contingency Cost 10%	**1,222,600**
			Total	**13,448,600**
11. Babu Khan Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	-	3,000	-
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,027,000**
			Contingency Cost 10%	**1,202,700**
			Total	**13,229,700**
12. Khakhar Dam				
Training (two times during construction period)	Nos	72	3,500	252,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000

Items	Unit	Quantity	Rate	Amount
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	-	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	35	3,000	105,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,125,000**
			Contingency Cost 10%	**1,212,500**
			Total	**13,337,500**
13. M Yousuf Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	25	3,000	75,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,102,000**

Items	Unit	Quantity	Rate	Amount
			Contingency Cost 10%	**1,210,200**
			Total	**13,312,200**
14. Aatho Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,045,000**
			Contingency Cost 10%	**1,204,500**
			Total	**13,249,500**
15. Sanyasi Dam				
Training (two times during construction period)	Nos	72	3,500	252,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000

Items	Unit	Quantity	Rate	Amount
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	25	3,000	75,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,263,000**
			Contingency Cost 10%	**1,226,300**
			Total	**13,489,300**
16. National Park Dam				
Training (two times during construction period)	Nos	70	3,500	245,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,115,000**
			Contingency Cost 10%	**1,211,500**
			Total	**13,326,500**
17. Dhani Bakhsh Bikak Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000

Items	Unit	Quantity	Rate	Amount
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	45	3,000	135,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,162,000**
			Contingency Cost 10%	**1,216,200**
			Total	**13,378,200**
18. Sundi Nai (Bahi Khan Goth) Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000

Items	Unit	Quantity	Rate	Amount
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,213,000**
			Contingency Cost 10%	**1,221,300**
			Total	**13,434,300**
19. Thado Nai (Chhuto Goth) Damm				
Training (two times during construction period)	Nos	68	3,500	238,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	30	3,000	90,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,096,000**
			Contingency Cost 10%	**1,209,600**
			Total	**13,305,600**
20. Abdullah Kanro Dam				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000

Items	Unit	Quantity	Rate	Amount
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,213,000**
			Contingency Cost 10%	**1,221,300**
			Total	**13,434,300**
21. Mathal				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	40	3,000	120,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,147,000**
			Contingency Cost 10%	**1,214,700**
			Total	**13,361,700**
22. Haji Imam Baksh				
Training (two times during construction period)	Nos	70	3,500	245,000

Items	Unit	Quantity	Rate	Amount
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	10	3,000	30,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,211,000**
			Contingency Cost 10%	**1,221,100**
			Total	**13,432,100**
23. Moidan-2				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	50	3,000	150,000

Items	Unit	Quantity	Rate	Amount
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,177,000**
			Contingency Cost 10%	**1,217,700**
			Total	**13,394,700**
24. Moidan Nadi				
Training (two times during construction period)	Nos	72	3,500	252,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 17 nos of machinery)	Month	204	3,500	714,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring as per SOPs	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	15	3,000	45,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,107,000**
			Contingency Cost 10%	**1,210,700**
			Total	**13,317,700**
25. Vaan Khand				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 20 nos of machinery)	Month	240	3,500	840,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and	Nos			

Items	Unit	Quantity	Rate	Amount
refilling (10 Kg each)		5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and Monitoring	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,213,000**
			Contingency Cost 10%	**1,221,300**
			Total	**13,434,300**
26. Saan-2				
Training (two times during construction period)	Nos	62	3,500	217,000
Generators & Construction Machinery Stack +Noise Monitoring (for 12 months for 16 nos of machinery)	Month	192	3,500	672,000
Drinking-Water Quality Monitoring, Before & During Construction (per month)	Month	13	12,000	156,000
Heavey Equipment fitnees Certification (Construction Machinery Certification)	Once	15	15,000	225,000
Personal Protective Equipment two sets for each headcount (avergarge 35 headcount)	Set	70	3,000	210,000
Fire Fighting Equipment purchase and refilling (10 Kg each)	Nos	5	8,000	40,000
GRM establishment & Running Cost	L. Sum	-	Lump sum	100,000
Camp Management (incl. costs of refrigerators in labor camps for cold water and for medicine storage) and monitoring	L. sum	-	Lump sum	200,000
Ambient Air Monitoring (before & During Cons) at one construction location	Month	14	25,000	350,000
Ambient Noise Monitoring (During Cons) at one construction location.	Month	15	1,000	15,000
Compensatory tree Plantation and post care for One year.	Nos	20	3,000	60,000
Environmental/Labour officer, Ecologist, Social and OHS Officer Salaries (100 thousand for each person) four different persons will be deputed on site)	Months	12	400,000	4,800,000
General Community support needs (if any)	Lump sum	-	Lump sum	5,000,000
			Subtotal	**12,045,000**
			Contingency Cost 10%	**1,204,500**
			Total	**13,249,500**
			Grand. Total	**347,305,200**

Table 10-3: Environmental & Social Management Plan

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
A. DESIGN PHASE									
A.1. Design / pre-construction considerations									
A.1.1	pre-construction considerations	A.1.1.1	Slope Instability	Excavated Material Disposal Plan to include a sitting and detailed assessment of the suitability of the proposed excavated materials disposal site	PIU	SCRP	All excavated surplus materials are to be disposed of in designated sites.	Once at the end of the design stage	SCRP Office
		A.1.1.2	Compliance to ESMP	Consideration of EMP in preparation for the detailed design and bid documents.	PIU	SCRP	Added ESMP in contract documents	Before the tendering	SCRP Office
		A.1.1.4	Geology and seismology	Stone pitching of the degraded reaches	PIU	SCRP	Emergency Preparedness and Response Plan in place before the commencement of construction.	Once at the end of the design stage	SCRP Office
	GRM	A 1.2	GBV, safety/health measures for the local population, etc.	The Grievance Focal Points (GFPs) in GRM will be provided training by the PIU/PIC in facilitating grievance redress. The GFP will be selected by the Social Safeguard team of PIU (SCRP), PIC and CLO consultation with the community to address GBV, safety/health measures for the local population, etc. related issues.	PIU & PIC	SCRP	Ensure that all workers have signed the code of conduct. Any complaint from the community.	All activities on a daily basis except public consultation will be carried out every month	SCRP Office

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
B. CONSTRUCTION PHASE									
B.1. Site Preparation and Clearance									
B.1.1	Site preparation	B.1.1.1	Top Soil Erosion	The Contractor will prepare an earthworks checklist and get approval from CSC. that the Checklist defines the limits to the excavation during reconditioning works. Instructions for topsoil management will also be defined. The use of soil from private land will be minimized and only after consultation and paying off the compensation to landowners.	CC	PIU & PIC	Approved Plans and comply with ESS1	During the Planning phase, in parallel with the preparation of bid documents	At any locations where borrow pits, and quarries will be operated.
				Vegetation clearance shall be limited to the area required for work.	CC	PIU & PIC	Written approval for cutting marked trees before cutting	Weekly	Same as above
				use of existing accessing tracks	CC	PIU & PIC	No tree-cutting on temporary haul routes	Weekly	Same as above
B.1.2	Disposal of Excavated Material	B.1.2.1	Identification of re-use of excavated material on site, to reduce off-site effects	All excavated materials are to be disposed of in designated sites as per the approved waste management plan the Plan shall deal with each waste stream separately	CC	PIU & PIC	Comply with approved WMP as per ESS1 –ESS3 – & Community complaints. Monitoring record	Monthly	At approved disposal sites
		B.1.2.2	Community Disturbance	Community liaison will be maintained during the construction stage and GRM will be established to address complaints.	CC	PIU & PIC		Monthly	Same as above
			Noise	Limiting working hours to between 9 am and 5 pm, six days a week. The campsite/s shall be	CC	PIU & PIC		Monthly	Same as above

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				situated at least 500m from any settlement. The affected communities will carry out on-demand noise monitoring in case of any complaint or request. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits of SEQS. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible.					
		B.1.2.3	Damage to existing infrastructure. Need to relocate infrastructure such as electricity transmission lines	Currently, no public infrastructure is observed which creates hindrances in the execution of the work. All damaged/removed infrastructures will be repaired/ restored to their original or better condition. Community liaison to be maintained.	CC	PIU & PIC		Monthly	Along the alignment
B.2. Construction and Labor Camps									
B.2.1	Locating Camp	B.2.1.1	Community disturbance	Locate the camp at least 500m away from the communities. Community consultations will be carried out and liaison will be maintained. GRM to be established to address related complaints.	CC	PIU & PIC	Review of Camp layout plan	Once	Campsite
			Loss of flora and fauna	Submit layout plans for the camp for the approval of the Engineer before the construction of the camp	CC	PIU & PIC	Construction of campsite: do not begin before approval of the	Once before camp establishment.	Same as above

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
			Surface water pollution	Locate camps away from the waterbody, etc.	CC	PIU & PIC	layout plan. As per ECoP 3:		
B.2.2	Supply of Drinking Water	B.2.2.1	Depletion of local drinking water resources	The contractor shall make his arrangements for the supply of water ensuring water supply and availability to local communities is unaffected.	CC	PIU & PIC	The contractor will not be entitled to use public water resources.	Monthly	Near the community water resources
		B.2.2.2	Spread of the disease through the unsuitable water supply	Provision of safe drinking water and monthly testing according to the SEQS-16	CC	PIU & PIC	Comply with SEQS	Monthly	Same as above
B.2.3	Water contaminations	B.2.3.1	Construction of impermeable layer	Suitable latrines (septic tanks etc.) and washing facilities are provided in the camps	CC	PIU & PIC	Latrines are provided at each camp	Once	Construction Camp
				Lined washing facilities including a shower, are available near each latrine, including clean running water, soap and drying facilities.	CC	PIU & PIC	Suitable washing facilities are provided at each camp	Once	Same as above
	Diversion of Water channels/water course	B.2.3.2	Inadequate diversion of canal/water course will affect the water supply to agricultural land of communities living nearby, which may create a social issue.	Schedules for construction activities along the water body have to be prepared with the consultation of the local community and active GRC needs to operate all the time	CC	PIU & PIC	Availability of water/ no complaint regarding water availability	Monthly	near/at the water source
B.2.4	Accidents and Emergencies	B.2.4.1	Emergency Response	The contractor shall prepare a shutdown procedure and evacuation plan	CC	PIU & PIC	As per Approved EPRP Plan	Once after the completion of the proposed work.	At the Construction area of sub-project sites

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				Emergency Preparedness & Response Plan to man-made and natural disasters (including rains, floods, fire, etc.)	CC	PIU & PIC	Annual evacuation drill	Quarterly	Same as above
				Emergency access routes shall be signed and maintained	CC	PIU & PIC	Emergency access routes are clear and signed	Monthly	Same as above
				Fire extinguishers are to be provided throughout the camp	CC	PIU & PIC	Fire extinguishers provided	Monthly	Same as above
B.2.5	Security	B.2.5.1	Conflict with local communities, attack on staff	Security for avoiding any conflict with local communities	CC	PIU & PIC	Fencing and security. The entrance to the camp shall be monitored and restricted	Monthly	Same as above
				Preparation and Implementation of a communication strategy, which will be developed by the contractor. under the guidance of CSC and get approval from PIU before the start of civil work.	CC	PIU & PIC	Approval of Communication Strategy by PIU	Once	
				The contractor shall provide all staff with Identity Cards showing their association with the project	CC	PIU & PIC		Monthly	All active work sites
				Sindh-speaking staff (Preferably the supervisors) to be available at all active work sites to communicate with the local community	CC	PIU & PIC	Sindhi staff available at all active work sites	Monthly	Same as above
				The Contractor shall include in the Emergency Plan, a procedure for emergency evacuation of camp and	CC	PIU & PIC	Plan submitted and approved	Once before the start of civil work	Camp area

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				practice this procedure					
B.2.6	Restoration	B.2.6.1	Change in Landscape after the closure of works	All temporary facilities shall be removed by the Contractor after the completion of the works	CC	PIU & PIC	Once at the time of completion of the subproject.	Once at the time of completion of the subproject.	Same as above
B.3. Storage of Material									
B.3.1	Stockpile Storage of Materials	B.3.1.1	Increase in particulate matter	Proper covered storage. Water sprinkling of any uncovered stockpile where dust is generated	CC	PIU & PIC	No dust generated from stockpiles	Monthly	Stockpiles
B.3.2	Storage of Hazardous Materials	B.3.2.1	Health and safety due to improper use of hazardous material	Fuel tanks and other hazardous material storage containers will be properly marked to highlight their contents.	CC	PIU & PIC	Comply with the approved Plan for Handling of Hazardous Materials while adhering ECP2	Monthly	Hazardous material storage areas
				Hazardous areas to be secure and access limited to trained personnel only	CC	PIU & PIC	Untrained personnel are not accessing hazardous storage areas	Monthly	Hazardous material storage areas
				Provide fire extinguishers	CC	PIU & PIC	Fire extinguishers are provided	Monthly	
				Provide and enforce the use of PPEs as per the Contractor's Health and Safety Plan	CC	PIU & PIC	Proper implementation of PPEs	Monthly	
		B.3.2.3	Health and Safety and Pollution	An oil-designated storage area used	CC	PIU & PIC	Stockpiles only in storage areas identified in the camp layout plan	Monthly	Sub-Project area
				Training on handling, use and disposal of hazardous material must be given to all those with access to the hazardous material area	CC	PIU & PIC	Training as per the Contractor's approved training plan	Monthly	Hazardous material storage areas at campsite

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
B.4. Waste Management									
B.4.1	Disposal of sanitary wastes using the municipal system (if available)	B.4.1.1	Introduction of Inappropriate Contaminants or Waste Volume to Municipal System	Testing of wastes and submission of results to the Engineer.	CC	PIU & PIC	Test results show waste is within SEQS limit for pre-treatment	Quarterly	Construction camp/s
				Written consent from the operator of the municipal system submitted to the Engineer	CC	PIU & PIC	Consent/ agreement submitted	Once before the start of civil works	
		B.4.1.2	Use of municipal system which falls below SEQS standards	All waste should be disposed off through SEPA certified vendor (They should be compliance and have expertise in handling and disposal the waste)	CC	PIU & PIC	Agreement with the certified waste collectors	Once before the start of civil works	
B.4.2	Collection of domestic wastes	B.4.2.1	Surface and groundwater pollution	Provide garbage bins within all camps for domestic wastes	CC	PIU & PIC	Provision of bins	Monthly	
B.4.3	Disposal of domestic wastes using Municipal facilities.	B.4.3.1	Ground and groundwater pollution, the spread of disease	Domestic waste shall be collected from waste bins on alternate days and transported by tractor trolley to dispose of in a nearby Municipal facility. A written agreement shall be made between the Municipal operator and contractor for the disposal of domestic waste.	CC	PIU & PIC	License or Written agreement b/w Municipal operator and Contractor checked.	Monthly	Licensed site.
B.4.4	Disposal of medical wastes	B.4.4.1	Surface water pollution, health and safety of staff and public.	Medical wastes will be stored on site. The contractor will engage a third-party contractor for the treatment and ultimate disposal of medical waste in a controlled manner.	CC	PIU & PIC	No medical waste in the municipal facility. Waste receiving receipt.	Monthly	Collection points/waste bin at the first aid center

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
B.4.5	Disposal of hazardous wastes	B.4.5.1	Ground, groundwater and surface water pollution, health and safety	Hazardous waste is to be passed to licensed contractors, or available wastes are to be stored in long-term storage facilities meeting the requirement of hazardous material storage area to be taken on client following construction. Details are to be provided in the pollution plan to the Engineer.	CC	PIU & PIC	As per approval of the Plan and guidelines WMP 2: Fuels and Hazardous Substances Management to meet the ESS1 & 3	Once	Collection point
B.4.6	Closure of works	B.4.6.1	Ground, groundwater and surface water pollution, health and safety.	All solid wastes shall be removed from the project area on completion of works	CC	PIU & PIC	All solid wastes disposed of or removed from the site and comply with the restoration plan	Once after the completion of civil work	At the Construction area of sub-project sites
B.5. Construction Plant and Vehicles									
B.5.1	Movement/ operation of vehicles on site	B.5.1.1	Air pollution	All vehicles are regular services as per manufacturers' requirements	CC	PIU & PIC	Black smoke was not observed emitting from Vehicles/plant	Quarterly	At the Construction area of sub-project sites
		B.5.1.2	Generation of dust	The access road is to be adequately compacted or regularly sprinkled to prevent dust generation during use	CC	PIU & PIC	Dust not reaching the settlements in the project area		Settlement in the Sub-project area
			Soil and Groundwater pollution	Vehicles/plants will be checked daily for fuel oils and leaks and fixed as required	CC	PIU & PIC	No fuel oil leaks were observed from the plant/vehicle		Sub-Project area
		B.5.1.3	Safety of the community, other road users, fauna and staff	Vehicle speed is limited to 10km/hr.	CC	PIU & PIC	Submittal and approval of the plan	Once	
				Safe driving practices included in Contractor's training plan	CC	PIU & PIC	Training as per the approved plan	Monthly	At the Construction area of sub-project sites

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				Flag persons to be provided where plant cross/meet the village road	CC	PIU & PIC	Flag persons provided	Monthly	Road approaching and crossing
				The contractor's Community Liaison Officer collaborates with communities to identify Socially sensitive areas and inform communities before the movement of large plant	CC	PIU & PIC	No complaints were received from the communities	Monthly	Settlement in the project area
				Vehicles with restricted rear visibility to be fitted with an audible backup alarm or provided with banks men	CC	PIU & PIC	Back-up alarms or banks men provided	Monthly	Project area
				Driving in the project area after nightfall is prohibited except on public highways	CC	PIU & PIC	No driving after dark	Monthly	Haul roads and temporary access roads
			Damage to public infrastructure	Damage to roads, infrastructure and property was immediately repaired/compensated by the Contractor	CC	PIU & PIC	No damage to roads/infrastructure	Monthly	Public roads
				Use of horns is prohibited near the settlement	CC	PIU & PIC	Nor horns were heard at the settlement	Monthly	Settlement in the project area
			Disturbance of Fauna	Biodiversity monitoring of impacts on fauna	CC	PIU & PIC	Status and behavior of terrestrial and avian-fauna	Quarterly	Sub-Project area
			Reduction in access to women and girls	Avoid routes used by women and girls as far as possible, if unavoidable, identify alternate routes for women and girls	CC	PIU & PIC	No complaints were received from women and girls	Monthly	
B.5.2	Deliveries to Site	B.5.2.1	Dust	Covered transportation of loose materials	CC	PIU & PIC	No dust generation from delivered materials	Monthly	Approach roads
		B.5.2.3	Community disturbance	Traffic management plan to be submitted to Engineer for	CC	PIU & PIC	Submittal and approval of plan	Once	

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
			increase in traffic	approval and to include routes for delivery vehicles			TMP		
				Deliveries should be carried out during normal working hours and prohibited at night if unavoidable then follow the nighttime working protocols.	CC	PIU & PIC	No deliveries were carried out at the night.	Monthly	Storage areas at the Construction campsite
				Delivery vehicles are prohibited from queuing on public roads	CC	PIU & PIC	No queuing delivery vehicles on public roads	Monthly	Same as the above
B.5.3	Road/access Closure	B.5.3.1	Community disturbance increase in traffic	Flag persons are to be provided where the plant cross/meet the village road.	CC	PIU & PIC	Flag persons provided	Weekly	At road partial closure
				The contractor's Community Liaison Officer collaborates with communities to identify the sensitive areas and inform communities before movement.	CC	PIU & PIC	No complaint received	Monthly	Settlement in the project area
				Request for road closure must be approved by the relevant authority	CC	PIU & PIC	As per Approved TMP	Once for each closure	Throughout construction period
B.6. Health and Safety of The Workforce									
B.6.1	General construction works	B.6.1.1	Health and safety of provisions	The contractor shall prepare and submit an occupational health and safety plan. This plan will need to describe all jobs, their risks, and the controls that will reduce risks; these controls may include PPE, restrictions on activities or locations, and other measures. Those who work near water, with heavy equipment will need special training so those hazards can be managed. The contractor will ensure the	CC	PIU & PIC	Submittal and approval of Labour Management plan. The number of reported accidents. The number of reported near-misses. Non-compliance observed. Community complaints.	Regularly as specified in the monitoring plan	At the Construction area of sub-project sites

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				use of Personal Protective Equipment (PPE) for his labours during the construction period. To overcome the drinking water contamination issue, at each construction camp, the contractor shall install a solar-operated domestic water filter/150GDP with Ultraviolet (UV) to ensure safe and healthy drinking water for the workforce. The Contractor will display sign boards and banners about traffic diversion at places on detour routes. Community liaison will be maintained during the construction stage and GRM will be established to address complaints related to safety hazards.					
		B.6.2.1	Health and safety of Staff	The contractor will submit an accident report to the Engineer following an accident on site. The report must detail actions to be taken to reduce the risk of occurrence	CC	PIU & PIC	Submittal of the accident report	Monthly	Same as above
				Qualified health and safety manager will be appointed by the Contractor	CC	PIU & PIC	Qualified health & safety manager present on site	Monthly	Same as above
				The contractor shall engage a full-time first-aider on-site Contractor to have the on-call doctor	CC	PIU & PIC	On-site Presence of qualified medical practitioners and first aid facilities	Monthly	First aid center

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				Provision of the dispensary for the treatment of staff. Dispensary to be stocked with appropriate medicines for likely incidents, diseases, and ailments to have occurred on site. Stock is to be replenished as necessary.	CC	PIU & PIC	Dispensary available on-site and regularly restocked	Monthly	Same as above
B.7 Borrow Aera Management and Dam/weir Axis									
B.7.1	works along the water body	B.7.1.1	Flooding	Prefer given not to work during rainy seasons Provide alternative drainage for rainwater if earthworks fill established drainage lines	CC	PIU & PIC	alternative drainage is provided	Monthly	Same as above
B.7.2	Formation of Borrow Areas	B.7.2.1	Habitat loss	The borrow Area Management Plan has to be prepared before the start of the civil work. Borrow areas shall not be established in the agriculture active land	CC	PIU & PIC	Borrow Area Management Plan. Borrow areas are not established in the agriculture-active lands.	Weekly	Borrow Area
		B.7.2.2	Borrowing from toes of embankments	The material shall not be borrowed from the outer and inner toe of the embankments	CC	PIU & PIC	Material is not borrowed from the toe of the embankments	Weekly	Borrow Area
		B.7.2.3	Borrow areas in environmentally sensitive sites	Borrow areas shall not be established in the wetlands, forest and any other environmental and socially sensitive areas	CC	PIU & PIC	Borrow areas are not established in the environmental and socially sensitive sites	Weekly	Same as above
		B.7.2.4	Restoration/rehabilitation of borrowed areas	Restoration of borrowed areas	CC	PIU & PIC	Borrow areas are restored to their original condition if situated on the private land	Monthly	Same as above
				Community liaison to be maintained. GRM to be	CC	PIU & PIC	Number of complaints	Regularly	Borrow Area

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				established to address related complaints.					
B.7.3	Access to Borrow Areas	B.7.3.1	Impacts on flora and fauna	available/existing access routes shall be followed	CC	PIU & PIC	existing access routes are followed	Weekly	Sub-Project area
		B.7.3.2	Impacts on agriculture land and crops	access routes in agricultural land shall be avoided	CC	PIU & PIC	Same as above	Weekly	Same as above
		B.7.3.3	if access route in the agricultural land is unavoidable, the owner of the land and crop shall be compensated	Compensation to the affected person shall be paid	CC	PIU & PIC	the affected person is compensated	Weekly	
B.7.4	Restoration of borrowed areas	B.7.4.1	Loss of habitat and landscape change	Potential for shallow wetland creation shall be maximized by the limited restored depth of borrow area to 0.3m	CC	PIU & PIC		Monthly	
		B.7.4.2	Loss of topsoil	Spread stockpiled topsoil (where topsoil is unsuitable for the formation of work) over borrow areas	CC	PIU & PIC		Weekly	
	Loss of natural vegetation and associated fauna	B.7.5.1	Loos of flora	136 Trees including young and mature expected to be removed/relocated from the site. In place of cut-down/uprooted trees, 680 new trees will be planted. The cost has been allocated for tree plantation for a better environment in ESMP Implementation Cost. Tree plantation plans for indigenous species will be prepared including the type of species, location for plantation, and other necessary information. No	CC	PIU & PIC	Record of tree cutting; Photographic record;	Fortnightly	Dam/Weir axis

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				invasive species will be planted.					
B.8 Archaeology and Cultural Sites									
B.8.1	Construction near religious sites	B.8.1.1	Community disturbance	All works excluded from mosques and Graveyards at the Project Site. (Spiritual Place for local people).	CC	PIU & PIC	Compliance with ESS8 – Cultural Heritage by adopting the chance find procedure Cultural and Religious Issues. All works excluded from the identified locations	Monthly	At the Construction area of sub-project sites
				Works do not block access to sites	CC	PIU & PIC	access to the sites is not blocked	Daily	Same as above
B.8.2	Discovery of unidentified cultural or religious site	B.8.2.1	Community disturbance	The contractor shall not trespass into the site, shall exclude all works and immediately inform the Site Engineer	CC	PIU & PIC	The engineer informed of the discovery of unidentified cultural or religious sites	Monthly	Same as above
				Community liaison to be maintained. GRM to be established to address related complaints.	CC	PIU & PIC	Number of complaints	regularly	Same as above
B.8.3	Chance find	B. 8.3.1		In the case of a chance finding, the contractor will secure the site and report immediately to PIU. Works may not recommence until the Engineer approves. Site visits of the Culture Tourism & Antiquities Department, Govt of Sindh will be facilitated. Further works will be carried out on such sites	CC, CSC	PIU &Culture Tourism & Antiquities Departme nt, Govt of Sindh	Chance find	As or when depends on chance find	Same as above

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				only after obtaining clearance from the Department					
B9. Safety/Health Measures for The Local Population									
B 9.1	The local population living within/near the sub-project especially women, children and elderly people	B 9.1.1	Accident risks, particularly for the local population living within/near the subproject especially women, children and elderly people; Public awareness campaigns through displaying signboards at site and haulage routes; Vulnerability to accidents; Deterioration of health due to dust	Restriction on the movement of machinery on the designated haulage routes for transportation of materials. Public awareness campaigns through displaying signboards at the site and haulage routes. Interaction with the community; Setting up speed limits (not more than 10 Km in work areas); Availability of first aid box for locals; Strict enforcement keeping non-working persons, particularly children, away from work sites; Adequate signage to manage traffic at sites, haulage and access roads; Ensure water sprinkling. For Community Female Members: •Awareness should be created among the local community including females about the construction work. •Workers should not be allowed to crowd in the residential communities within the site. •Alternative routes for pedestrians should be provided to avoid mixing women with workers. •Raise awareness among the	CC	PIU & PIC	Number of complaints to ensure compliance with ESS4 – Community Health and Safety	regularly	Same as above

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
				communities of the potential risks of GBV, SEA, and SH and establish links with response services in the nearby communities that can respond to instances of GBV (particularly those related to issues of labour influx). •Contractor should take proper measures to address and resolve issues relating to harassment, intimidation, and exploitation, especially against women. •Measures to prevent GBV, SEA and SH the Contractor must include relevant clauses in the workers' code of conduct. •Development and implementation of grievance redress/stakeholder response mechanism procedures to ensure timely handling of grievances.					
C. OPERATION PHASE									
C.1	Animal burrowing	C.1.1	Damage to the structure	Regular inspection of structures against burrowing by animals. (Rodents, porcupines, reptiles, etc.). Removal of the animals from the burrow and filling/ compaction of the pit.	SCRP	Third-party	No incident of any damages	Continues as per the government schedule or best practices	Entire sub-project area
C.2	Care of newly planted trees	C.2.1	Mortality of newly planted saplings	The Contractor shall be responsible for the aftercare of the newly planted trees for the first year, after which trees will be handed over to the client.	SCRP	Third-party	Compliance with SEQS	Twice in year	Entire project area

Sr. No.	Project Activities	Section	Environmental Impacts/Entity	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location
					Execution	Monitoring			
C.3	Impacts on lower riparian	C.3.1	Strom water will be blocked for lower riparian/downstream users.	With the construction of proposed dams, the aquifer will recharge. It is expected that the groundwater level will be raised.	SCRP	Third-party	No incident of any damges	Twice in year	Entire project area
C.4	Impacts on existing community tracks	C.4.1	Few kacha tracks of villages are expected to affect	All the pedestrian and vehicular tracks, which could be blocked by proposed dam reservoirs or affected by construction activities, will be realigned by providing unmetalled vehicle tracks. Cost estimation has been made	SCRP	Local Community	No incident of any damges	Twice in year	Entire project area

Table 10-4: Environmental & Social Monitoring Plan

Sr. No.	Parameters	Means of Monitoring	Frequency	Responsibility	
				Implementation	Supervision
1	Vegetation clearance	Visual inspection of loss of vegetation, soil erosion & instability, surface water pollution and occupational health of workers and community	Weekly	CC	PIC/PIU-SCRP
2	Top Soil	Visual inspection of topsoil of 15 cm depth should be excavated and stored properly	Beginning of earthworks	CC	PIC/PIU-SCRP
3	Erosion	Visual inspection of the occurrence of erosion and erosion prevention measures	At the end of the filling activity	CC	PIC/PIU-SCRP
4	Operation of burrow and quarry site	Visual inspections of quarry sites/ burrow areas	Monthly	CC	PIC/PIU-SCRP
5	Excavation of earth	Visual inspection for soil erosion & stability	Weekly	CC	PIC/PIU-SCRP
6	Material supply	Inspection of possession of official approval or valid operating license of suppliers' materials (asphalt, cement, quarry and burrow material)	Before the agreement for the supply of material	CC	PIC/PIU-SCRP
7	Storage and handling of materials	Visual inspection of storage facilities	Monthly	CC	PIC/PIU-

Sr. No.	Parameters	Means of Monitoring	Frequency	Responsibility	
				Implementation	Supervision
					SCRP
8	Local roads	Visual inspection to ensure local roads are not damaged	Monthly	CC	PIC/PIU-SCRP
9	Traffic safety	Visual inspection to see whether proper traffic signs are placed and safety barriers for traffic management are occupied	Monthly	CC	PIC/PIU-SCRP
10.	Air Quality	Air quality monitoring mobile lab (Certified laboratory from SEPA)	Monthly	CC	PIC/PIU-SCRP
		Visual inspection to ensure water sprinkling is being implemented	Daily	CC	PIC/PIU-SCRP
		Visual inspection to ensure asphalt plant is located greater than 500 m from residential/settlement areas	Monthly	CC	PIC/PIU-SCRP
10	Air quality & noise	Certified laboratory from SEPA	Monthly	CC	PIC/PIU-SCRP
11	Surface & groundwater quality	Sampling and analysis of surface water quality (Certified laboratory from SEPA)	Monthly	CC	PIC/PIU-SCRP
12	Solid waste	The visual inspection that solid waste is disposed of at the designated site	Weekly	CC	PIC/PIU-SCRP
13	Floral and faunal monitoring	Visual inspection	Daily	CC	PIC/PIU-SCRP
14	Cultural and archeological sites	Visual inspection	Daily	CC	PIC/PIU-SCRP
15	Visual check for exhaust emissions from equipment and vehicles	Visual inspection	Daily	CC	PIC/PIU-SCRP
16	Grievances of the local communities	Visual inspection	Daily	CC	PIC/PIU-SCRP
17	Reinstatement of work site	Visual Inspection	After completion of all works	CC	PIC/PIU-SCRP

11. CONCLUSIONS & RECOMMENDATIONS

11.1 Conclusions

This report presents the results of an Environmental & Social Impact Assessment (ESIA) of the proposed 26 small Dams. All proposed sites fall in the Kirthar National Park. As far as the sub-project area is concerned, none of the endemic or endangered species of both flora and fauna have been recorded. The wildlife hotspots, Khar & Karchat are located outside of primary and secondary impact zones of proposed dam sites, at a distance of an average 5 km (only three are at 5 to 8 km) while remaining are above 15 km away.

The initial screening criteria suggest that proposed project interventions would have substantial levels of environmental and social risks. These risks are likely to be temporary and reversible and are not expected to have lasting effects on the proposed sub-project areas.

The construction of small dams will bring the following impacts in the sub-project area.

- The proposed subproject will have a dual purpose of recharging the groundwater as well as would reduce the flood velocity, and there will be fewer losses to the fertile soil erosion, habitat destructions, and public amenities like link roads, electricity poles, and local human settlements.

- The proposed small dams will help to regulate the flow of water and reduce the peak discharge of floods.

- The project will help in recharging the groundwater and provide water in the areas where it is crucial for drinking, domestic use, and livestock.

- Due to the project, intervention water will be available for a longer period, which will augment to uplift socio-economic activities. Sub-project also contributes expansion of habitat for wildlife found in the area, it also provides a feeding ground for birds and associated fauna.

- The construction of the subproject will open job opportunities for the local people. This will help in raising their living standard.

- No permanent or temporary road will be constructed existing alignment will be used.

- All the proposed small dams of sub-project areas will be constructed on existing clearing or barren land to minimize the impacts on habitat.

- Additionally, during the operational stage no machinery, equipment, etc. needs to be operated during the operation stage.

- The operation phase of proposed dams in addition to the other already constructed and planned dams may create a positive impact on VECs in terms of habitat restoration and vegetation cover enhancement, which ultimately support the fauna of the area.

- It has been concluded that the constructions of small dams have a positive impact not only on land cover changes but also on livelihood resources directly and indirectly and reduces the wastage of rainwater and stores the water for future needs.

- The proposed small dams (SCRP) will have a synergistic impact on overall water conservation and rainwater harvesting during the operation phase.

- Cumulatively, due to the construction of proposed small dams, the groundwater level both in upper and lower riparians will be increased. The recharging of groundwater aquifers will also improve water quality from very poor to good.

11.2 Recommendations

- The Contractor will be responsible for the on-field implementation of the ESMP as well as maintaining responsibility for environmental protection liabilities under the Sindh Environmental Protection Act (SEPA), 2014, World Bank ESF 2018, Contractor's code of conduct and other applicable national as well as provincial policies and regulations.

- The negative impact could only be anticipated during the construction phase, which will last for this very small period only. However, mitigation measures recommended in the report would need to be strictly ensured by the contractor during the construction period. Besides, it outlines a specific description of institutional arrangements for carrying out the mitigation measures and their monitoring; capacity building and training of field staff; implementation and cost estimates; and Grievance Redressal Mechanism (GRM).

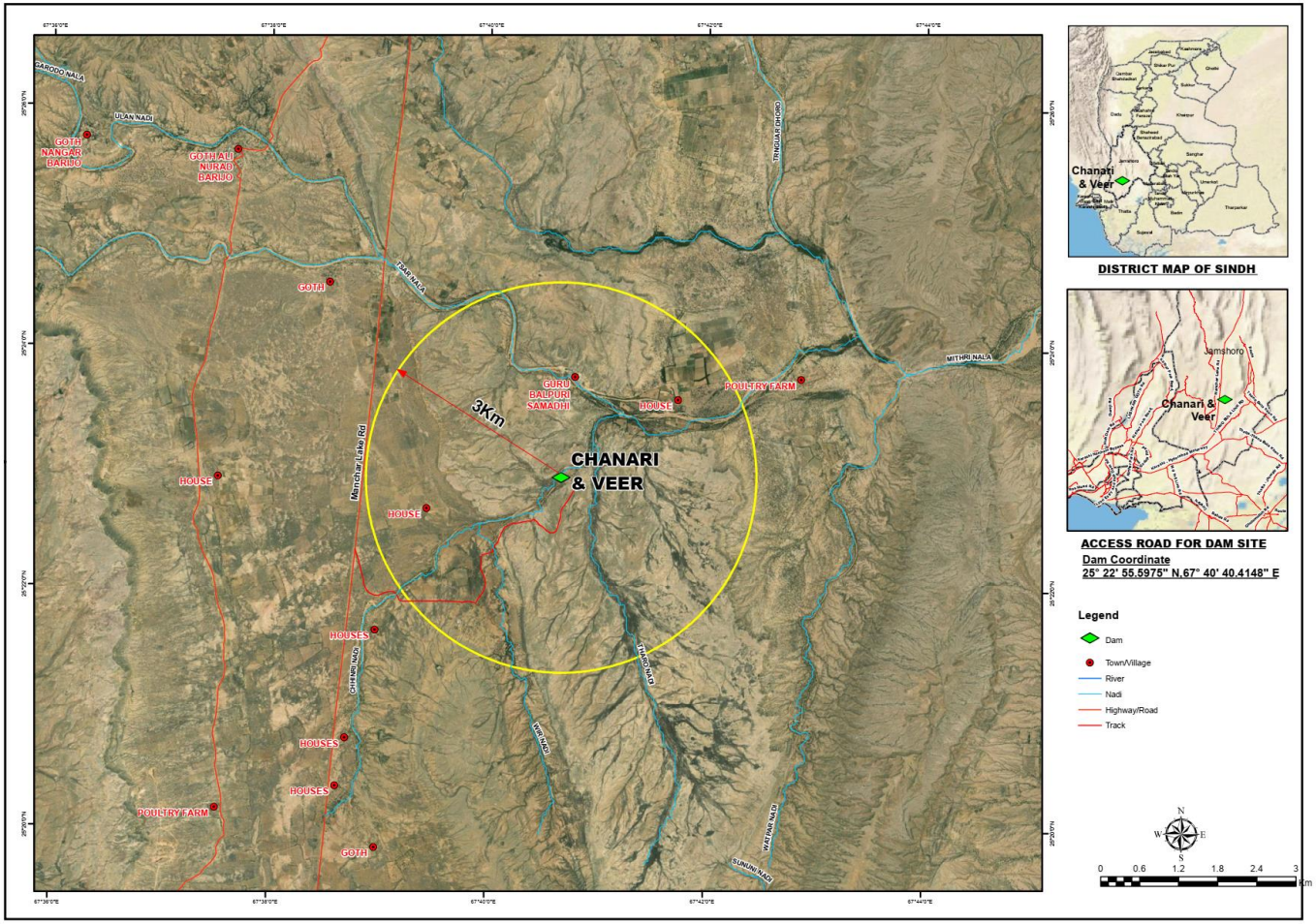
- E&S Safeguard monitoring has to be carried out to ensure that the mitigation plans are regularly and effectively implemented.

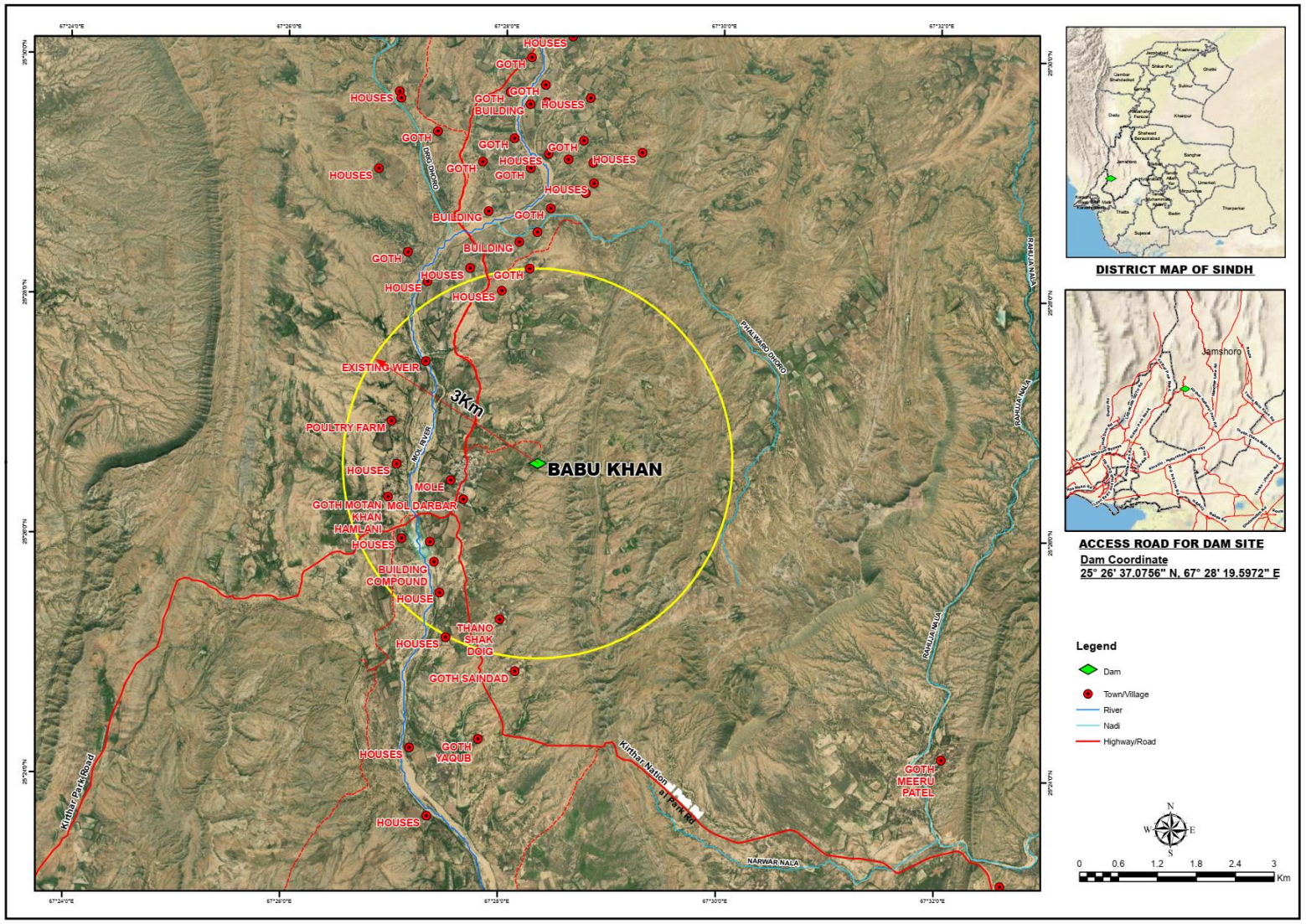
- The Contractor shall engage full-time technical staff (Environmental/Labour Officer; HSE Officer; Ecologist, and Social Expert as Community Liaison Officer) capable of carrying out the monitoring activities as proposed in the ESMP as contractual obligations under the contract agreement.

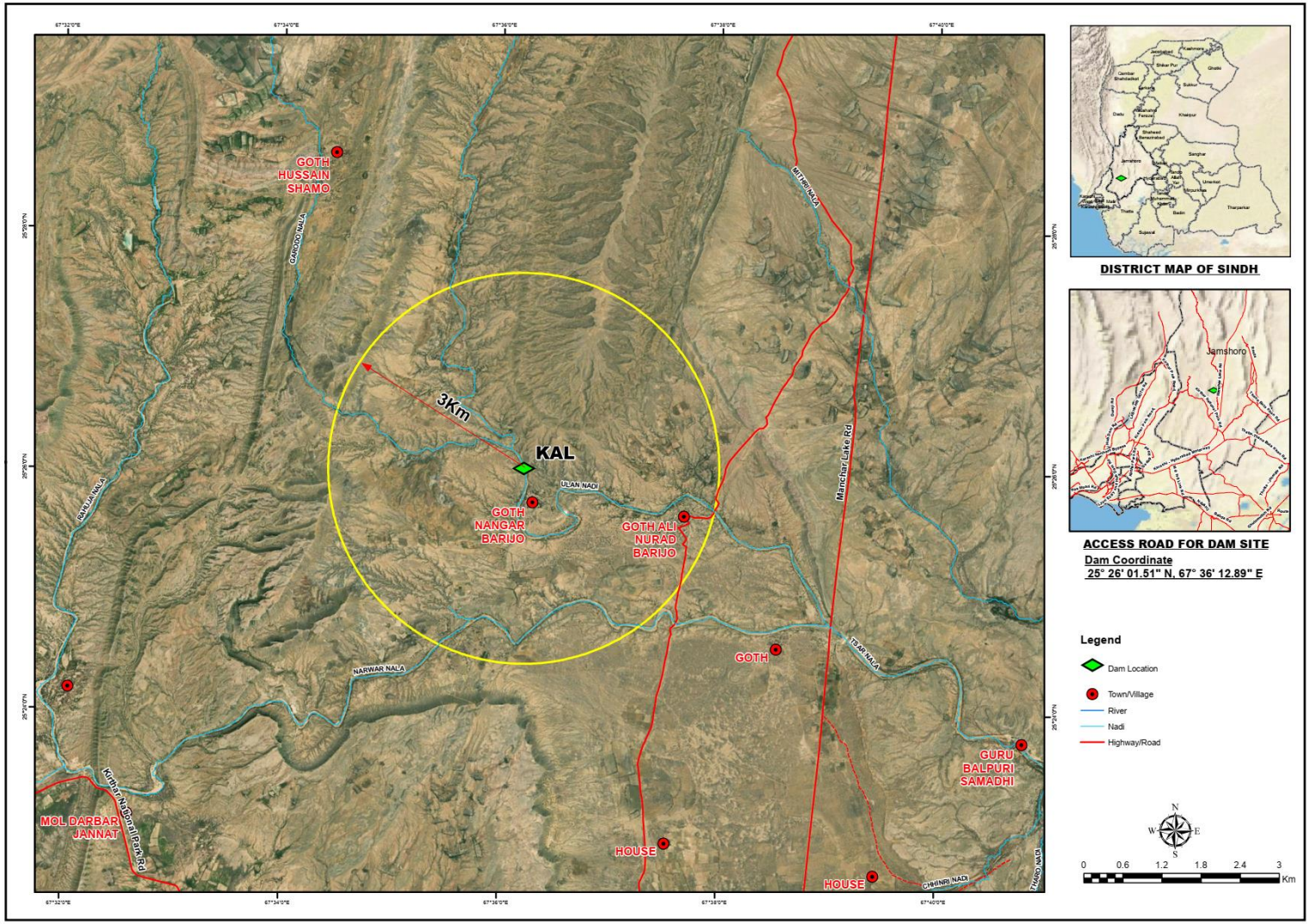
- A separate budget has been allocated for the implementation of the ESMP. For general community support and unforeseen impacts, a separate amount has been allocated for each proposed site. ESMP implementation cost has to be incorporated as a provisional sum item in the ESMP bill of each proposed small dam.

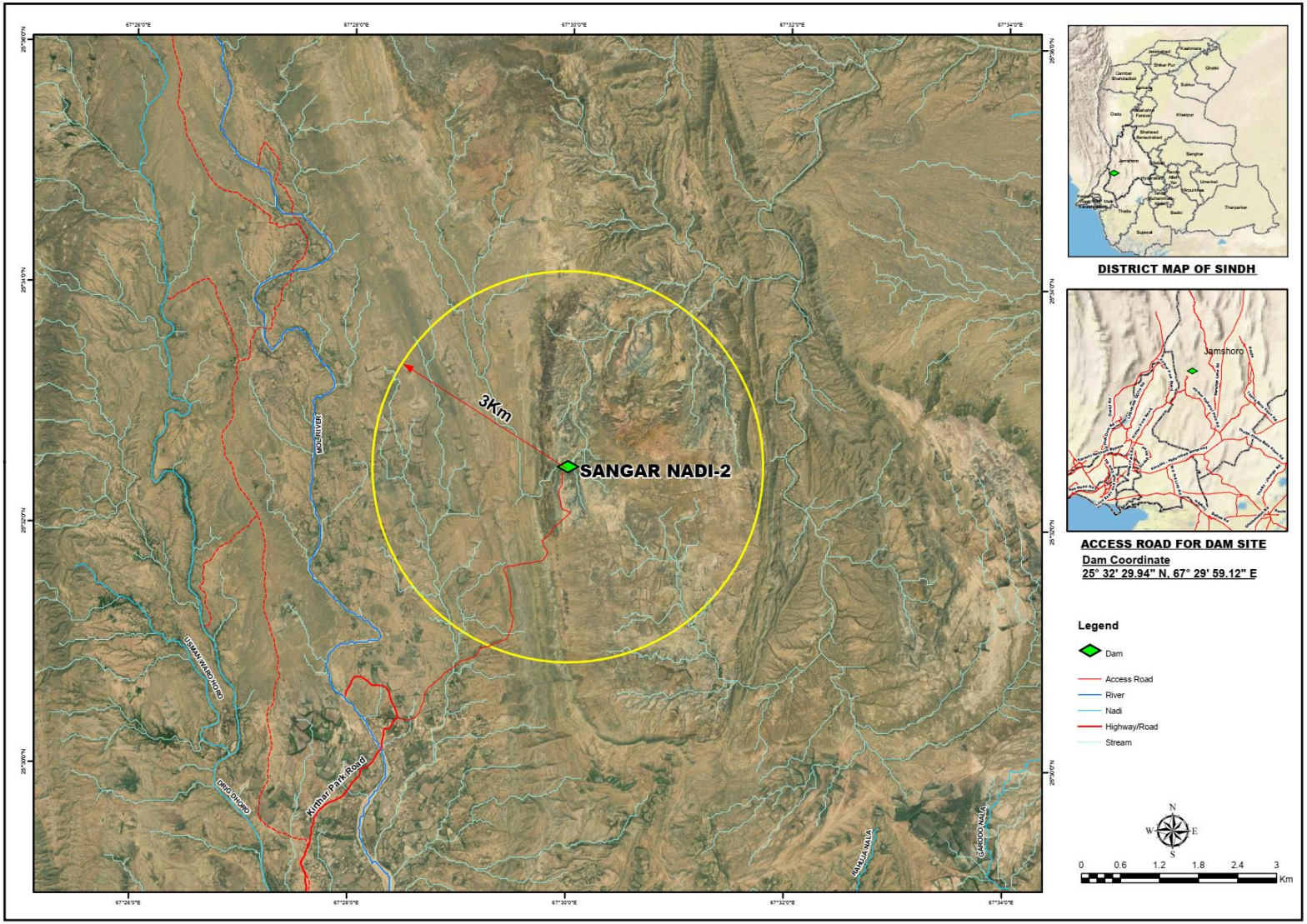
- Furthermore, a separate study has been recommended for the Cumulative Environmental and Social Impact Assessment (C-ESIA). The timeline for the completion of the study would be six months after signing the contract. The overall goal of the C-ESIA is to identify environmental and social impacts and risks associated with the context of existing, planned, and reasonably predictable developments, which may generate cumulative impacts that could jeopardize the overall long-term environmental, social, and economic sustainability of the watersheds of proposed small dams.

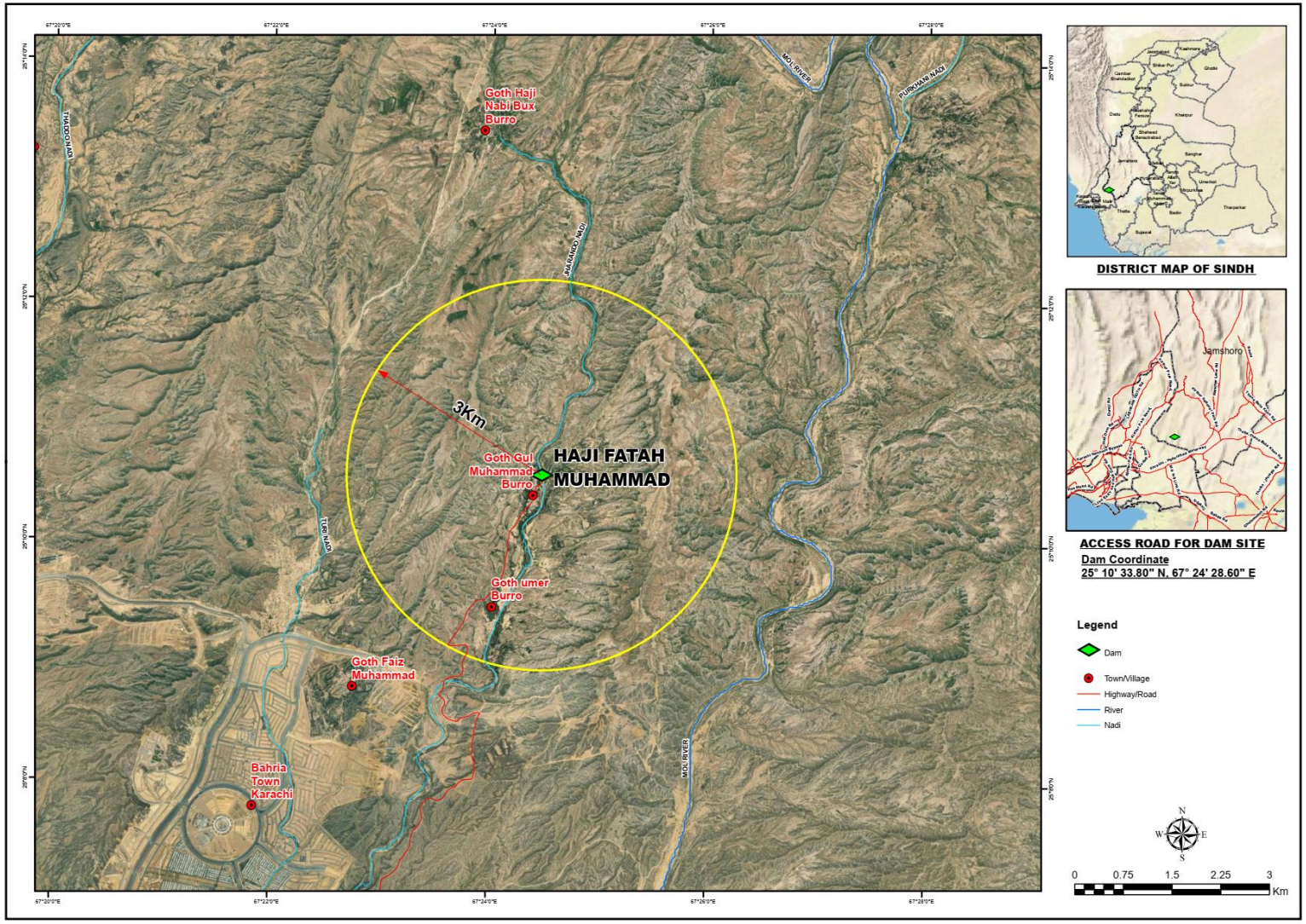
Annexure I: Primary & Secondary Impact Zone Maps

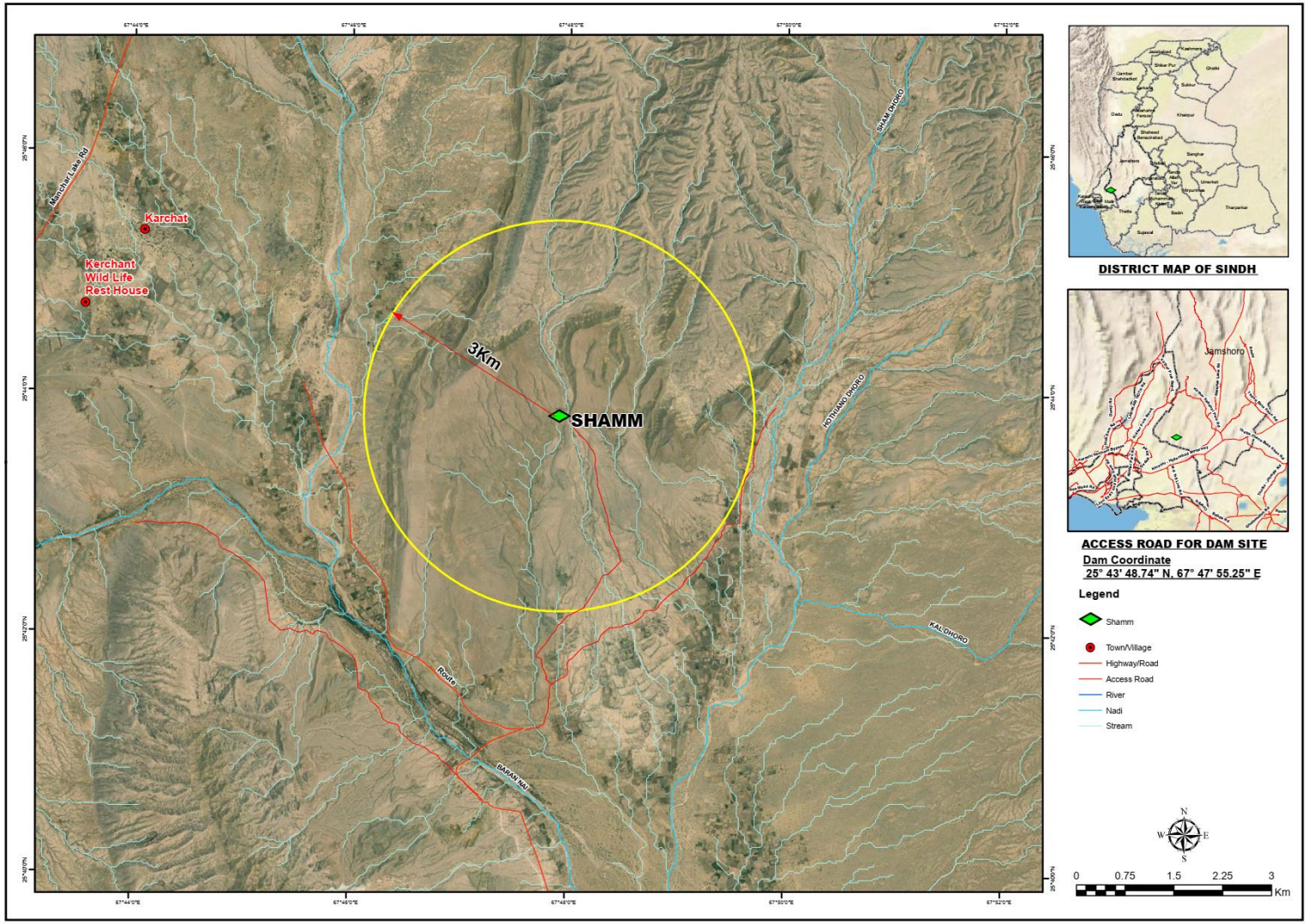


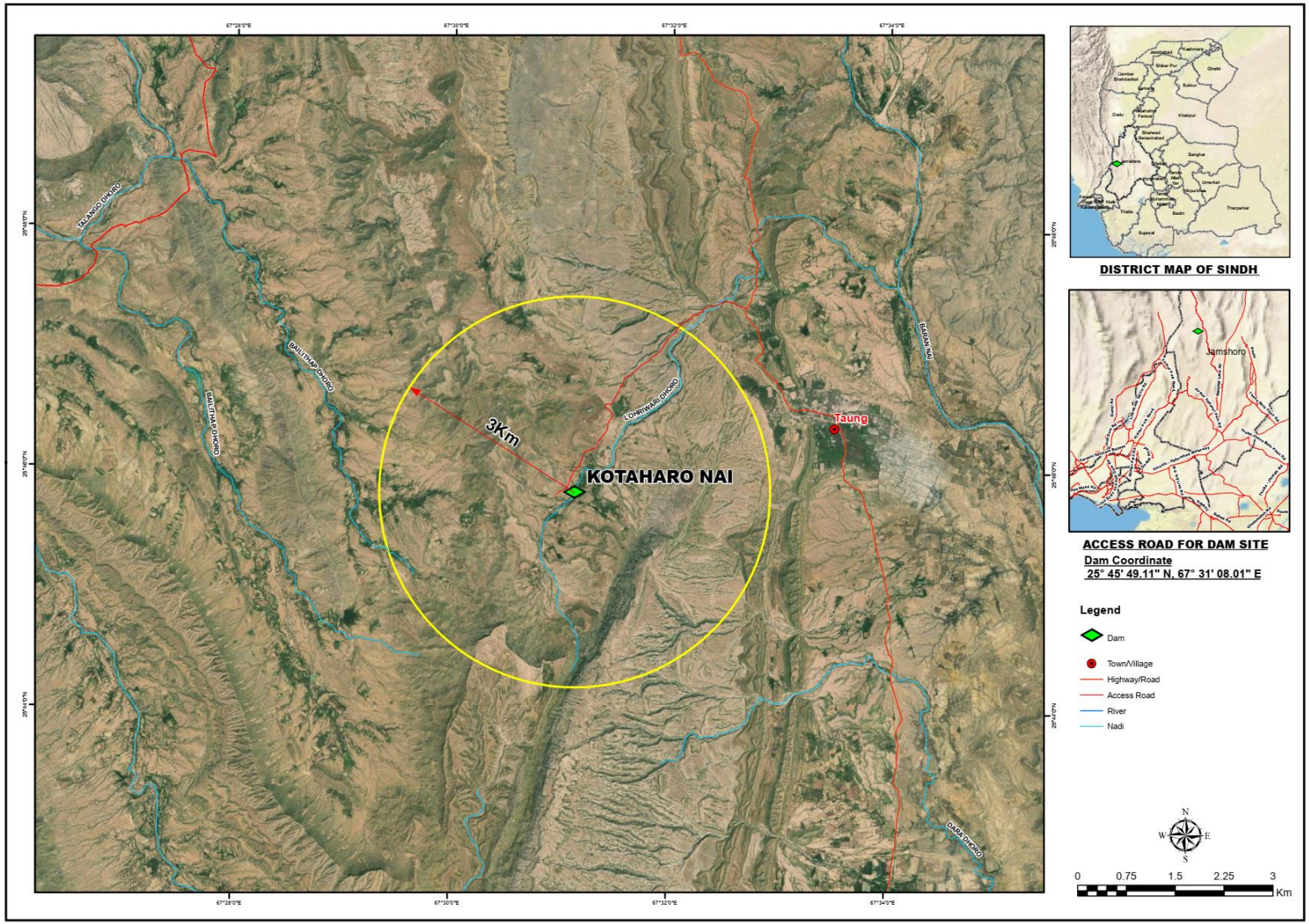

HOUSES
GOTH
BUILDING
PIRO DHORO
EXISTING WEIR
3Km
BABU KHAN
POULTRY FARM
MOL RIVER
MOLE
GOTH MOTANI
MOL DARBAR
KHAN
HAMLANI
BUILDING COMPOUND
HOUSE
THANO SHAK DOIG
GOTH SAINDAD
GOTH YAQUB
GOTH MEERU PATEL
Kirthar Park Road
Kirthar National Park Rd
NARWAR NALA
PHALWARO DHORO
RAHIJA NALA
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 26' 37.0756" N, 67° 28' 19.5972" E
Legend
Dam
Town/Village
River
Nadi
Highway/Road
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

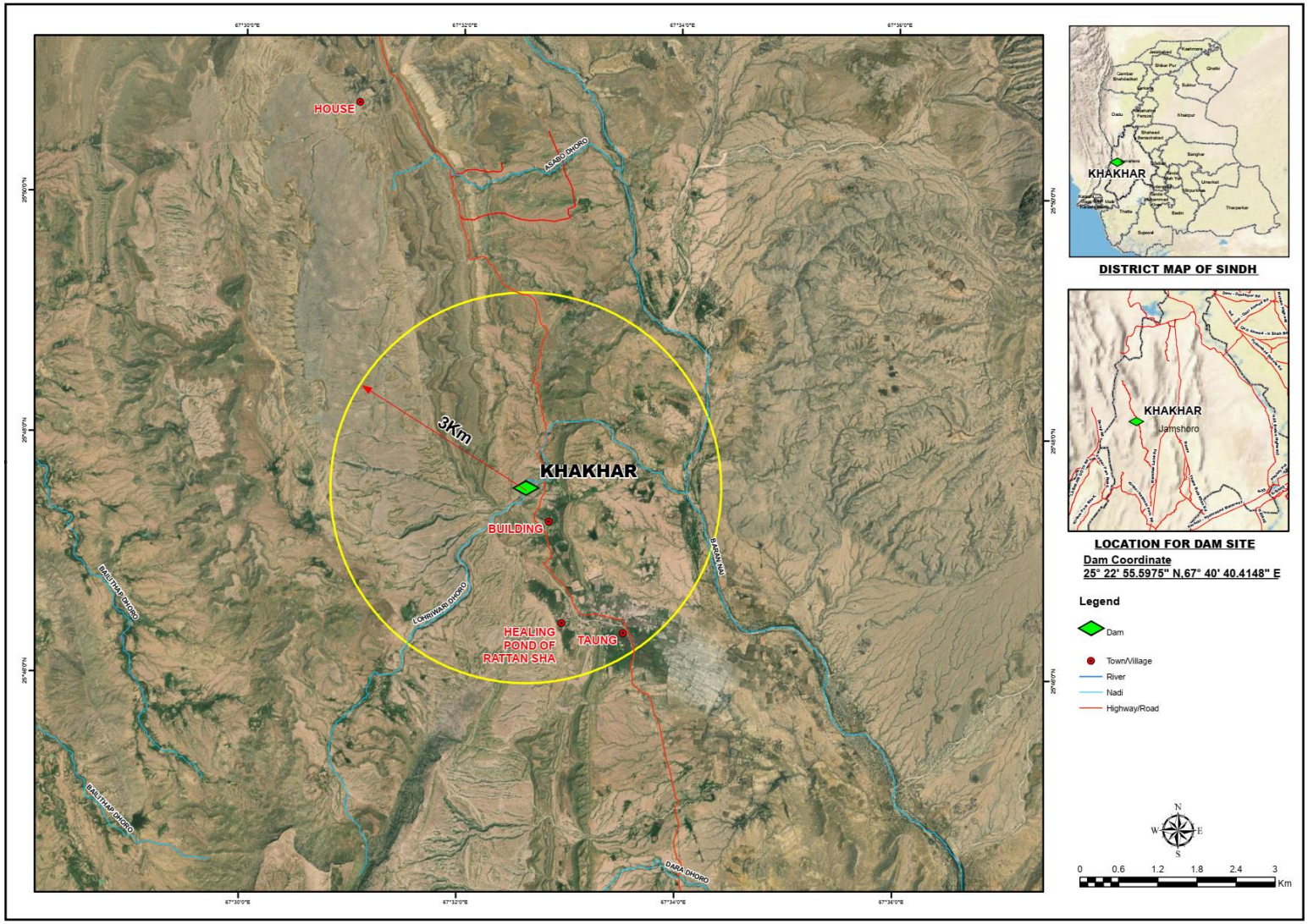

GOTH HUSSAIN SHAMO
GADODO NALA
MITHRI NALA
3Km
KAL
ULAN NADI
GOTH NANGAR BARIJO
GOTH ALI NURAD BARIJO
Manchar Lake Rd
RAMJAN NALA
NARWAR NALA
GOTH
TEJAR NALA
GURU BALPURI SAMADHI
MOL DARBAR JANNAT
Kirthar N.Sanctuary Park Rd
HOUSE
HOUSE
CHHINRI NADI
TAMRO NADI
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 26' 01.51" N, 67° 36' 12.89" E
Legend
Dam Location
Town/Village
River
Nadi
Highway/Road
0 0.6 1.2 1.8 2.4 3 Km

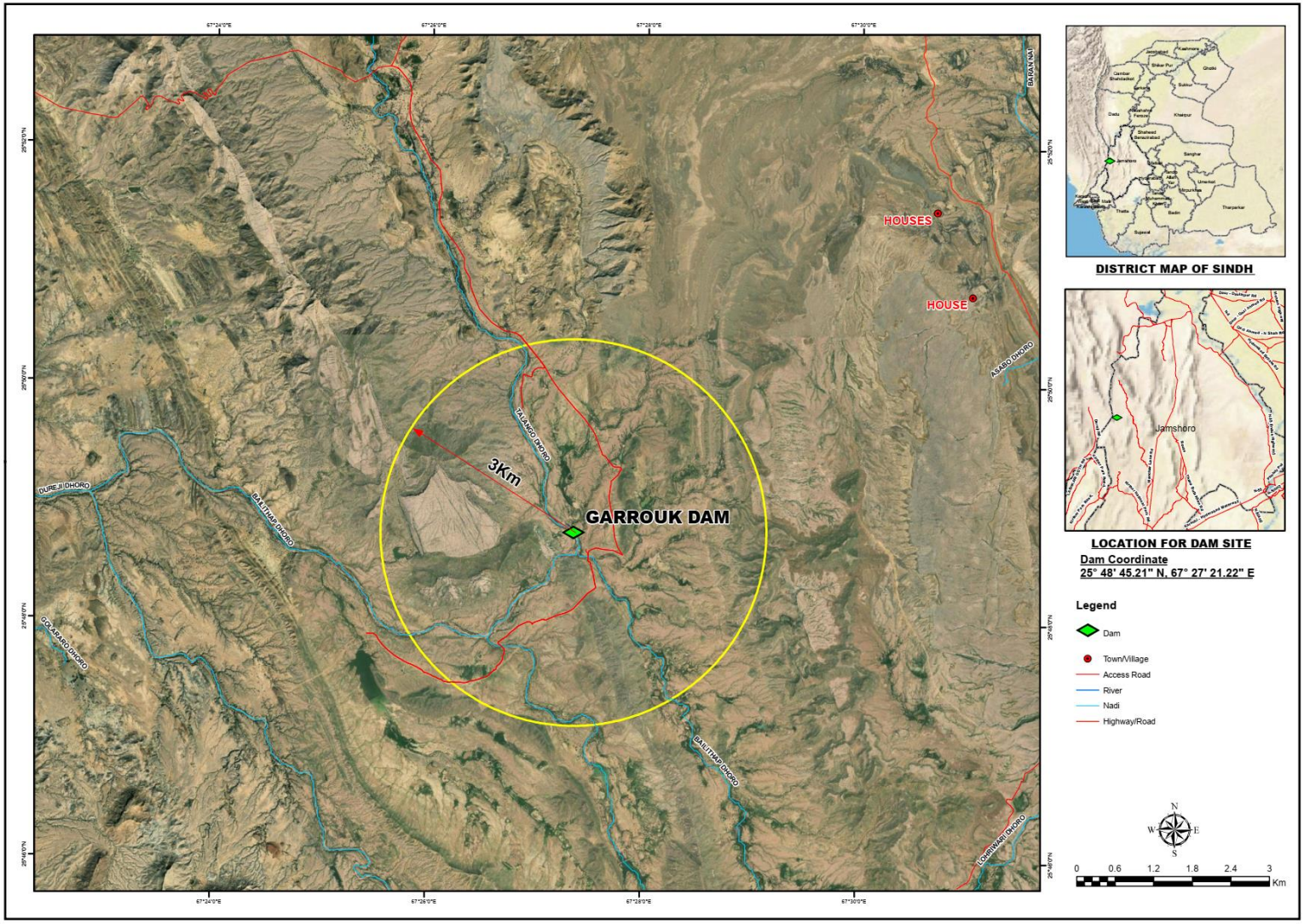

3Km
SANGAR NADI-2
MOLIRIVER
USMAN WARO NORO
DARO DHORO
Kunhar Park Road
RAKSA WALA
GARODO NALA
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 32' 29.94" N, 67° 29' 59.12" E
Legend
Dam
Access Road
River
Nadi
Highway/Road
Stream
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

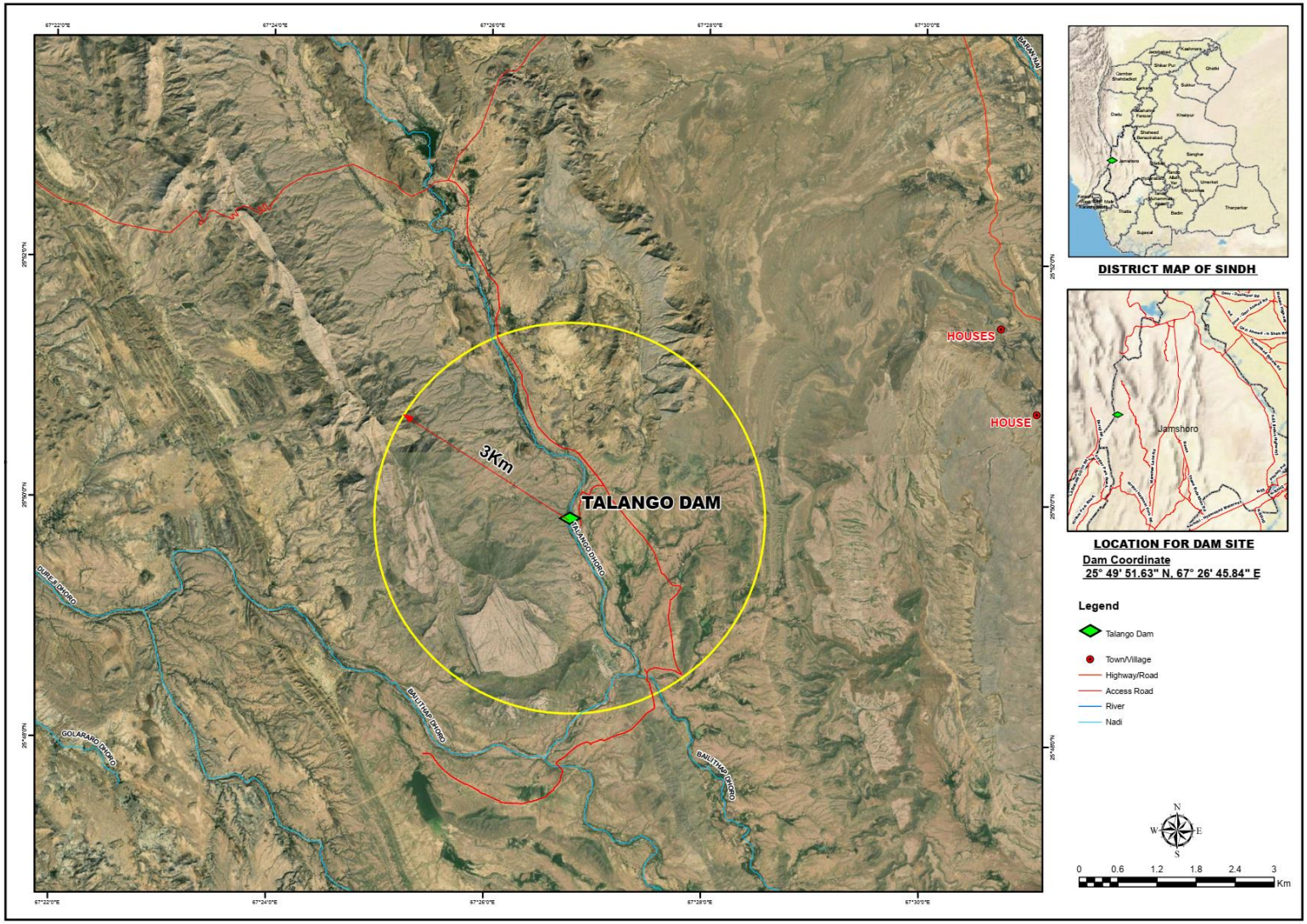

Goth Haji Nabi Bux Burro
MOL RIVER
DURKHANI NADI
THADDO NADI
SHARANGO NADI
3Km
HAJI FATAH MUHAMMAD
Goth Gul Muhammad Burro
TURI NADI
Goth umer Burro
Goth Faiz Muhammad
Bahria Town Karachi
MOL RIVER
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 10' 33.80" N, 67° 24' 28.60" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.75 1.5 2.25 3
Km

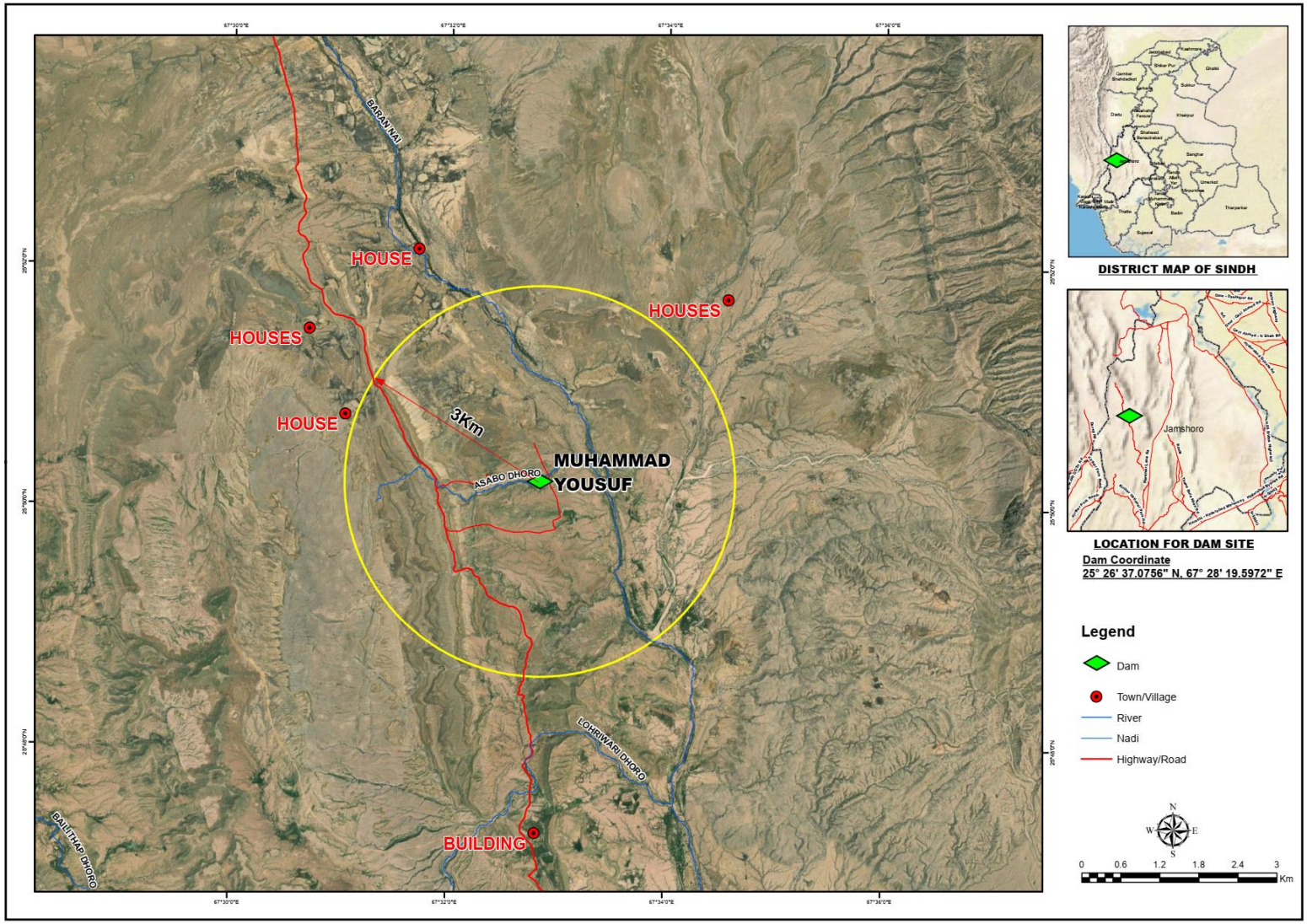

Manchhar Lake Rd
Karchat
Kerchant
Wild Life
Rest House
3Km
SHAMM
SHAM DHORO
HOTHIANO DHORO
KAL DHORO
Route
BARAN NAI
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 43' 48.74" N, 67° 47' 55.25" E
Legend
Shamm
Town/Village
Highway/Road
Access Road
River
Nadi
Stream
N
W
E
S
0 0.75 1.5 2.25 3
Km

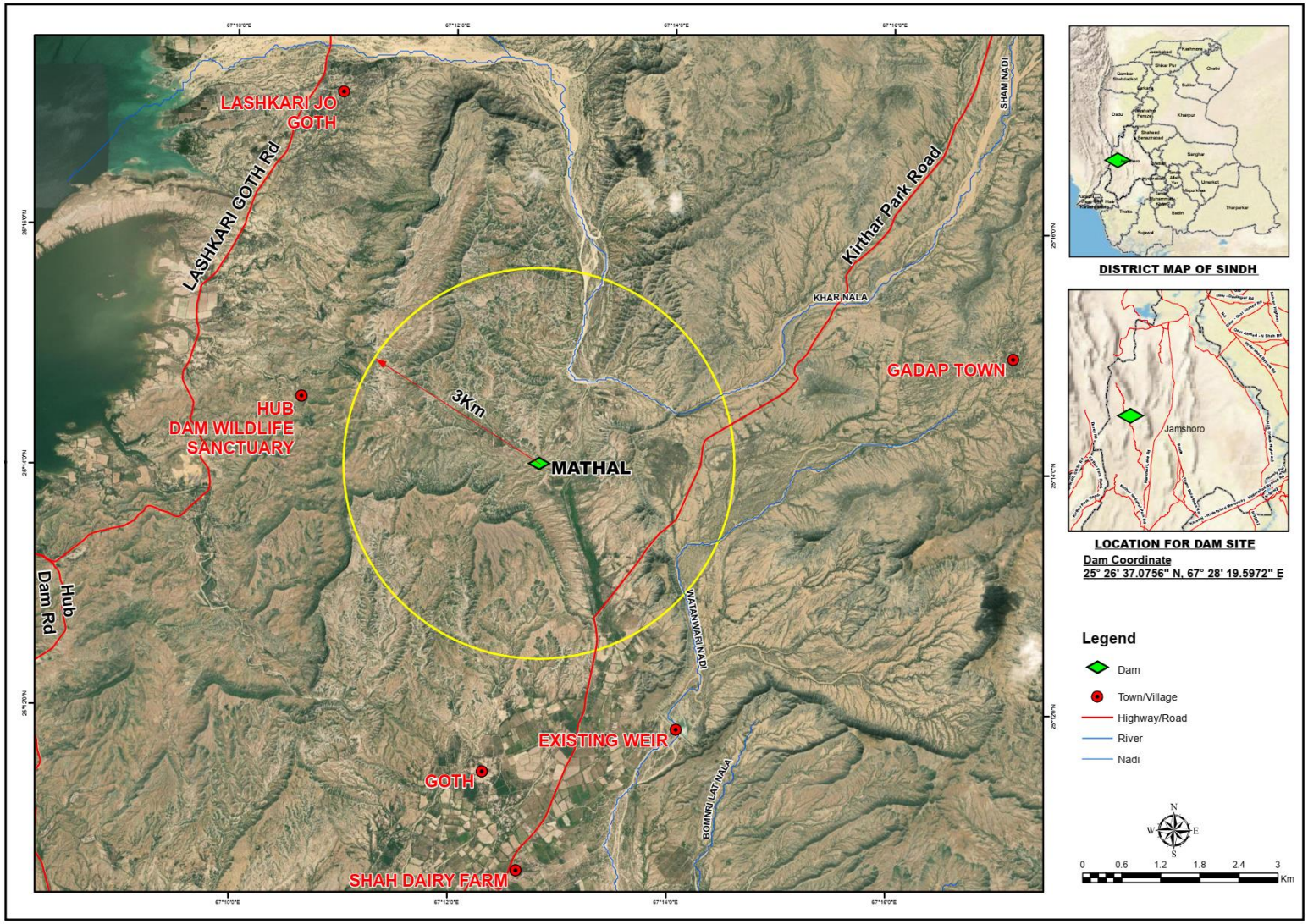

KOTAHARO NAI
3Km
Taung
FULANGO DHORO
BAILITHAR DHORO
LOHRIWARI DHORO
BAGAN NAI
DADA DHORO
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 45' 49.11" N, 67° 31' 08.01" E
Legend
Dam
Town/Village
Highway/Road
Access Road
River
Nadi
0 0.75 1.5 2.25 3
Km

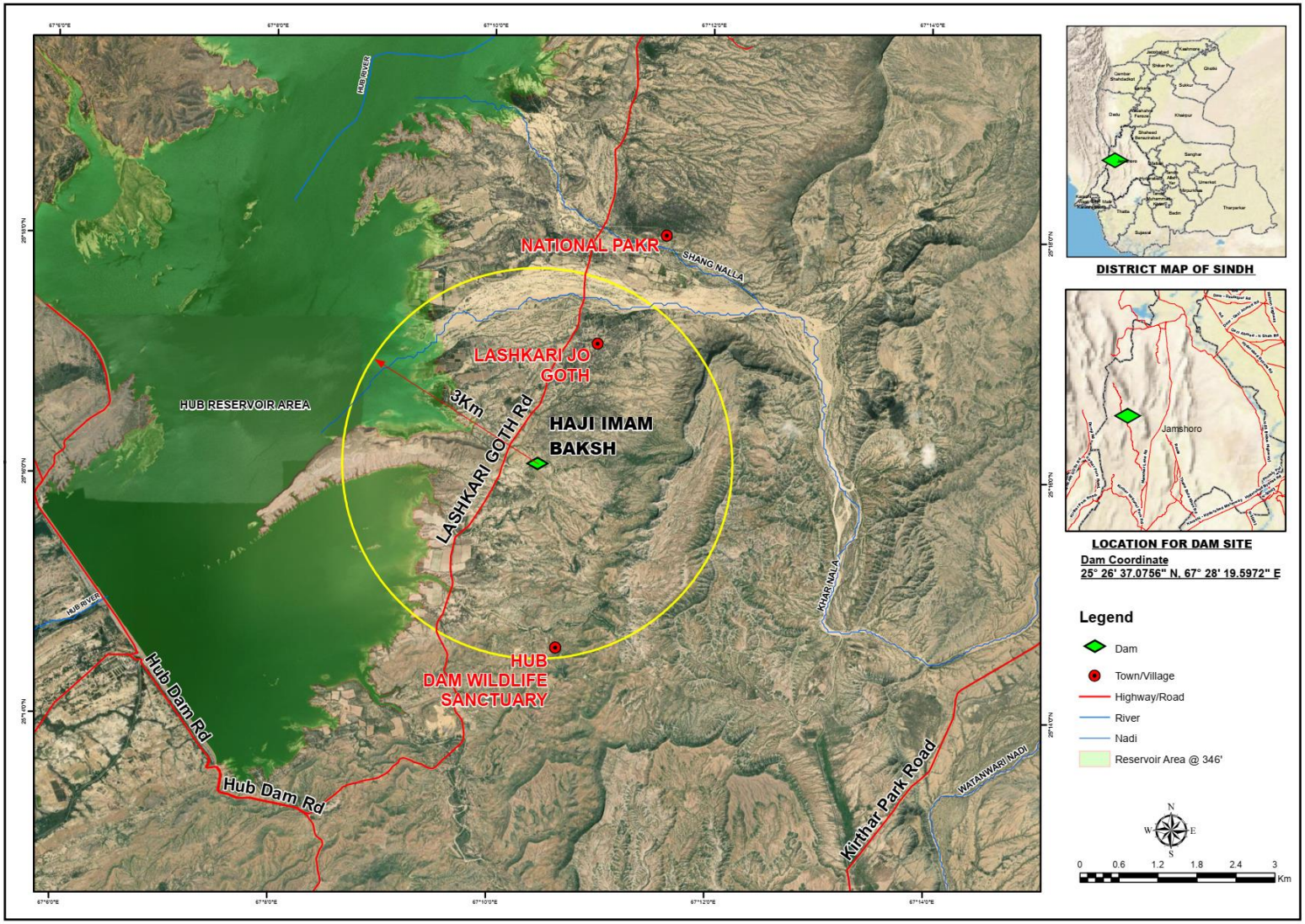

HOUSE
ASABO DHORO
3Km
KHAKHAR
BUILDING
BARAN NAI
LOHRIWARI DHORO
BABUTHAR DHORO
HEALING POND OF RATTAN SHA
TAUNG
DARA DHORO
KHAKHAR
DISTRICT MAP OF SINDH
KHAKHAR
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 22' 55.5975" N,67° 40' 40.4148" E
Legend
Dam
Town/Village
River
Nadi
Highway/Road
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

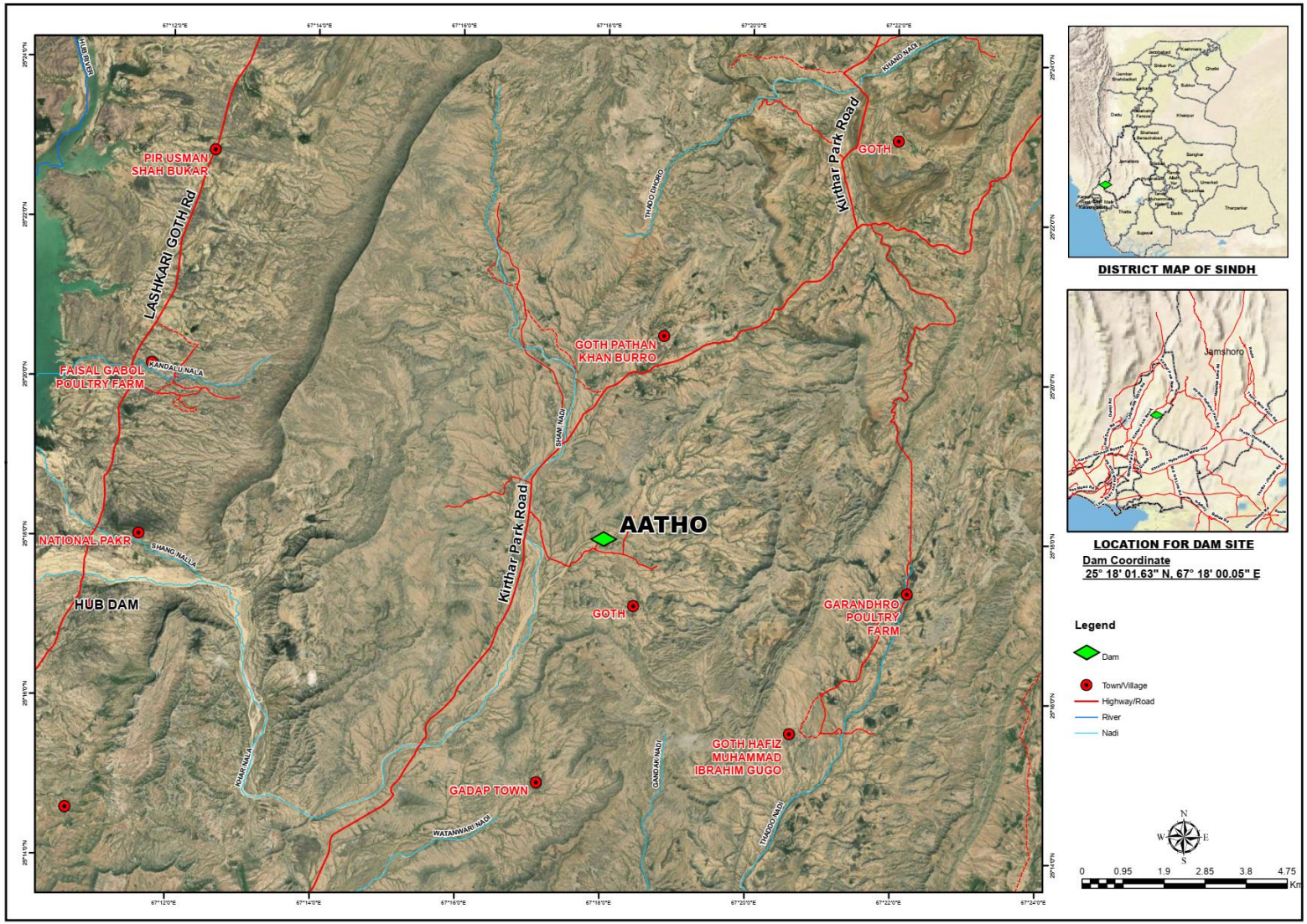

HOUSES
HOUSE
3Km
GARROUK DAM
TALANGO DHORO
ASARO DHORO
DURE JI DHORO
BALITHAR DHORO
GOLARARO DHORO
LONGIWARI DHORO
BARAN NAI
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 48' 45.21" N, 67° 27' 21.22" E
Legend
Dam
Town/Village
Access Road
River
Nadi
Highway/Road
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

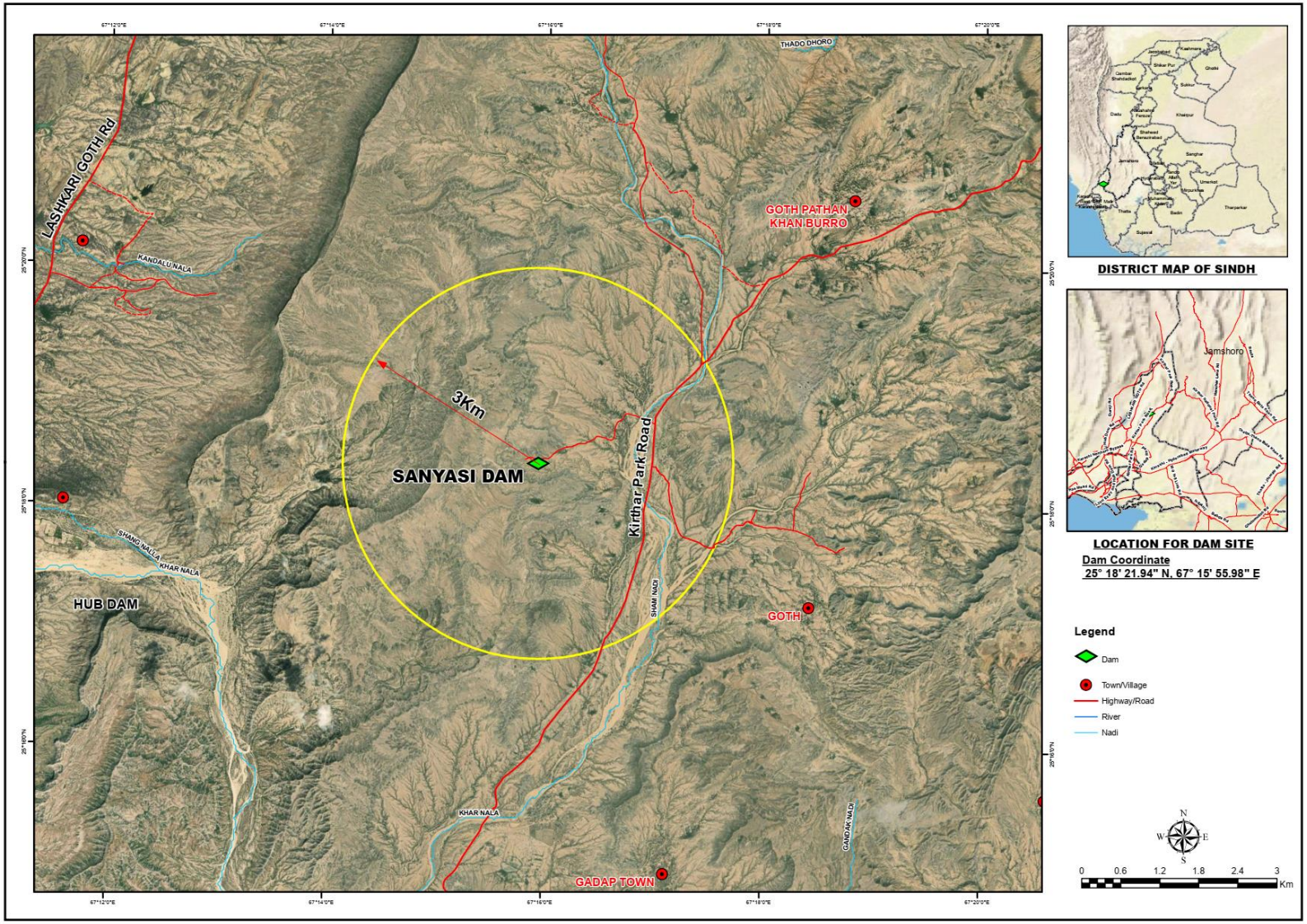

TALANGO DAM
3Km
HOUSES
HOUSE
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 49' 51.63" N, 67° 26' 45.84" E
Legend
Talango Dam
Town/Village
Highway/Road
Access Road
River
Nadi
0 0.6 1.2 1.8 2.4 3
Km

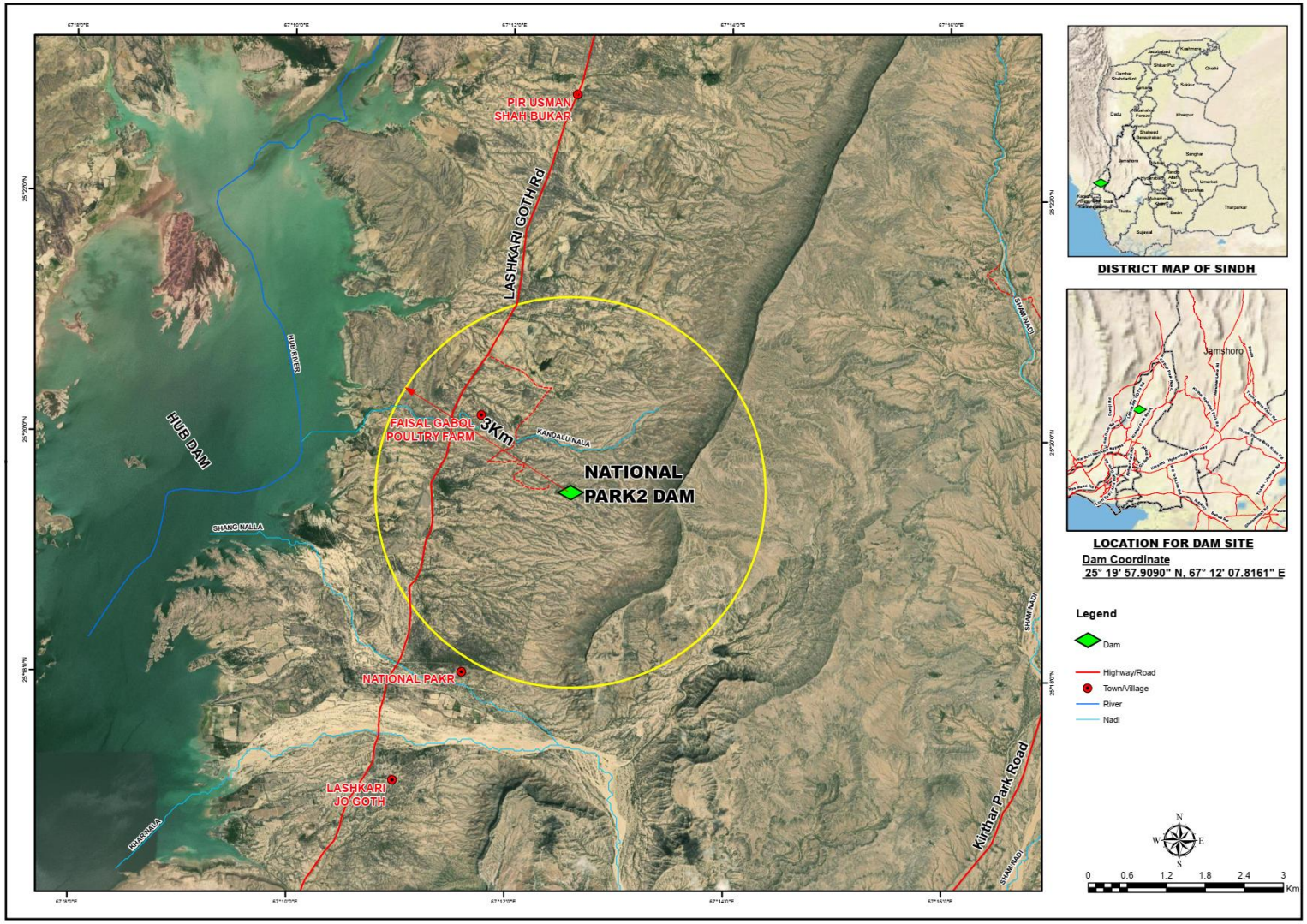

BARAN NAI
HOUSE
HOUSES
HOUSES
HOUSE
3Km
MUHAMMAD YOUSUF
ASABO DHORO
LOHRIWARI DHORO
DAILITHAP DHORO
BUILDING
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 26' 37.0756" N, 67° 28' 19.5972" E
Legend
Dam
Town/Village
River
Nadi
Highway/Road
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

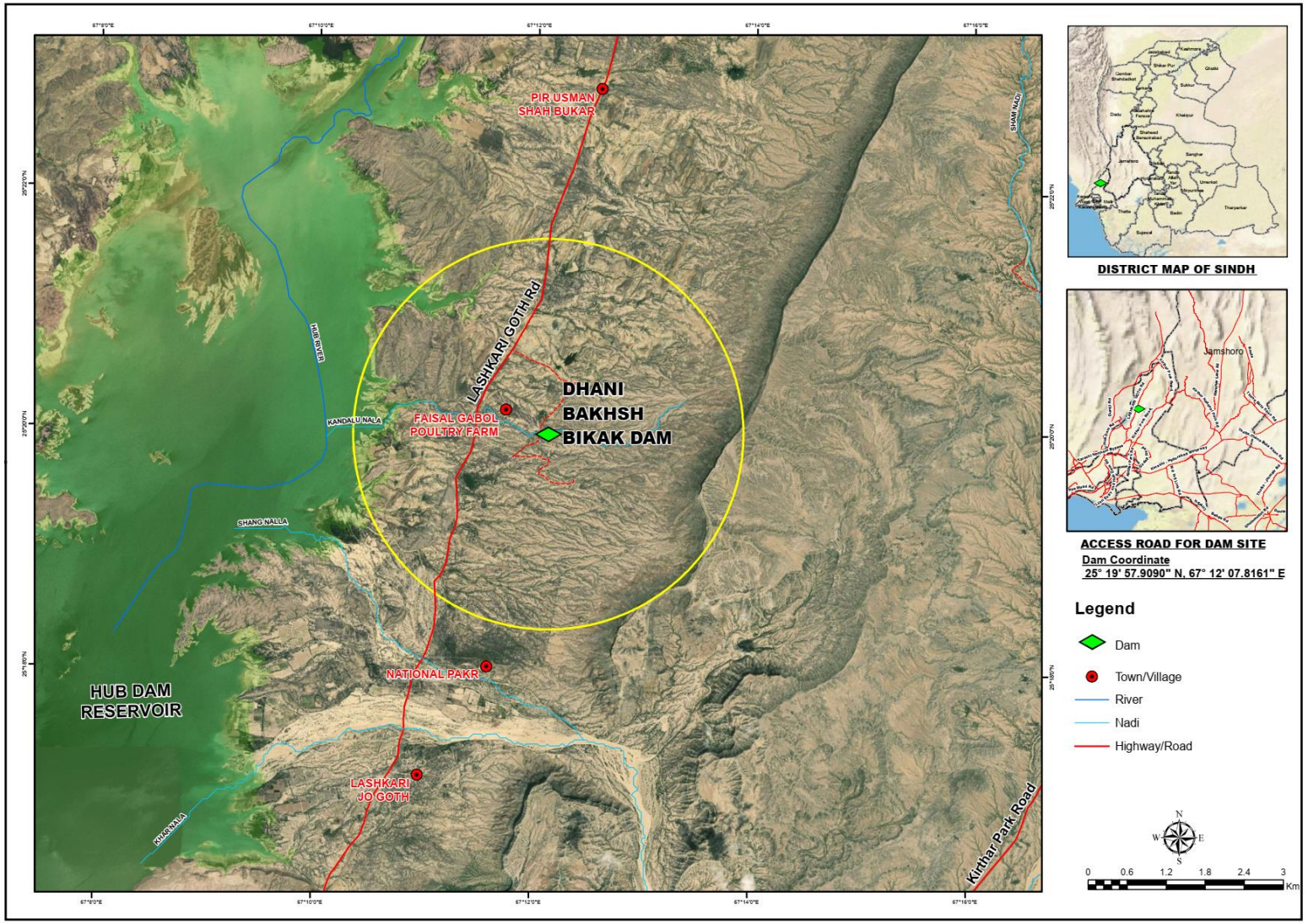

LASHKARI JO GOTH
LASHKARI GOTH Rd
SHAM NADI
Kirthar Park Road
KHAR NALA
GADAP TOWN
HUB DAM WILDLIFE SANCTUARY
3Km
MATHAL
Hub Dam Rd
WATANWARI NADI
EXISTING WEIR
GOTH
BOMNBILAT NALA
SHAH DAIRY FARM
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 26' 37.0756" N, 67° 28' 19.5972" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

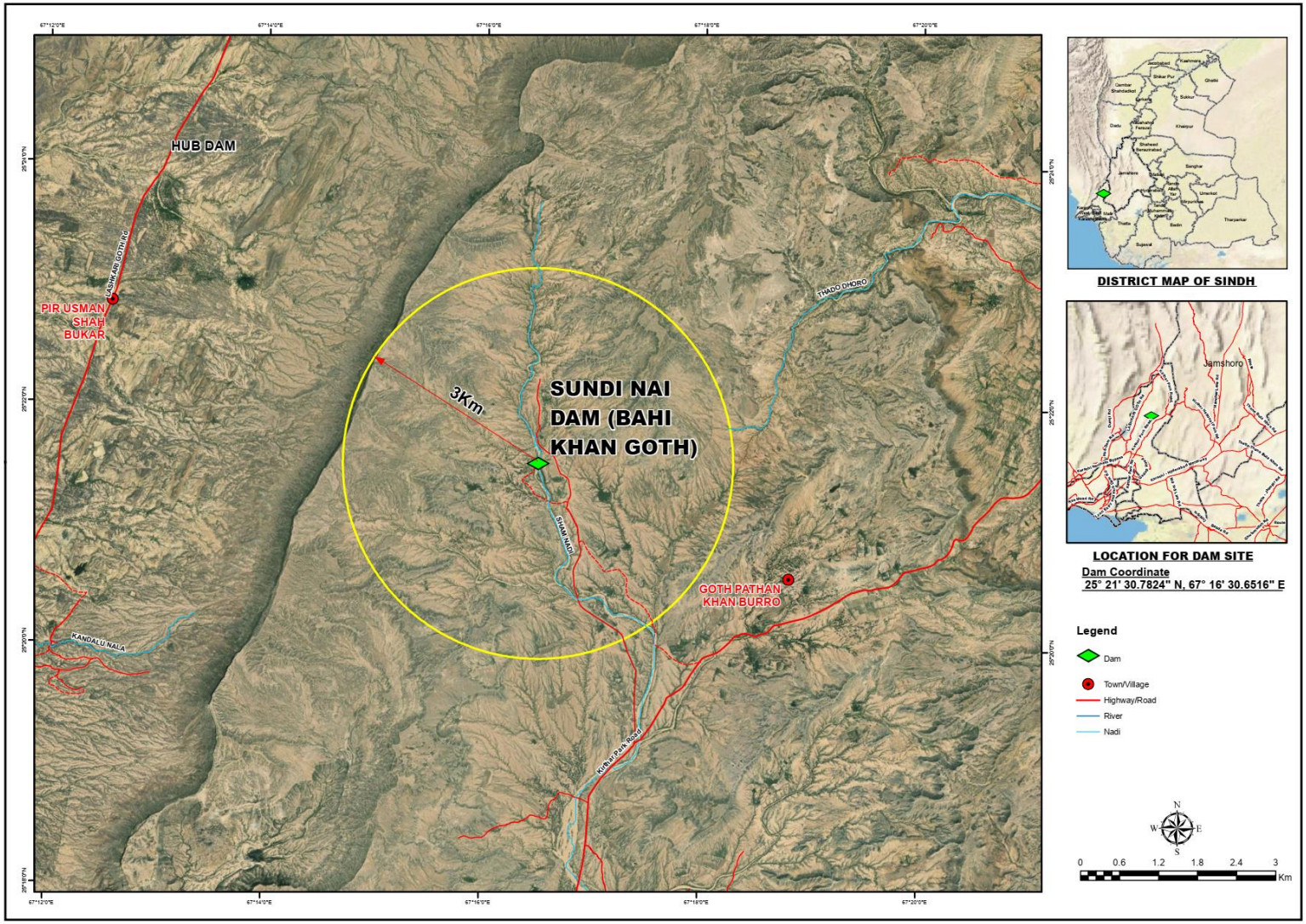

NATIONAL PAKR
SHANG NALLA
LASHKARI JO GOTH
3Km
LASHKARI GOTH Rd
HAJI IMAM BAKSH
HUB RESERVOIR AREA
HUB DAM WILDLIFE SANCTUARY
Hub Dam Rd
Hub Dam Rd
Kirthar Park Road
KHAR NALA
WATANWARI NADI
HUB RIVER
HUB RIVER
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 26' 37.0756" N, 67° 28' 19.5972" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
Reservoir Area @ 346'
0 0.6 1.2 1.8 2.4 3
Km


PIR USMAN SHAH BUKAR
LASHKARI GOTH Rd
FAISAL GABOL POULTRY FARM
KANDALU NALA
NATIONAL PAKR
SHANG NALLA
HUB DAM
KHAR NALA
GADAP TOWN
WATANWARI NADI
GOTH PATHAN KHAN BURRO
SHAM NADI
Kirthar Park Road
AATHO
GOTH
THADO DHORO
KHAND NADI
GOTH
GARANDHRO POULTRY FARM
GOTH HAFIZ MUHAMMAD IBRAHIM GUGO
GANDAK NADI
THADDO NADI
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 18' 01.63" N, 67° 18' 00.05" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.95 1.9 2.85 3.8 4.75
Km

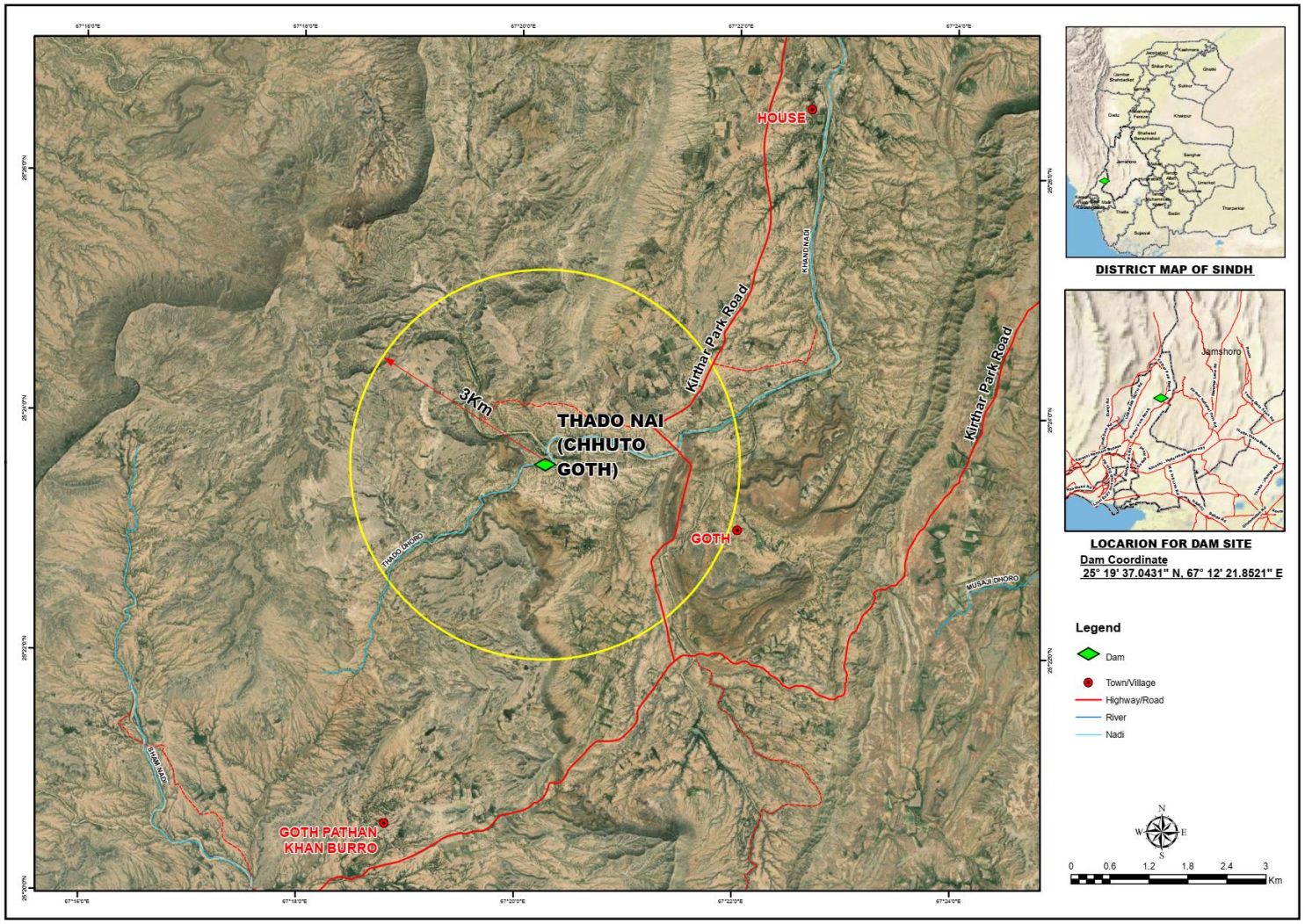

THADO DHORO
LASHKARI GOTH Rd
KANDALU NALA
GOTH PATHAN KHAN BURRO
3Km
SANYASI DAM
Kirthar Park Road
SHANG NALA
KHAR NALA
HUB DAM
SHAM NALA
GOTH
KHAR NALA
GANDAK WALI
GADAP TOWN
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 18' 21.94" N, 67° 15' 55.98" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

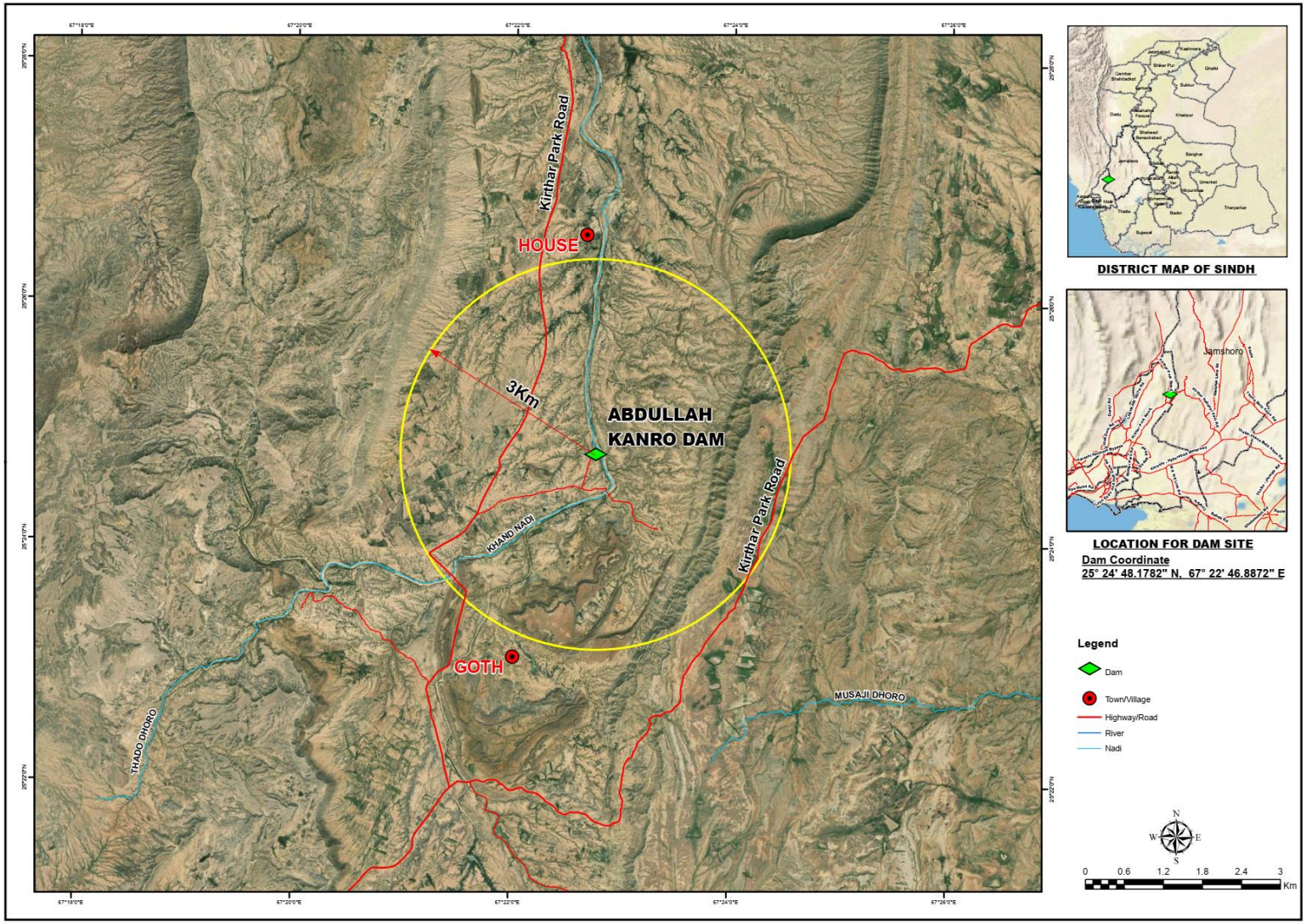

PIR USMAN SHAH BUKAR
LASHKARI GOTH Rd
HUB RIVER
HUB DAM
FAISAL GABOL POULTRY FARM
3Km
KANDALU NALA
NATIONAL PARK2 DAM
SHANG NALLA
NATIONAL PAKR
LASHKARI JO GOTH
KIRTHAR NALA
SHAH NADI
Kirthar Park Road
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 19' 57.9090" N, 67° 12' 07.8161" E
Legend
Dam
Highway/Road
Town/Village
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

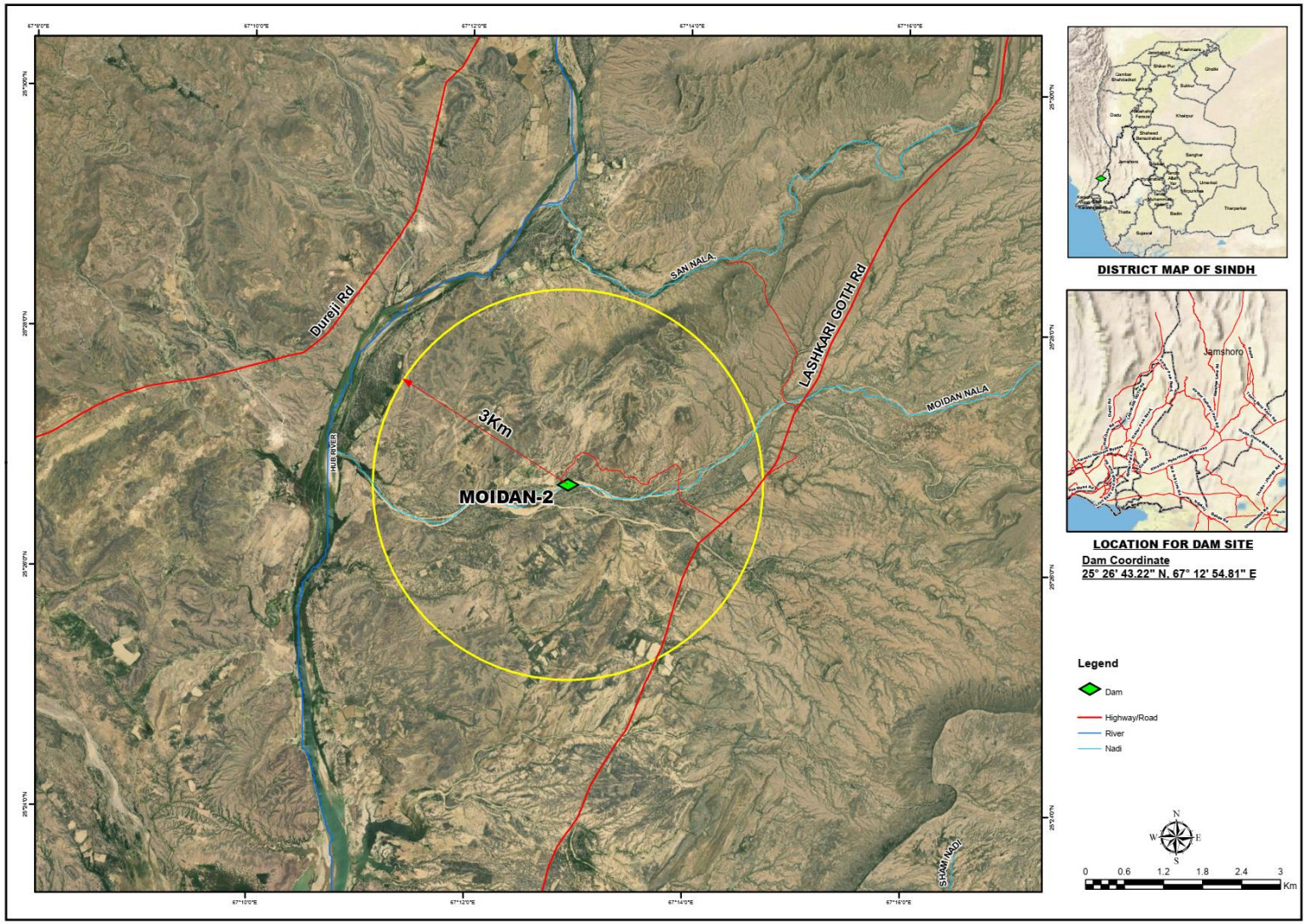

PIR USMAN SHAH BUKAR
LASHKARI GOTH Rd
DHANI BAKHSH BIKAK DAM
FAISAL GABOL POULTRY FARM
KANDALU NALA
HUB RIVER
SHANG NALLA
NATIONAL PAKR
HUB DAM RESERVOIR
LASHKARI JO GOTH
KHUSH NALA
Kirthar Park Road
SHAH NADI
DISTRICT MAP OF SINDH
Jamshoro
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 19' 57.9090" N, 67° 12' 07.8161" E
Legend
Dam
Town/Village
River
Nadi
Highway/Road
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

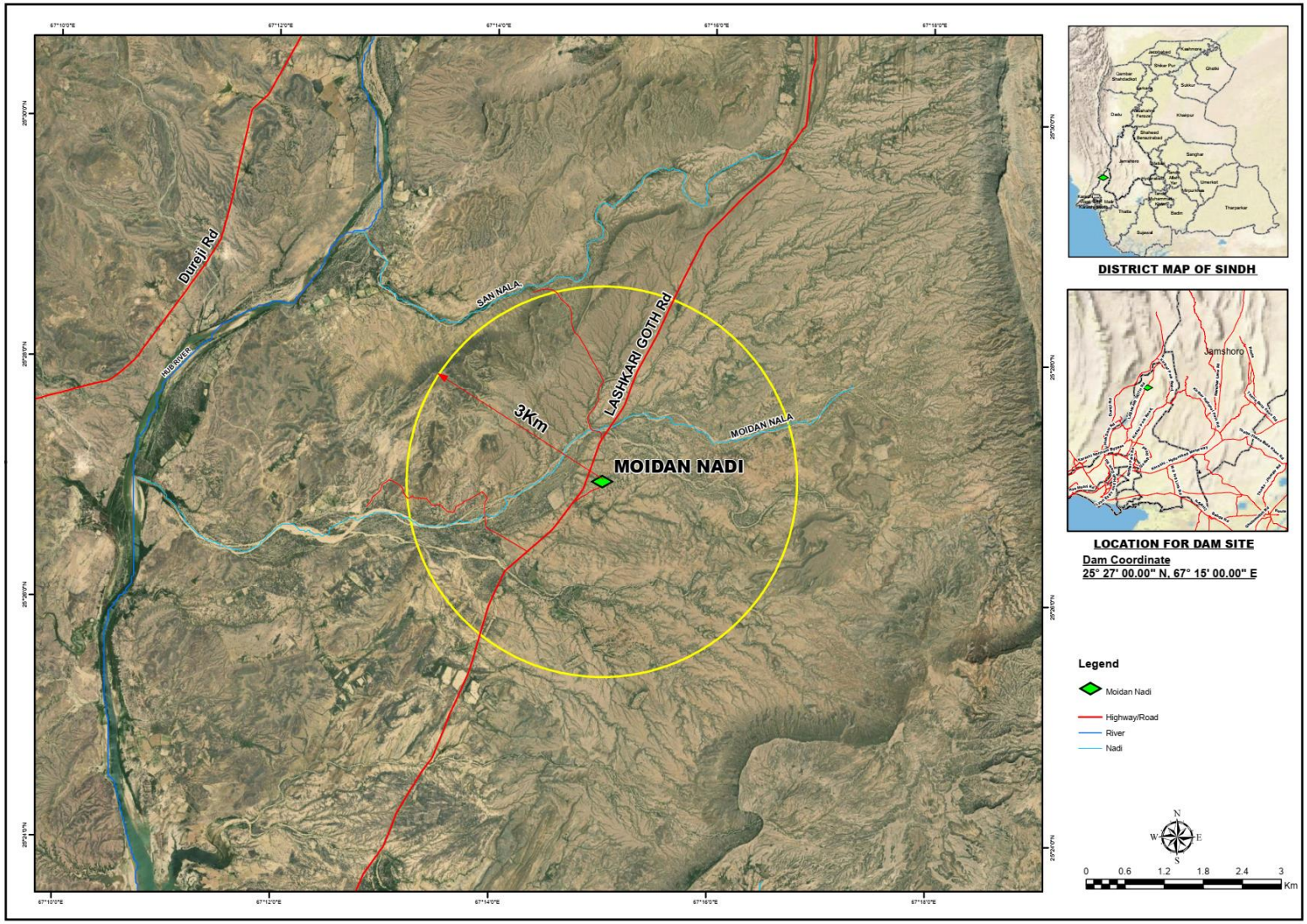

HUB DAM
PIR USMAN SHAH BUKAR
3Km
SUNDI NAI DAM (BAHI KHAN GOTH)
GOTH PATHAN KHAN BURRO
KANDALU NALA
THADO DHORO
SHAM NADI
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 21' 30.7824" N, 67° 16' 30.6516" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

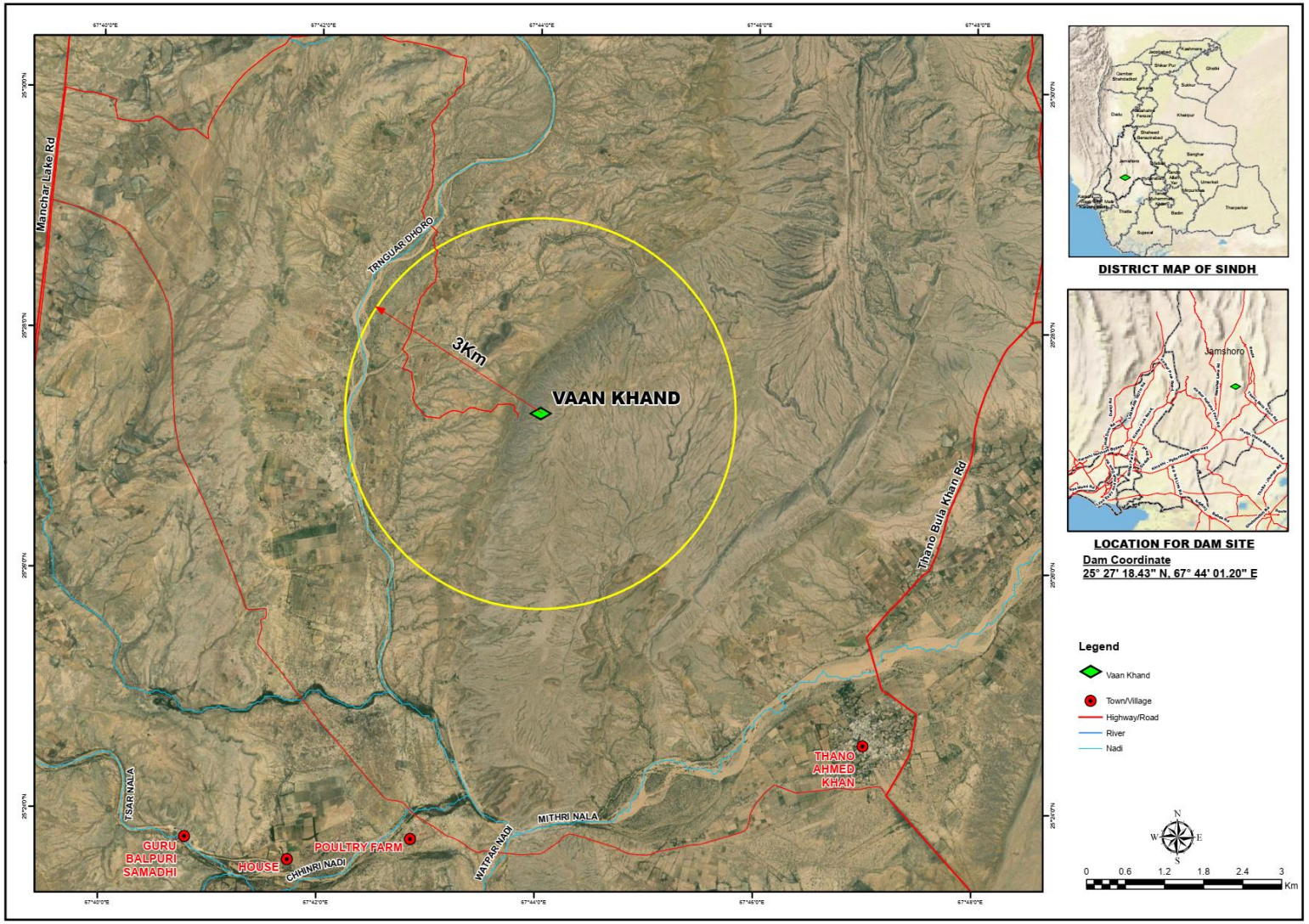
I)

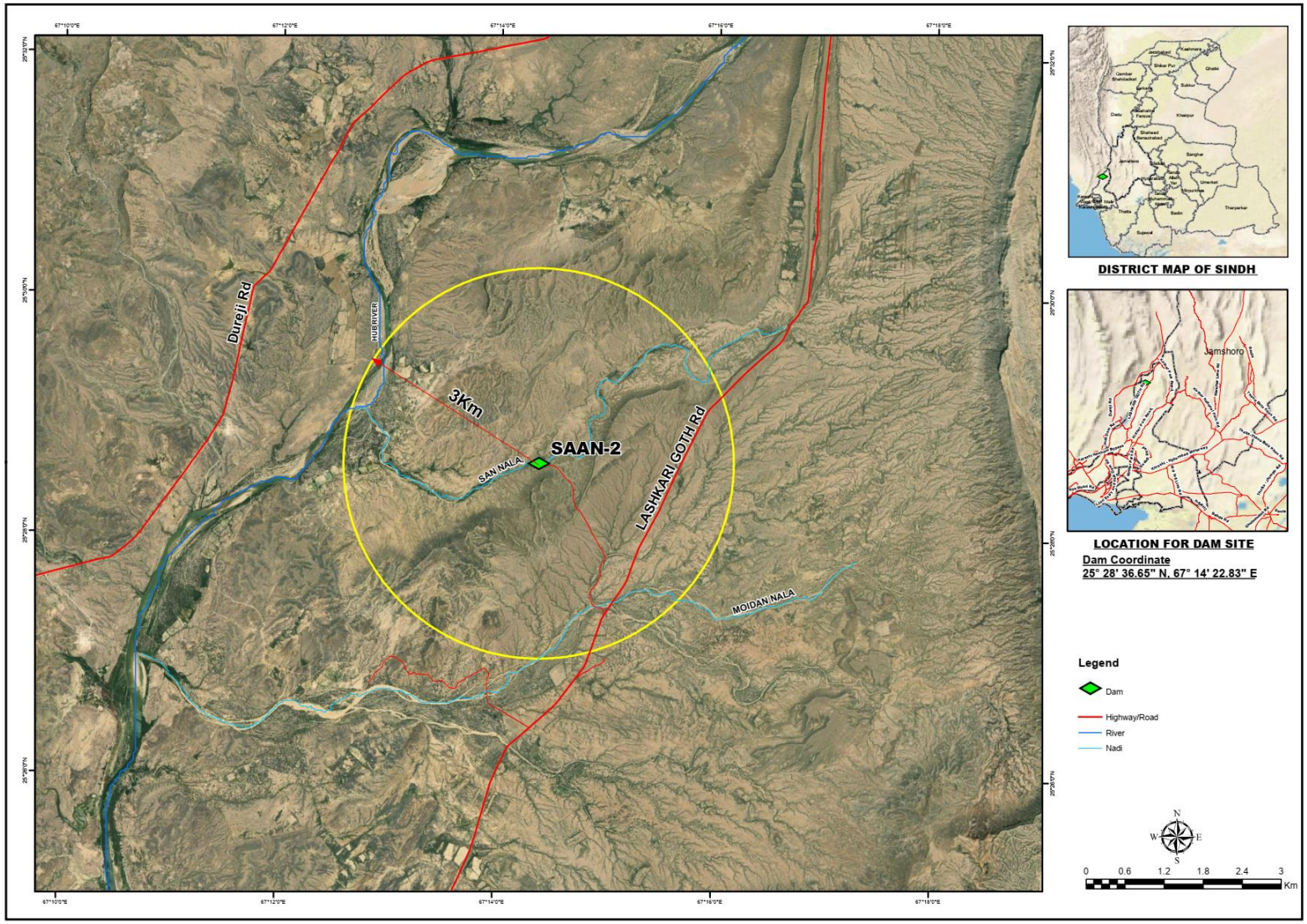

HOUSE
Kirthar Park Road
3Km
THADO NAI
(CHHUTO
GOTH)
GOTH
THADO DHORO
MUSAJI DHORO
GOTH PATHAN
KHAN BURRO
DISTRICT MAP OF SINDH
Jamshoro
LOCARION FOR DAM SITE
Dam Coordinate
25° 19' 37.0431" N, 67° 12' 21.8521" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
0 0.6 1.2 1.8 2.4 3
Km

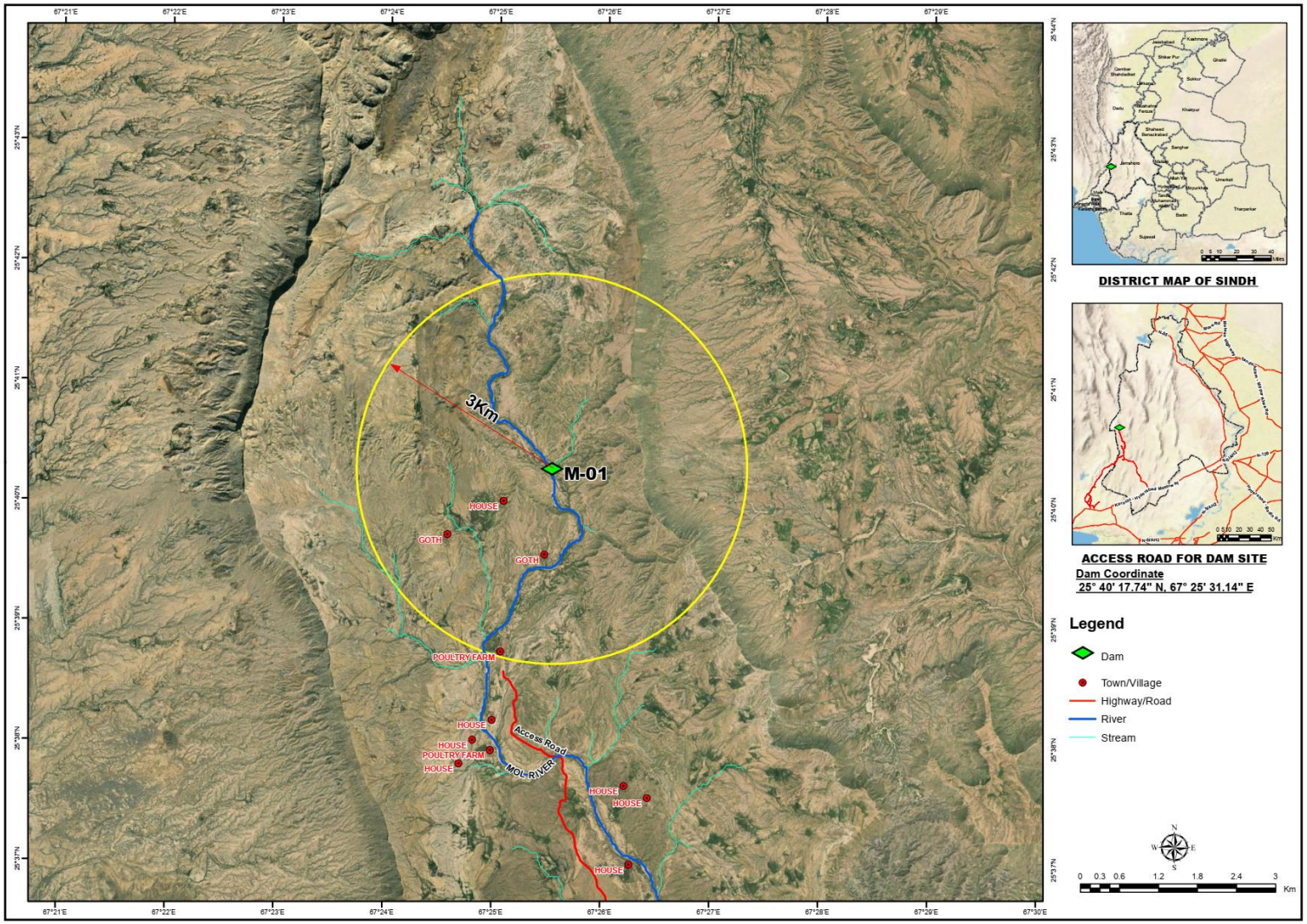

Kirthar Park Road
HOUSE
3Km
ABDULLAH
KANRO DAM
KHANO NADI
Kirthar Park Road
GOTH
THADO DHORO
MUSAJI DHORO
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 24' 48.1782" N, 67° 22' 46.8872" E
Legend
Dam
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km

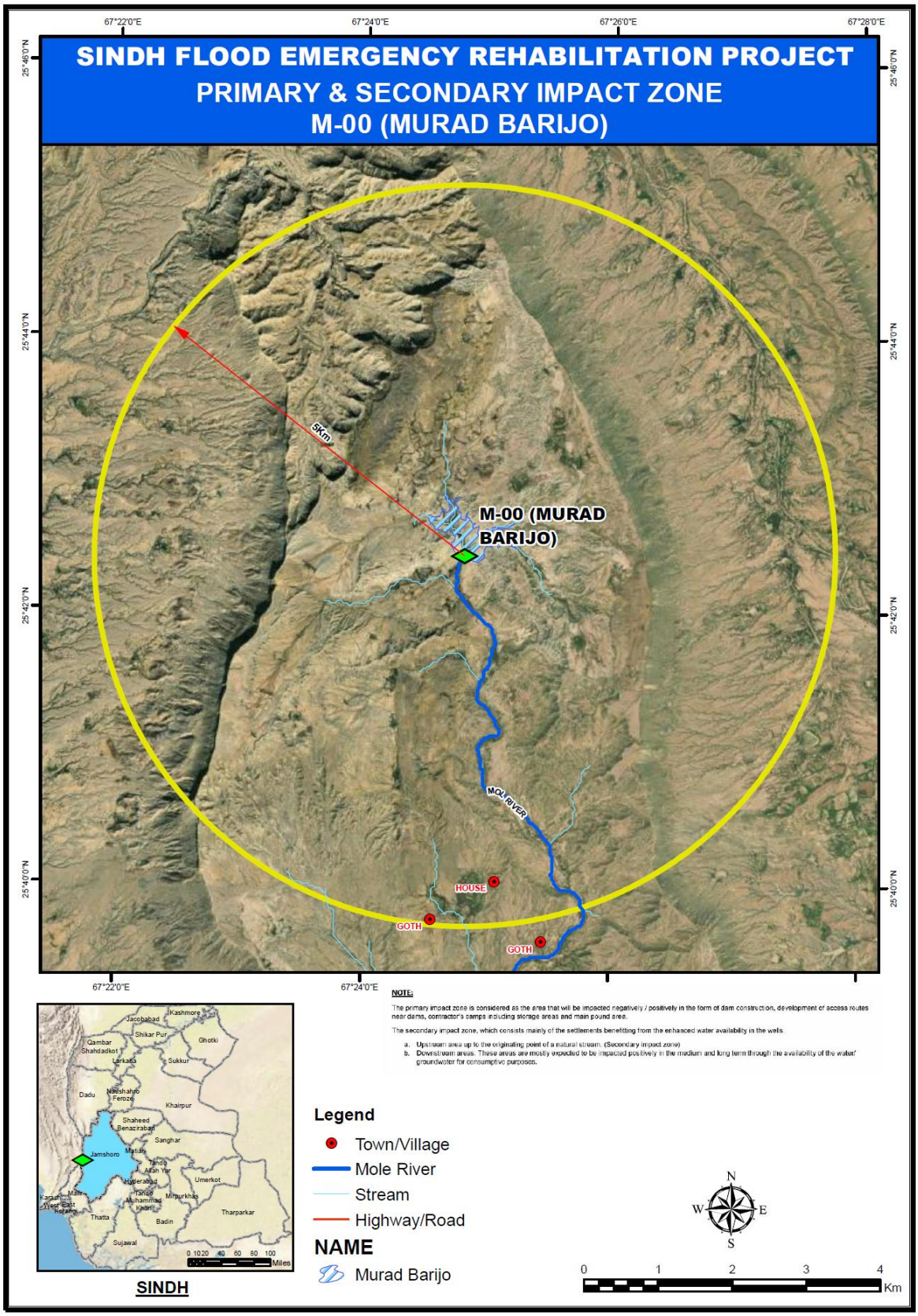

Dureji Rd
SAN NALA
LASHKARI GOTH Rd
MOIDAN NALA
3Km
HUB RIVER
MOIDAN-2
SHAH NADI
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 26' 43.22" N, 67° 12' 54.81" E
Legend
Dam
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km


Dureji Rd
SAN NALA
LASHKARI GOTH Rd
HAB RIVER
3Km
MOIDAN NALA
MOIDAN NADI
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 27' 00.00" N, 67° 15' 00.00" E
Legend
Moidan Nadi
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km


Manchar Lake Rd
IRNGUAR DHORO
3Km
VAAN KHAND
Thano Bula Khan Rd
THANO AHMED KHAN
MITHRI NALA
WAIPAR NADI
CHHINRI NADI
POULTRY FARM
HOUSE
GURU BALPURI SAMADHI
TSAR NALA
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 27' 18.43" N, 67° 44' 01.20" E
Legend
Vaan Khand
Town/Village
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km


Dureji Rd
HUB RIVER
3Km
SAAN-2
SAN NALA
LASHKARI GOTH Rd
MOIDAN NALA
DISTRICT MAP OF SINDH
Jamshoro
LOCATION FOR DAM SITE
Dam Coordinate
25° 28' 36.65" N, 67° 14' 22.83" E
Legend
Dam
Highway/Road
River
Nadi
N
W
E
S
0 0.6 1.2 1.8 2.4 3
Km


3Km
M-01
HOUSE
GOTH
GOTH
POULTRY FARM
HOUSE
HOUSE
POULTRY FARM
HOUSE
Access Road
MOL RIVER
HOUSE
HOUSE
HOUSE
DISTRICT MAP OF SINDH
ACCESS ROAD FOR DAM SITE
Dam Coordinate
25° 40' 17.74" N, 67° 25' 31.14" E
Legend
Dam
Town/Village
Highway/Road
River
Stream
0 0.3 0.6 1.2 1.8 2.4 3
Km


SINDH FLOOD EMERGENCY REHABILITATION PROJECT
PRIMARY & SECONDARY IMPACT ZONE
M-00 (MURAD BARIJO)
67°22'0"E
67°24'0"E
67°26'0"E
67°28'0"E
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
5Km
M-00 (MURAD BARIJO)
MOL RIVER
HOUSE
GOTH
GOTH
NOTE:
The primary impact zone is considered as the area that will be impacted negatively / positively in the form of dam construction, development of access routes near dams, contractor's camps including storage areas and main pound area.
The secondary impact zone, which consists mainly of the settlements benefitting from the enhanced water availability in the wells.
a. Upstream area up to the originating point of a natural stream. (Secondary impact zone)
b. Downstream areas. These areas are mostly expected to be impacted positively in the medium and long term through the availability of the water/ groundwater for consumptive purposes.
Kashmore
Jacobabad
Shikar Pur
Ghotki
Gambar Shahdadkot
Larkana
Sukkur
Dadu
Nawabshah Feroze
Khairpur
Shaheed Benazirabad
Sanghar
Jamshoro
Matiari
Tando Allah Yar
Hyderabad
Umerkot
Tando Muhammad Khan
Mirpurkhas
Karachi West
Karachi East
Malir
Keti Bandar
Thatta
Badin
Tharparkar
Sujawal
0 10 20 40 60 80 100 Miles
SINDH
Legend
Town/Village
Mole River
Stream
Highway/Road
NAME
Murad Barijo
N
W
E
S
0 1 2 3 4
Km

Annexure II: Screening Criteria to Determine Environmental Category of Sub-Projects

Title of Sub-project:			
Scope of Works:			
Duration:			
Client Project:			
Funded by:			
Section: B Assessment			
Environmental Issues			
Section C: Environmental Category w.r.t Sindh Environmental Protection Agency (Review of IEE and EIA) Regulations, 2021.			
Type of Project: Water Management, Dams, Irrigation, and Flood Protection			
Type of Project	**Category**	**Applicable (Yes/No)**	**Comments**
Dams and reservoirs with storage volume less than 25 million cubic meters			
Dams and reservoirs having a surface area less than 4 sq.-km			
Section D: World Bank Env. & Social Standards Relevant to the Project			
ESS1 – Assessment and Management of Environmental and Social Risks and Impacts			
ESS2 – Labor and Working Conditions			
ESS3 – Resource Efficiency and Pollution Prevention and Management			
ESS4 – Community Health and Safety			
ESS5 – Land Acquisition, Restrictions on Land Use and Involuntary Resettlement			
ESS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources			
ESS7 – Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities			
ESS8 – Cultural Heritage			
ESS9 – Financial Intermediarie			
ESS10 – Stakeholder Engagement and Disclosur			

Annexure III: Baseline Environmental Monitoring Scan Reports

(National Park-2 Dam Site Pictures)

Dec 21, 2022 12:25:25 PM
25°19'33.708"N 67°12'24.822"E
Malir
Karachi City
Altitude:149.3m
Speed:0.0km/h
Index number: 100

Dec 21, 2022 12:24:57 PM
Malir
Karachi City
Altitude:152.1m
Speed:0.0km/h
Index number: 93

Dec 21, 2022 12:26:17 PM
25°19'33.444"N 67°12'25.038"E
Malir
Karachi City
Altitude:150.8m
Speed:1.9km/h
Index number:109

Dec 21, 2022 12:26:22 PM
Malir
Karachi City
Altitude:151.0m
Speed:1.4km/h
Index number:113

Dec 21, 2022 12:25:12 PM
25°19'33.702"N 67°12'24.852"E
Malir
Karachi City
Altitude:150.5m
Speed:2.4km/h
Index number: 97

Dec 21, 2022 12:25:10 PM
25°19'33.696"N 67°12'24.858"E
Malir
Karachi City
Altitude:150.6m
Speed:2.9km/h
Index number: 96

Dec 21, 2022 12:25:43 PM
25°19'33.63"N 67°12'24.696"E
Malir
Karachi City
Altitude:148.5m
Speed:0.0km/h
Index number: 103

Malir
Karachi City
Altitude:151.6m
Speed:0.0km/h
Index number: 90

Dec 21, 2022 12:27:15 PM
25°19'33.39"N 67°12'24.582"E
Malir
Karachi City
Altitude:156.4m
Speed:0.0km/h
Index number: 119

Dec 21, 2022 12:26:49 PM
25°19'33.636"N 67°12'24.642"E
Altitude:154.9m
Speed:2.9km/h
Index number: 117

Dec 21, 2022 12:26:25 PM
25°19'33.456"N 67°12'25.05"E
Malir
Karachi City
Altitude:151.3m
Speed:0.0km/h
Index number: 116

Dec 21, 2022 12:24:45 PM
25°19'33.57"N 67°12'25.086"E
Malir
Karachi City
Altitude:152.1m
Speed:0.0km/h
Index number: 93

(National Park-2 DAM Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 21-12-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: National park-2 Dam Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 21-12-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0475
Sample Site Coordinates. 25°19'33.6"N
67°12'25.1"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	1.3	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	15.2	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	2.5	
4		Ozone	O_3	130	µg/m³	6.1	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	127.9	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	32.4	
7		Suspended Particulate Matter	SPM	500	µg/m³	374.9	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	11.5	UV fluorescence
10		Noise		75	dB	34.6	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

Office No: M-06 & 07,M-18,19 & 20, In Fort Sultan, Opp Airport
Telephone Exchange, Shahrah-e-faisal, Karachi Pakistan.
Ph:+92 (021) 34686002
E-mail: info@everglab.com
Web : www.everglab.com

(National Park-2 DAM Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 21-12-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: National park-2 Dam Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 21-12-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0475
Sample Site Coordinates. 25°19'33.6"N
67°12'25.1"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	1.3	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	15.2	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	2.5	
4		Ozone	O_3	130	µg/m³	6.1	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	127.9	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	32.4	
7		Suspended Particulate Matter	SPM	500	µg/m³	374.9	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	11.5	UV fluorescence
10		Noise		75	dB	34.6	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

Office No: M-06 & 07,M-18,19 & 20, In Fort Sultan, Opp Airport
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Web : www.everglab.com

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 21-12-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: National park-2 Dam Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0476

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	National park-2 Dam Proposed Site	25°19'33.6"N 67°12'25.1"E	32.1	34.6	33.3	75
2	National park-2 Dam 500 m from Upper Site of Dam	25°19'33.7"N 67°12'24.8"E	32.5	34.8	33.6	75
3	National park-2 Dam 500 m from Lower Site of Dam	25°19'20.9"N 67°11'51.7"E	33.4	35.6	34.5	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

Office No: M-06 & 07,M-18,19 & 20, in Fort Sultan, Opp Airport
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Web : www.everglab.com

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.

Site ID: **National park-2 Dam Gadap Malir Sindh.**
*Lab. Rpt. Rf. No.: **28371/NEST/AS/2122/0477***

Date of Sample Collection: 21-12-2022
Date of Sample Received: 23-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Ground Water Sampling.
Sample Site Coordinates: 25°19'21.0"N 67°11'53.6"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	7.2	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.0	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.0	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	3890	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	463.1	EDTA Titration.Hach-8213
8	Fluoride(as F^-)	≤ 1.5	mg/L	1.352	USEPA 340.1
9	Chloride(as Cl^-)	< 250	mg/L	365.2	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	5.6	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.854	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00653	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	0.0498	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00854	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0398	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00742	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0985	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.463	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0301	Hach 8034
28	Barium	0.7	mg/L	0.00598	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking Water Sampling results are not well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Prepared By	Section Incharge (EGEL)

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

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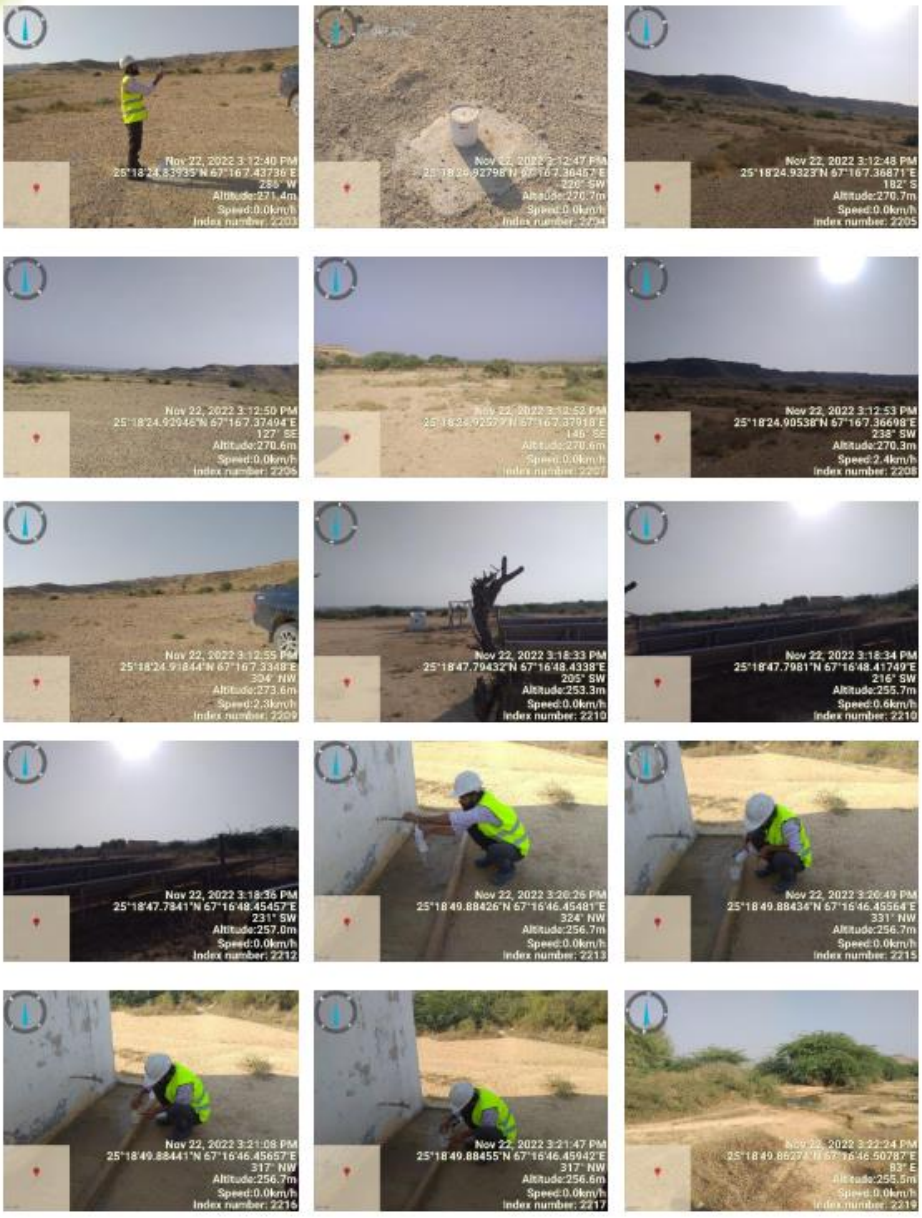
(Sanyasi Dam Site Pictures)


Nov 22, 2022 3:12:40 PM
25°18'24.83935"N 67°167.43736"E
285° W
Altitude:271.4m
Speed:0.0km/h
Index number: 2203
Nov 22, 2022 3:12:48 PM
25°18'24.9323"N 67°167.36871"E
182° S
Altitude:270.7m
Speed:0.0km/h
Index number: 2205
Nov 22, 2022 3:12:50 PM
25°18'24.92946"N 67°167.37494"E
127° SE
Altitude:270.6m
Speed:0.0km/h
Index number: 2206
Nov 22, 2022 3:12:53 PM
25°18'24.90538"N 67°167.36698"E
238° SW
Altitude:270.3m
Speed:2.4km/h
Index number: 2208
Nov 22, 2022 3:12:55 PM
25°18'24.91844"N 67°167.33488"E
304° NW
Altitude:273.6m
Speed:2.3km/h
Index number: 2209
Nov 22, 2022 3:18:33 PM
25°18'47.79432"N 57°16'48.4338"E
205° SW
Altitude:253.3m
Speed:0.0km/h
Index number: 2210
Nov 22, 2022 3:18:34 PM
25°18'47.7981"N 67°16'48.41749"E
216° SW
Altitude:255.7m
Speed:0.6km/h
Index number: 2210
Nov 22, 2022 3:18:36 PM
25°18'47.7841"N 67°16'48.45457"E
231° SW
Altitude:257.6m
Speed:0.0km/h
Index number: 2212
Nov 22, 2022 3:20:26 PM
25°18'49.88426"N 67°16'46.45481"E
324° NW
Altitude:256.7m
Speed:0.0km/h
Index number: 2213
Nov 22, 2022 3:20:49 PM
25°18'49.88434"N 67°16'46.45564"E
331° NW
Altitude:256.7m
Speed:0.0km/h
Index number: 2215
Nov 22, 2022 3:21:08 PM
25°18'49.88441"N 67°16'46.45657"E
317° NW
Altitude:256.7m
Speed:0.0km/h
Index number: 2216
Nov 22, 2022 3:21:47 PM
25°18'49.88455"N 67°16'46.45942"E
317° NW
Altitude:256.6m
Speed:0.0km/h
Index number: 2217

(Sanyasi Dam Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 22-11-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: Sanyasi Dam Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 22-11-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0465
Sample Site Coordinates. 25°18'22.1"N
67°15'56.2"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	0.9	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	11.3	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	1.6	
4		Ozone	O_3	130	µg/m³	6.9	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	115.2	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	20	
7		Suspended Particulate Matter	SPM	500	µg/m³	296.4	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	9.1	UV fluorescence
10		Noise		75	dB	45.1	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 22-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Sanyasi Dam Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0466

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Sanyasi Dam Proposed Site	25°18'22.1"N 67°15'56.2"E	43.5	45.1	44.3	75
2	Sanyasi Dam 500 m from Upper Site of Dam	25°18'24.8"N 67°16'07.4"E	44.3	46.6	45.4	75
3	Sanyasi Dam 500 m from Lower Site of Dam	25°18'24.3"N 67°16'00.9"E	42.4	44.2	43.3	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.

Site ID: Sanyasi Dam Gadap Malir Sindh
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0467

Date of Sample Collection: 22-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°18'49.9"N
67°16'46.5"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	7.8	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.2	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.1	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	1550	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	264.3	EDTA Titration.Hach-8213
8	Fluoride(as F)	≤ 1.5	mg/L	0.325	USEPA 340.1
9	Chloride(as Cl)	< 250	mg/L	231.9	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	2.9	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.724	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00854	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00721	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0528	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00332	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0296	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.38	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0396	Hach 8034
28	Barium	0.7	mg/L	0.00429	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Prepared By	Section Incharge (EGEL)

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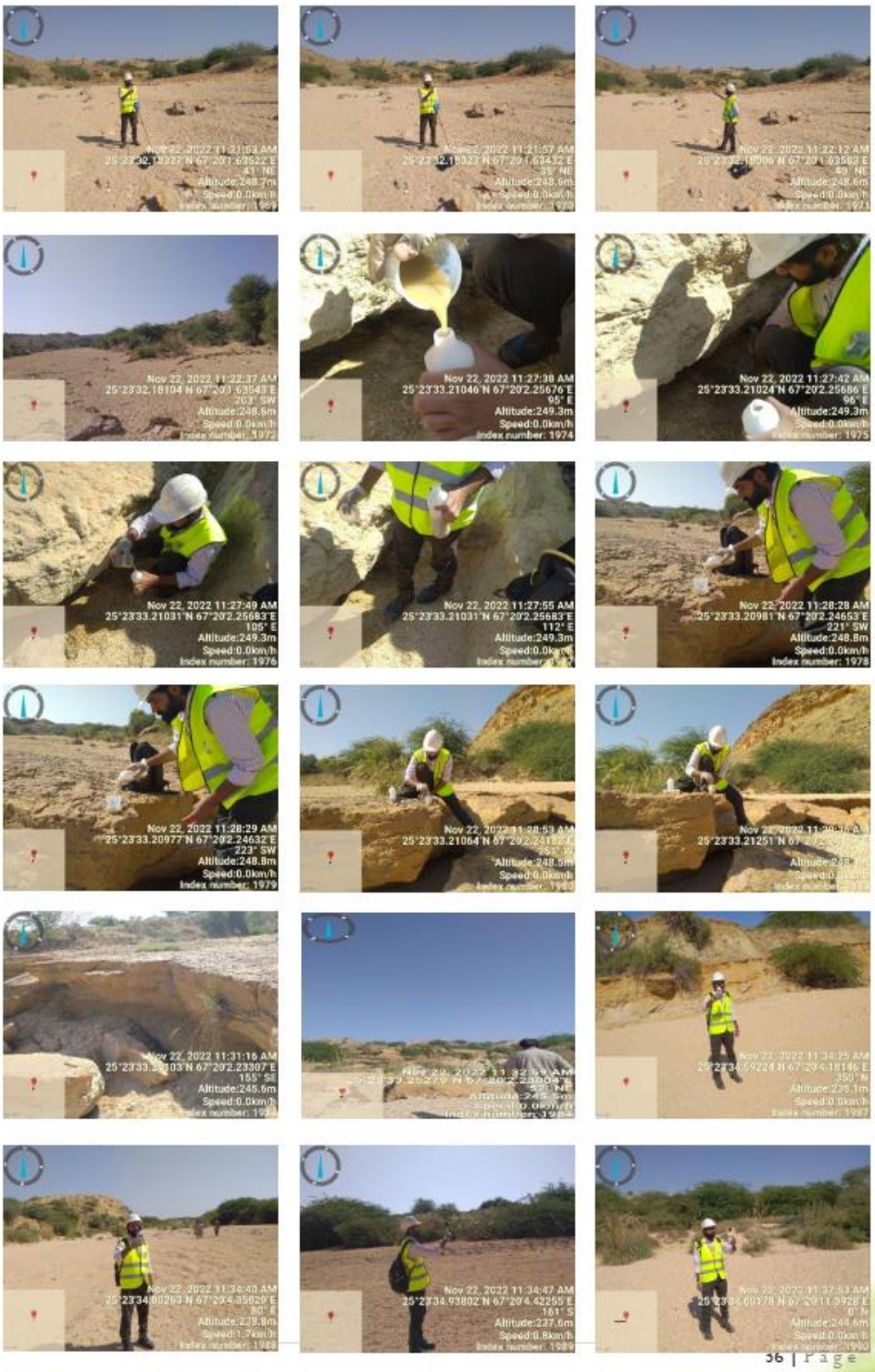
(Thado Nai Dam Site Pictures)



(Thado Nai Dam Lab Report)

EPA Certified Lab
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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** Date: **29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test — Sample Type: Ambient Air
Sampling Start Date: 22-11-2022 Time: 09:00 am — Sampling Stop Date: 22-11-2022 Time: 17:00 pm
Sampling Duration: 08 hrs. — Lab Report Ref. No.: 28371/NEST/AS/2122/0471
Site ID: Thado Nai (Chhutto Goth) Dam Gadap Malir Sindh — Sample Site Coordinates. 25°23'32.3"N 67°20'01.6"E
Sampling Location: Proposed Small Dam Site

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	0.9	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	12.5	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	1.9	
4		Ozone	O_3	130	µg/m³	5.9	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	120.5	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	30.4	
7		Suspended Particulate Matter	SPM	500	µg/m³	328.9	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	10.0	UV fluorescence
10		Noise		75	dB	46.8	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 22-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Thado Nai (Chhutto Goth) Dam Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0472

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Thado Nai (Chhutto Goth) Dam Proposed Site	25°23'32.3"N 67°20'01.6"E	44.4	46.8	45.6	75
2	Thado Nai (Chhutto Goth) Dam 500 m from Upper Site of Dam	25°23'27.4"N 67°20'02.3"E	43.2	45.9	44.5	75
3	Thado Nai (Chhutto Goth) Dam 500 m from Lower Site of Dam	25°23'27.3"N 67°20'02.2"E	43.7	45.3	44.5	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.

Site ID: **Thado Nai (Chhutto Goth) Dam Gadap Malir Sindh.**
*Lab. Rpt. Rf. No.: **28371/NEST/AS/2122/0473***

Date of Sample Collection: 22-11-2022
Date of Sample Received: 01-11-2022
Samples collected /send by: Collected by EGELC
Sample type: Ground Water Sampling.
Sample Site Coordinates: 25°23'38.8"N 67°20'20.3"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	7.4	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	02	APHA-2020 B/C
5	Turbidity	< 5	NTU	00	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	550	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	239.4	EDTA Titration.Hach-8213
8	Fluoride(as F^-)	≤ 1.5	mg/L	0.563	USEPA 340.1
9	Chloride(as Cl^-)	< 250	mg/L	296.4	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	2.3	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.598	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00934	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	0.0555	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00629	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0532	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00594	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0632	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.746	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0532	Hach 8034
28	Barium	0.7	mg/L	0.00496	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking Water Sampling results are well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Prepared By	Section Incharge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Date of Sample Collection: 22-11-2022
Date of Sample Received: 01-11-2022
Samples collected /send by: Collected by EGELC
Sample type: Surface Water Sampling.
Sample Site Coordinates: 25°23'33.2"N 67°20'02.3"E

Site ID: **Thado Nai (Chhutto Goth) Dam Gadap Malir Sindh.**
Lab. Rpt. Rf. No.: ***28371/NEST/AS/2122/0474***

Surface Water Analysis Results

Sr. No.	Parameter	Analysis Method	Result	SEQS Limits
	Field Analysis			
1	Temperature	SMWW 2550 B	29	≤ 3°C
	Lab Analysis			
2	pH	SMWW 4500 H+ B	7.7	6-9
3	Biochemical Oxygen Demand (BOD_5)	SMWW 5210-B	132.9	250 mg/L
4	Chemical Oxygen Demand (COD)	SMWW 5220 B	201.6	400 mg/L
5	Total Suspended Solids (TSS)	SMWW 2540 D	132	400 mg/L
6	Total Dissolved Solids (TDS)	SMWW 2540 C	396.2	3500 mg/L
7	Phenolic Compounds (as Phenols)	SMWW 5530 D	0.0	0.3 mg/L
8	Grease and Oil	USEPA 1664 B	0.0	10 mg/L
9	Chloride (Cl^-)	SMWW 4500 Cl- B	487.2	1000 mg/L
10	Fluoride (F^-)	SMWW 4500 F- C	0.0	10 mg/L
11	Cyanide (CN^-)	SMWW 4500 CN- F	0.0	1.0 mg/L
12	An-ionic Detergents (as MBAs)	SMWW 5540-C	0.0	20 mg/L
13	Sulfate (SO_4^{-2})	SMWW 4500 SO_4^{-2} C	63.9	600 mg/L
14	Sulfide (S^{2-})	SMWW 4500 S^{-2} F	0.0	1.0 mg/L
15	Ammonia (NH_3)	SMWW 4500-NH_3 D	0.0	40 mg/L
16	Cadmium (Cd)	SMWW 3113 B	0.0296	0.1 mg/L
17	Chromium (Cr)	SMWW 3113 B	0.00320	1.0 mg/L
18	Copper (Cu)	SMWW 3113 B	0.196	1.0 mg/L
19	Lead (Pb)	SMWW 3113 B	0.0258	0.5 mg/L
20	Mercury (Hg)	SMWW 3112 B	BDL	0.01 mg/L
21	Selenium (Se)	SMWW 3114 B	0.0632	0.5 mg/L
22	Nickel (Ni)	SMWW 3113 B	0.0277	1.0 mg/L
23	Silver (Ag)	SMWW 3113 B	0.00352	1.0 mg/L
24	Total Toxic Metals	Calculated Value	0.018	2.0
25	Zinc (Zn)	SMWW 3111 B	0.0214	5.0 mg/L
26	Arsenic (As)	SMWW 3114 B	0.00296	1.0 mg/L
27	Barium (Ba)	SMWW 3113 B	0.00326	1.5 mg/L
28	Iron (Fe)	SMWW 3113 B	0.196	8.0 mg/L
29	Manganese (Mn)	SMWW 3111 B	0.0396	1.5 mg/L
30	Boron (B)	SMWW 3113 B	0.0514	6.0 mg/L
31	Residual Chlorine (Cl_2)	SMWW 4500 Cl- B	0.0	1.0 mg/L

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2014

Note:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The left over samples (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise Negotiated between the client and the laboratory.

Prepared By	Section Incharge (EGEL)

The Analyses based on sample (s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment .We have no responsibility and warranty or representation in Connection with which such report is used.

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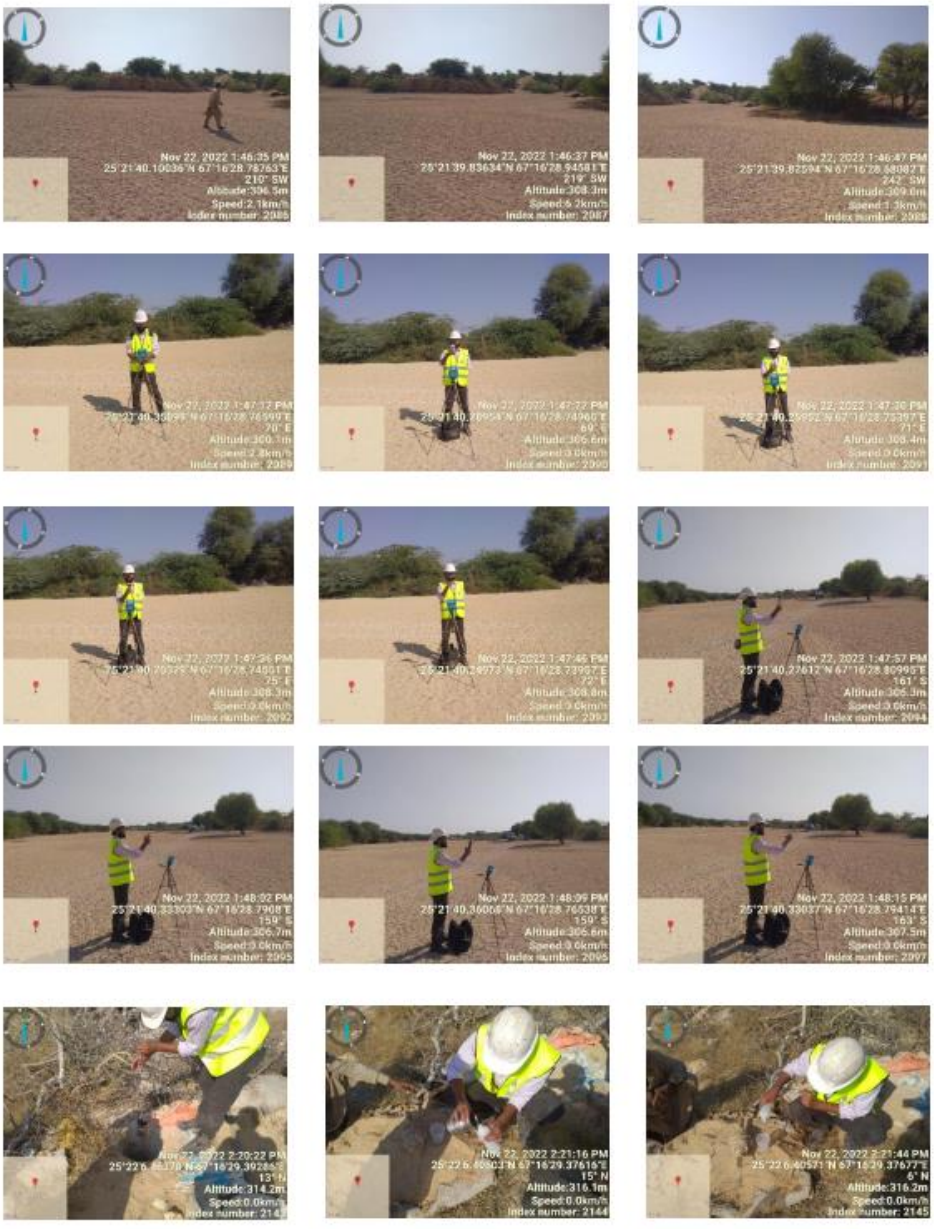
(Sundai Nai Dam Site Pictures)



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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 22-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Sundi Nai (Bhai Khan Goth) Dam Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0469

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Sundi Nai (Bhai Khan Goth) Dam Proposed Site	25°21'40.3"N 67°16'28.8"E	44.4	46.2	45.3	75
2	Sundi Nai (Bhai Khan Goth) Dam 500 m from Upper Site of Dam	25°21'38.7"N 67°16'29.4"E	42.5	44.6	43.5	75
3	Sundi Nai (Bhai Khan Goth) Dam 500 m from Lower Site of Dam	25°21'42.4"N 67°16'28.1"E	42.2	44.8	43.5	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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(Sundai Nai Dam Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 22-11-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: Sundi Nai (Bhai Khan Goth) Dam Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 22-11-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0468
Sample Site Coordinates. 25°21'40.3"N 67°16'28.8"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m^3	1.1	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	$\mu g/m^3$	10.9	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	$\mu g/m^3$	1.3	
4		Ozone	O_3	130	$\mu g/m^3$	4.3	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	$\mu g/m^3$	119	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	$\mu g/m^3$	23	
7		Suspended Particulate Matter	SPM	500	$\mu g/m^3$	354.2	
8		Lead	Pb	1.5	$\mu g/m^3$	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	$\mu g/m^3$	8.3	UV fluorescence
10		Noise		75	dB	46.2	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were mg/Nm^3 otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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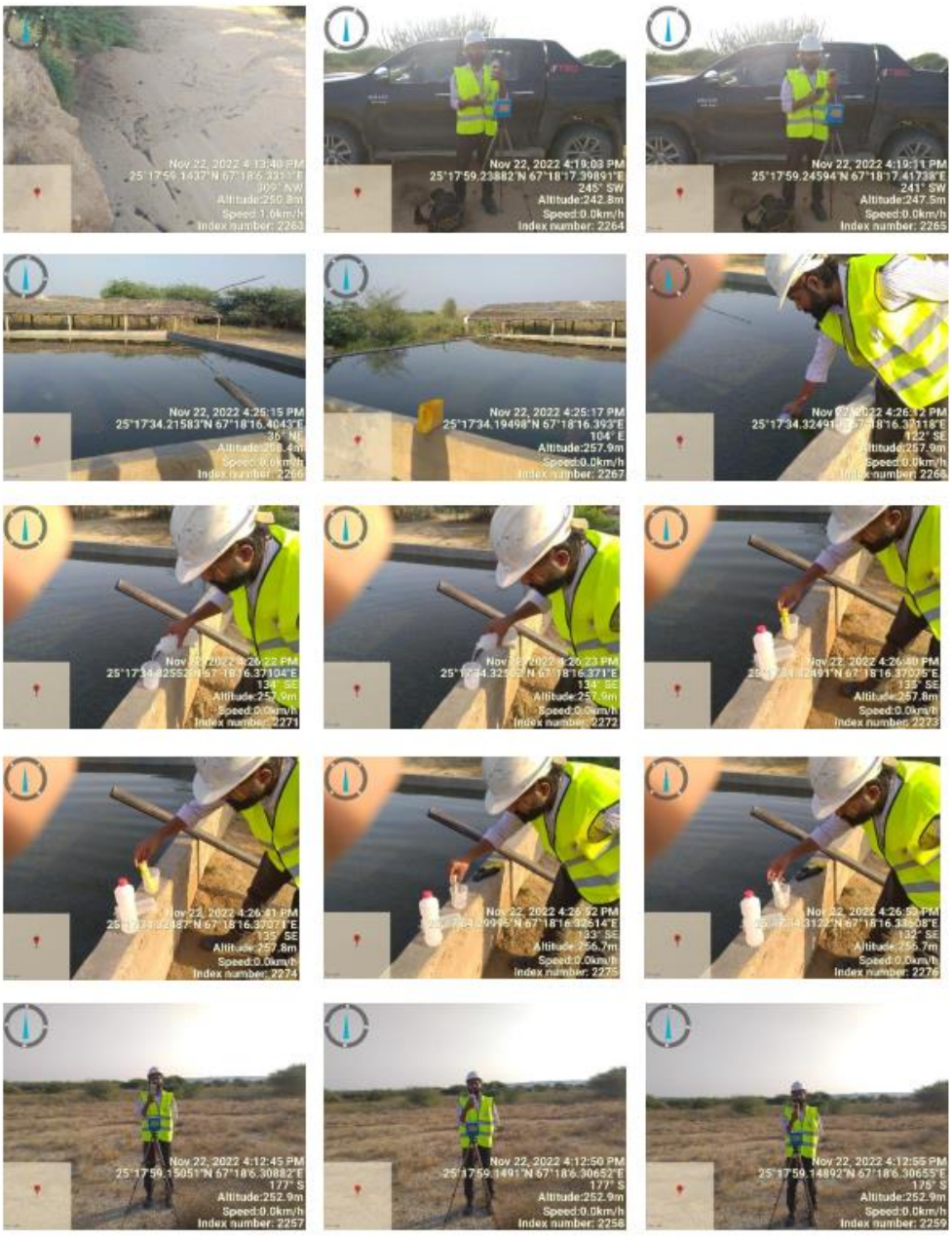
(Aatho Dam Pictures)



(Aatho Dam Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 28-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 22-11-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: AATHO Dam Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 22-11-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0455
Sample Site Coordinates. 25°17'59.2"N
67°18'06.3"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	0.8	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	14.9	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	2.3	
4		Ozone	O_3	130	µg/m³	4.7	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	115	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	25	
7		Suspended Particulate Matter	SPM	500	µg/m³	324	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	10.7	UV fluorescence
10		Noise		75	dB	46.3	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 28-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 22-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: AATHO Dam Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0456

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	AATHO Dam Proposed Site	25°17'59.2"N 67°18'06.3"E	44.1	46.3	45.2	75
2	AATHO Dam 500 m from Upper Site of Dam	25°18'10.1"N 67°18'18.7"E	42.2	44.6	43.4	75
3	AATHO Dam 500 m from Lower Site of Dam	25°18'06.4"N 67°18'20.9"E	43.5	45.3	44.4	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 28-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A, Main University Road, Karachi- Sindh.

Site ID: **AATHO Dam Gadap Malir Sindh.**
*Lab. Rpt. Rf. No.: **28371/NEST/AS/2122/0457***

Date of Sample Collection: 22-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°17'34.3"N 67°18'16.4"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	8.0	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.3	APHA-2020 B/C
5	Turbidity	< 5	NTU	01	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	347	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	178	EDTA Titration.Hach-8213
8	Fluoride(as F)	≤ 1.5	mg/L	0.842	USEPA 340.1
9	Chloride(as Cl)	< 250	mg/L	201.5	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	2.1	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.596	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00432	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00463	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0102	Hach 8506
20	Lead	≤ 0.05	mg/L	BDL	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0428	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.59	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0463	Hach 8034
28	Barium	0.7	mg/L	0.00584	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Prepared By	Section Incharge (EGEL)

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

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(Abdullah Kanro Dam Site Pictures)

(Abdullah Kanro Dam Lab Report)

EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 21-12-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: Abdullah Kanro DAM Gadap Malir Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 21-12-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0458
Sample Site Coordinates. 25°24'39.8"N
67°22'46.7"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	1.6	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	14.9	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	1.4	
4		Ozone	O_3	130	µg/m³	6.5	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	128.9	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	31.5	
7		Suspended Particulate Matter	SPM	500	µg/m³	352.6	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	10.1	UV fluorescence
10		Noise		75	dB	49.3	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Sampling Date: 21-12-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Abdullah Kanro DAM Gadap Malir Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0459

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Abdullah Kanro DAM Proposed Site	25°24'38.6"N 67°22'49.9"E	41.2	43.6	42.4	75
2	Abdullah Kanro DAM 500 m from Upper Site of Dam	25°24'39.8"N 67°22'46.7"E	43.3	45.6	44.4	75
3	Abdullah Kanro DAM 500 m from Lower Site of Dam	25°24'40.0"N 67°22'46.4"E	41.5	43.8	42.6	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/730/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A, Main University Road, Karachi- Sindh.

Site ID: Abdullah Kanro DAM Gadap Malir Sindh
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0460

Date of Sample Collection: 21-12-2022
Date of Sample Received: 24-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°24'38.6"N 67°22'49.9"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	8.2	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	05	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.3	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	1210	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	325.4	EDTA Titration.Hach-8213
8	Fluoride(as F)	≤ 1.5	mg/L	0.412	USEPA 340.1
9	Chloride(as Cl)	< 250	mg/L	412.1	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	2.9	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.985	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00695	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00684	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0639	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00711	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0496	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.69	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0532	Hach 8034
28	Barium	0.7	mg/L	0.00814	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Prepared By	Section Incharge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 29-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Date of Sample Collection: 22-12-2022
Date of Sample Received: 24-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Surface Water Sampling.
Sample Site Coordinates: 25°24'38.9"N 67°22'49.7"E

Site ID: Abdullah Kanro DAM Gadap Malir Sindh.
Lab. Rpt. Rf. No.: ***28371/NEST/AS/2122/0461***

Surface Water Analysis Results

Sr. No.	Parameter	Analysis Method	Result	SEQS Limits
	Field Analysis			
1	Temperature	SMWW 2550 B	28.4	≤ 3°C
	Lab Analysis			
2	pH	SMWW 4500 H^+ B	7.2	6-9
3	Biochemical Oxygen Demand (BOD_5)	SMWW 5210-B	128.2	250 mg/L
4	Chemical Oxygen Demand (COD)	SMWW 5220 B	210.5	400 mg/L
5	Total Suspended Solids (TSS)	SMWW 2540 D	96	400 mg/L
6	Total Dissolved Solids (TDS)	SMWW 2540 C	401	3500 mg/L
7	Phenolic Compounds (as Phenols)	SMWW 5530 D	0.0	0.3 mg/L
8	Grease and Oil	USEPA 1664 B	0.0	10 mg/L
9	Chloride (Cl^-)	SMWW 4500 Cl- B	265.3	1000 mg/L
10	Fluoride (F^-)	SMWW 4500 F- C	0.0	10 mg/L
11	Cyanide (CN^-)	SMWW 4500 CN- F	0.0	1.0 mg/L
12	An-ionic Detergents (as MBAs)	SMWW 5540-C	0.0	20 mg/L
13	Sulfate (SO_4^{-2})	SMWW 4500 SO_4^{-2} C	43.5	600 mg/L
14	Sulfide (S^{-2})	SMWW 4500 S^{-2} F	0.0	1.0 mg/L
15	Ammonia (NH_3)	SMWW 4500-NH_3 D	0.0	40 mg/L
16	Cadmium (Cd)	SMWW 3113 B	0.0118	0.1 mg/L
17	Chromium (Cr)	SMWW 3113 B	0.00432	1.0 mg/L
18	Copper (Cu)	SMWW 3113 B	0.396	1.0 mg/L
19	Lead (Pb)	SMWW 3113 B	0.0132	0.5 mg/L
20	Mercury (Hg)	SMWW 3112 B	BDL	0.01 mg/L
21	Selenium (Se)	SMWW 3114 B	0.0474	0.5 mg/L
22	Nickel (Ni)	SMWW 3113 B	0.0296	1.0 mg/L
23	Silver (Ag)	SMWW 3113 B	0.00354	1.0 mg/L
24	Total Toxic Metals	Calculated Value	0.254	2.0
25	Zinc (Zn)	SMWW 3111 B	0.0721	5.0 mg/L
26	Arsenic (As)	SMWW 3114 B	0.00596	1.0 mg/L
27	Barium (Ba)	SMWW 3113 B	0.00574	1.5 mg/L
28	Iron (Fe)	SMWW 3113 B	0.521	8.0 mg/L
29	Manganese (Mn)	SMWW 3111 B	0.0614	1.5 mg/L
30	Boron (B)	SMWW 3113 B	0.0768	6.0 mg/L
31	Residual Chlorine (Cl_2)	SMWW 4500 Cl- B	0.0	1.0 mg/L

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/733/2014

Note:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The left over samples (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise Negotiated between the client and the laboratory.

Prepared By	Section Incharge (EGEL)

The Analyses listed on samples received or sent by the Client. The interpretation or opinions expressed represent the best judgment .We have no responsibility and warranty or representation in Connection with which such report is used.

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(Babu Khan Dam Pictures)

(Babu Khan Dam Lab Report)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

SAMPLE DESCRIPTION

Sample ID: **Air Quality Test** Sample Type: **Ambient Air**
Sampling Start Date : **06-11-2022** Time : **09:00 am** Sampling Stop Date : **06-11-2022** Time : **17:00 pm**
Sampling Duration: **08 hrs.** Lab Report Ref. No. : **28371/NEST/AS/2122/0307**
Site ID: **Babu Khan Dam Thano Bula Khan Jamshoro Sindh** Sample Site Coordinates. **25°26'40.368"N**
Sampling Location: **Proposed Small Dam Site** **67°28'16.515"E**

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	0.8	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	14.9	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	1.3	
4		Ozone	O_3	130	µg/m³	4.6	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	128	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	30	
7		Suspended Particulate Matter	SPM	500	µg/m³	397	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	8.6	UV fluorescence
10		Noise		75	dB	50.9	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 06-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Babu Khan Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0308

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Babu Khan Dam Proposed Site	25°26'40.516"N 67°28'16.733"E	46.2	48.3	47.25	75
2	Babu Khan Dam 500 m from Upper Site of Dam	25°26'38.354"N 67°28'17.922"E	47.1	49.5	48.3	75
3	Babu Khan Dam 500 m from Lower Site of Dam	25°26'38.407"N 67°28'16.025"E	46.6	48.8	47.7	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Date of Sample Collection: 06-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°26'42.4"N 67°27'52.4"E

Site ID: Babu Khan Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: ***28371/NEST/AS/2122/0309***

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	7.1	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.5	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.1	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	338	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	125.3	EDTA Titration,Hach-8213
8	Fluoride(as F^-)	≤ 1.5	mg/L	0.078	USEPA 340.1
9	Chloride(as Cl^-)	< 250	mg/L	217.3	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	2.9	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.63	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.0096	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.0055	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.096	Hach 8506
20	Lead	≤ 0.05	mg/L	0.0074	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.063	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.55	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.037	Hach 8034
28	Barium	0.7	mg/L	0.0043	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Prepared By	Section Incharge (EGEL)

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

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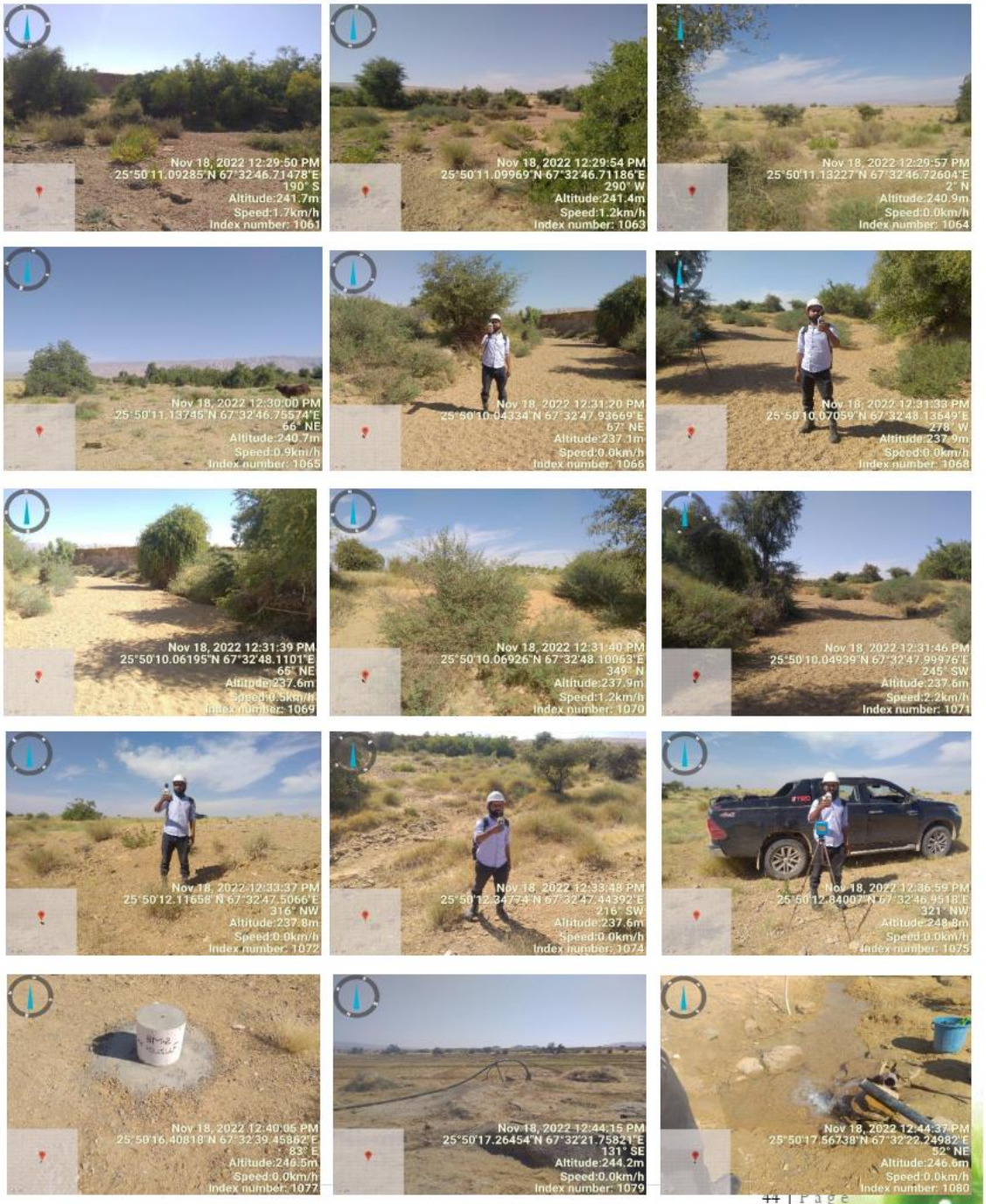
(Muhammad Yousuf Dam Site Pictures)



Nov 18, 2022 12:45:14 PM
25°50'17.5142"N 67°32'22.25044"E
349° N
Altitude:244.1m
Speed:0.0km/h
Index number: 1082

Nov 18, 2022 12:45:44 PM
25°50'17.50852"N 67°32'22.2635"E
338° N
Altitude:244.3m
Speed:0.0km/h
Index number: 1086

Nov 18, 2022 12:47:07 PM
25°50'17.50736"N 67°32'22.2491"E
334° NW
Altitude:244.3m
Speed:0.0km/h
Index number: 1090

Nov 18, 2022 12:48:39 PM
25°50'18.01594"N 67°32'23.11955"E
101° E
Altitude:241.7m
Speed:0.0km/h
Index number: 1093

Nov 18, 2022 12:50:20 PM
25°50'17.89465"N 67°32'23.0059"E
83° E
Altitude:246.8m
Speed:0.0km/h
Index number: 1097

Nov 18, 2022 12:50:28 PM
25°50'17.89577"N 67°32'23.00474"E
81° E
Altitude:246.8m
Speed:0.0km/h
Index number: 1099

Nov 18, 2022 12:50:52 PM
25°50'17.90887"N 67°32'23.00312"E
81° E
Altitude:247.0m
Speed:0.0km/h
Index number: 1100

Nov 18, 2022 12:56:41 PM
25°50'17.51323"N 67°32'22.22171"E
24° NE
Altitude:246.4m
Speed:0.0km/h
Index number: 1103

Nov 18, 2022 1:01:21 PM
25°50'12.54181"N 67°32'47.46538"E
293° NW
Altitude:240.3m
Speed:0.0km/h
Index number: 1106

Nov 18, 2022 1:03:59 PM
25°50'11.06909"N 67°32'46.60004"E
47° NE
Altitude:237.1m
Speed:0.0km/h
Index number: 1107

Nov 18, 2022 1:04:02 PM
25°50'11.06599"N 67°32'46.60256"E
47° NE
Altitude:237.1m
Speed:0.0km/h
Index number: 1108

Nov 18, 2022 1:04:13 PM
25°50'11.05818"N 67°32'46.58881"E
47° NE
Altitude:237.2m
Speed:0.0km/h
Index number: 1109

Nov 18, 2022 1:04:16 PM
25°50'11.12705"N 67°32'46.57805"E
47° NE
Altitude:237.4m
Speed:0.0km/h
Index number: 1110

Nov 18, 2022 1:04:26 PM
25°50'11.13238"N 67°32'46.78328"E
310° NW
Altitude:236.0m
Speed:0.0km/h
Index number: 1111

Nov 18, 2022 1:05:02 PM
25°50'11.17698"N 67°32'46.5931"E
105° E
Altitude:237.1m
Speed:0.0km/h
Index number: 1118

(Muhammad Yousuf Dam Lab Report)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date : 15-11-2022 Time : 09:00 am
Sampling Duration: 08 hrs.
Site ID: Muhammad Yousuf Dam Thano Bula Khan Jamshoro Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date : 15-11-2022 Time : 17:00 pm
Lab Report Ref. No. : 28371/NEST/AS/2122/0349
Sample Site Coordinates. 25°50'11.3"N 67°32'46.9"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m^3	0.9	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m^3	13.7	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m^3	1.0	
4		Ozone	O_3	130	µg/m^3	3.5	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m^3	118.3	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m^3	25	
7		Suspended Particulate Matter	SPM	500	µg/m^3	368.4	
8		Lead	Pb	1.5	µg/m^3	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m^3	7.3	UV fluorescence
10		Noise		75	dB	44.9	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were mg/Nm^3 otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

The Analyses based on sample (s) provided to us by the Client. The interpretation or opinions expressed represent the best judgment .We have no responsibility and warranty or representation in connection with which such reports is used.

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 15-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Muhammad Yousuf Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0350

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	Muhammad Yousuf Dam Proposed Site	25°50'10.0"N 67°32'47.9"E	42.3	44.6	43.4	75
2	Muhammad Yousuf Dam 500 m from Upper Site of Dam	25°50'11.3"N 67°32'46.9"E	42.6	44.9	43.7	75
3	Muhammad Yousuf Dam 500 m from Lower Site of Dam	25°50'12.8"N 67°32'47.0"E	44.3	46.2	45.2	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.

Date of Sample Collection: 15-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°50'17.5"N 67°32'22.2"E

Site ID: Muhammad Yousuf Dam Thano Bula Khan Jamshoro Sindh.
*Lab. Rpt. Rf. No.: **28371/NEST/AS/2122/0351***

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	6.8	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.1	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.1	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	1260	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	245.3	EDTA Titration.Hach-8213
8	Fluoride(as F^-)	≤ 1.5	mg/L	0.245	USEPA 340.1
9	Chloride(as Cl^-)	< 250	mg/L	298.4	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	4.9	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.78	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.0095	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00723	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0694	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00725	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0715	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.77	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0632	Hach 8034
28	Barium	0.7	mg/L	0.00798	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

Prepared By	Section Incharge (EGEL)

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

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EPA Certified Lab
EPA/LAB/Certificate-14/2020

Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Date of Sample Collection: 15-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Surface Water Sampling.
Sample Site Coordinates: 25°50'17.5"N 67°32'22.3"E

Site ID: Muhammad Yousuf Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: ***28371/NEST/AS/2122/0352***

Surface Water Analysis Results

Sr. No.	Parameter	Analysis Method	Result	SEQS Limits
	Field Analysis			
1	Temperature	SMWW 2550 B	32.0	≤ 3°C
	Lab Analysis			
2	pH	SMWW 4500 H^+ B	7.3	6-9
3	Biochemical Oxygen Demand (BOD_5)	SMWW 5210-B	78.9	250 mg/L
4	Chemical Oxygen Demand (COD)	SMWW 5220 B	124.5	400 mg/L
5	Total Suspended Solids (TSS)	SMWW 2540 D	69.4	400 mg/L
6	Total Dissolved Solids (TDS)	SMWW 2540 C	1290	3500 mg/L
7	Phenolic Compounds (as Phenols)	SMWW 5530 D	0.0	0.3 mg/L
8	Grease and Oil	USEPA 1664 B	0.0	10 mg/L
9	Chloride (Cl^-)	SMWW 4500 Cl- B	264.3	1000 mg/L
10	Fluoride (F^-)	SMWW 4500 F- C	0.0	10 mg/L
11	Cyanide (CN^-)	SMWW 4500 CN- F	0.0	1.0 mg/L
12	An-ionic Detergents (as MBAs)	SMWW 5540-C	0.0	20 mg/L
13	Sulfate (SO_4^{2-})	SMWW 4500 SO_4^{-2} C	55.9	600 mg/L
14	Sulfide (S^{2-})	SMWW 4500 S^{-2} F	0.0	1.0 mg/L
15	Ammonia (NH_3)	SMWW 4500-NH_3 D	0.0	40 mg/L
16	Cadmium (Cd)	SMWW 3113 B	0.0155	0.1 mg/L
17	Chromium (Cr)	SMWW 3113 B	0.00791	1.0 mg/L
18	Copper (Cu)	SMWW 3113 B	0.378	1.0 mg/L
19	Lead (Pb)	SMWW 3113 B	0.0129	0.5 mg/L
20	Mercury (Hg)	SMWW 3112 B	BDL	0.01 mg/L
21	Selenium (Se)	SMWW 3114 B	0.0947	0.5 mg/L
22	Nickel (Ni)	SMWW 3113 B	0.0325	1.0 mg/L
23	Silver (Ag)	SMWW 3113 B	0.00463	1.0 mg/L
24	Total Toxic Metals	Calculated Value	0.1384	2.0
25	Zinc (Zn)	SMWW 3111 B	0.0729	5.0 mg/L
26	Arsenic (As)	SMWW 3114 B	0.00863	1.0 mg/L
27	Barium (Ba)	SMWW 3113 B	0.00732	1.5 mg/L
28	Iron (Fe)	SMWW 3113 B	0.263	8.0 mg/L
29	Manganese (Mn)	SMWW 3111 B	0.0742	1.5 mg/L
30	Boron (B)	SMWW 3113 B	0.0865	6.0 mg/L
31	Residual Chlorine (Cl_2)	SMWW 4500 Cl- B	0.0	1.0 mg/L

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2014

Note:

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- The responsibility of the ethical use of the results reported in this report lies with the client.
- The left over samples (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise Negotiated between the client and the laboratory.

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Web : www.everglab.com

(Khakhar Dam Site Pictures)

Nov 17, 2022 5:18:47 PM
25°48'5.77973"N 67°32'51.02898"E
318° NW
Altitude:220.0m
Speed:0.0km/h
Index number: 844

Nov 17, 2022 5:19:02 PM
25°48'5.95598"N 67°32'51.11408"E
17° N
Altitude:220.7m
Speed:2.3km/h
Index number: 845

Nov 17, 2022 5:19:12 PM
25°48'6.06006"N 67°32'51.30085"E
109° E
Altitude:222.7m
Speed:1.2km/h
Index number: 846

Nov 17, 2022 5:19:17 PM
25°48'6.15632"N 67°32'51.29026"E
348° N
Altitude:222.0m
Speed:0.0km/h
Index number: 847

Nov 17, 2022 5:19:20 PM
25°48'6.17353"N 67°32'51.30442"E
291° W
Altitude:221.6m
Speed:0.0km/h
Index number: 848

Nov 17, 2022 5:20:40 PM
25°48'6.0269"N 67°32'51.41839"E
106° E
Altitude:221.6m
Speed:0.0km/h
Index number: 849

Nov 17, 2022 5:26:37 PM
25°48'6.10862"N 67°32'51.17332"E
55° NE
Altitude:230.7m
Speed:0.0km/h
Index number: 853

Nov 17, 2022 5:27:03 PM
25°48'6.07"N 67°32'51.24001"E
57° NE
Altitude:232.0m
Speed:0.0km/h
Index number: 856

Nov 17, 2022 5:27:05 PM
25°48'6.06996"N 67°32'51.23857"E
56° NE
Altitude:232.0m
Speed:0.0km/h
Index number: 857

Nov 17, 2022 5:28:00 PM
25°48'6.07151"N 67°32'51.23278"E
58° NE
Altitude:231.6m
Speed:0.0km/h
Index number: 861

Nov 17, 2022 5:28:01 PM
25°48'6.07144"N 67°32'51.23285"E
57° NE
Altitude:231.6m
Speed:0.0km/h
Index number: 862

Nov 17, 2022 5:31:32 PM
25°48'6.97968"N 67°32'52.01102"E
57° NE
Altitude:219.2m
Speed:0.0km/h
Index number: 865

Nov 17, 2022 5:31:32 PM
25°48'6.97968"N 67°32'52.01102"E
56° NE
Altitude:219.2m
Speed:0.0km/h
Index number: 866

Nov 17, 2022 5:31:42 PM
25°48'7.16285"N 67°32'52.04699"E
135° SE
Altitude:219.5m
Speed:0.0km/h
Index number: 867

Nov 17, 2022 5:32:00 PM
25°48'7.15172"N 67°32'52.23041"E
224° SW
Altitude:219.6m
Speed:0.0km/h
Index number: 869

Nov 17, 2022 5:32:16 PM
25°48'7.05287"N 67°32'52.22821"E
305° NW
Altitude:218.9m
Speed:0.0km/h
Index number: 870

Nov 17, 2022 5:32:22 PM
25°48'7.00974"N 67°32'52.19866"E
131° SE
Altitude:219.4m
Speed:0.5km/h
Index number: 871

Nov 17, 2022 5:32:25 PM
25°48'7.03163"N 67°32'52.19776"E
22° N
Altitude:219.9m
Speed:0.0km/h
Index number: 872

(Khakhar Dam Lab Report)

EPA Certified Lab
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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

SAMPLE DESCRIPTION

Sample ID: Air Quality Test
Sampling Start Date: 14-11-2022 Time: 09:00 am
Sampling Duration: 08 hrs.
Site ID: KHAKHAR DAM Thano Bula Khan Jamshoro Sindh
Sampling Location: Proposed Small Dam Site

Sample Type: Ambient Air
Sampling Stop Date: 14-11-2022 Time: 17:00 pm
Lab Report Ref. No.: 28371/NEST/AS/2122/0354
Sample Site Coordinates. 25°48'06.0"N 67°32'51.1"E

ANALYTICAL TEST REPORT

S. NO.	LOCATION	PARAMETERS TO BE ANALYZED		STANDARD SEQS	UNITS	RESULTS	TEST METHOD
1	Proposed Small Dam Site	Carbon Mono Oxide	CO	10	mg/m³	1.2	Gas Filter Correlation
2		Oxides of Nitrogen as	NO_2	80	µg/m³	14.6	Chemiluminescence
3		Oxides of Nitrogen as	NO	40	µg/m³	1.6	
4		Ozone	O_3	130	µg/m³	4.3	UV fluorescence
5		Respirable Particulate Matter	PM_{10}	150	µg/m³	110.6	Gravimetric Sampling
6		Respirable Particulate Matter	$PM_{2.5}$	75	µg/m³	21	
7		Suspended Particulate Matter	SPM	500	µg/m³	355.1	
8		Lead	Pb	1.5	µg/m³	ND	Spectrophotometer
9		Sulphur Dioxide	SO_2	120	µg/m³	8.1	UV fluorescence
10		Noise		75	dB	44.2	Microphone

** SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:

- Selected measurement units were mg/Nm³ otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Ambient Air average concentration calculated for the 8hours are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST).**
Office # 203, 1st Floor Good Earth Court building,
Gulshan-e-Iqbal Block 13-A. Main University Road,
Karachi- Sindh.

Sampling Date: 14-11-2022
Sampling Duration: 03 hrs.at Each Site.
Sample type: Ambient Noise Sampling.

Site ID: Khakhar Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: 28371/NEST/AS/2122/0355

ANALYTICAL TEST REPORT

Sr. No.	Sampling Site Location	Coordinates	Min dB(A)	Max dB(A)	Average dB(A)	SEQS Standard dB(A)
1	KHAKHAR DAM Proposed Site	25°48'02.9"N 67°32'47.1"E	43.2	45.6	44.4	75
2	KHAKHAR DAM 500 m from Upper Site of Dam	25°48'06.0"N 67°32'51.1"E	42.5	44.2	43.3	75
3	KHAKHAR DAM 500 m from Lower Site of Dam	25°48'07.0"N 67°32'52.0"E	41.8	43.5	42.6	75

❖ *SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2016*

Note:
- Selected measurement units were dB(A) otherwise stated
- Quality was assured through self-calibration of the instrument.
- The values were represent of process conditions (combustion in furnace) when monitoring was carried out.

Remarks: The Noise Sampling average concentration calculated for the 3 hours at Each Site are well within guideline values set by SEQS.

Prepared By	Section In charge (EGEL)

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: M/s. The Natural Environmental Services (NEST).
Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.

Site ID: Khakhar Dam Thano Bula Khan Jamshoro Sindh.
Lab. Rpt. Rf. No.: ***28371/NEST/AS/2122/0356***

Date of Sample Collection: 14-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Drinking/Ground Water Sampling.
Sample Site Coordinates: 25°47'25.9"N 67°32'48.9"E

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS	STANDARDS SSDWQ - LIMITS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	SU	7.4	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	Physical	Acceptable	Physical
4	Color	≤ 15	TCU	0.3	APHA-2020 B/C
5	Turbidity	< 5	NTU	0.1	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	mg/L	1210	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	mg/L	263.4	EDTA Titration.Hach-8213
8	Fluoride(as F^-)	≤ 1.5	mg/L	0.284	USEPA 340.1
9	Chloride(as Cl^-)	< 250	mg/L	325.1	Hach 8206
10	Nitrate (NO_3)	≤ 50	mg/L	3.4	Hach -8039
11	Nitrite (NO_2)	≤ 3	mg/L	0.872	Hach – 8153
12	Cyanide(as CN-)total	≤ 0.05	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	-	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	mg/L	0.00784	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	mg/L	0.00728	ASTM D-3557
18	Chromium , Total	≤ 0.05	mg/L	BDL	ASTM D-1687
19	Copper	2	mg/L	0.0725	Hach 8506
20	Lead	≤ 0.05	mg/L	0.00658	ASTM D-3559
21	Mercury	≤ 0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	mg/L	BDL	ASTM D-1886
24	Boron	0.3	mg/L	0.0425	ASTM D-3082
25	Residual Chlorine	0.2-0.5 at Consumer End	mg/L	ND	Hach - 8167
26	Zinc	5.0	mg/L	0.77	USEPA 3500 Zn B
27	Manganese	≤ 0.5	mg/L	0.0596	Hach 8034
28	Barium	0.7	mg/L	0.00684	Hach 8014
29	Pesticides	-	mg/l	BDL	USEPA 8081-A
30	Polynuclear Aromatic Hydrocarbon (as PAH)	-	g/L	ND	GC-APHA-6440
	MICROBIOLOGICAL ANALSIS REPORT				
31	Total Coliform	0cfu/100ml	cfu	00	APHA-SM9221B
32	Fecal Coliform	0cfu/100ml	cfu	00	APHA-SM9221F
33	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	00	APHA-SM9221F

SSDWQ=Sindh Standard for Drinking Water Quality
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit, ND= Not Detected

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Remarks: The Drinking/Ground Water Sampling results are well within guideline values set by SEQS.

Evergreen Environmental S.E.P.A Certified Karachi Laboratory

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Evergreen Environmental Laboratory

Customer's Ref: **10405/EGEL/NEST/2122/ES/04** **Date: 08-12-2022**

Report to: **M/s. The Natural Environmental Services (NEST). Office # 203, 1st Floor Good Earth Court building, Gulshan-e-Iqbal Block 13-A. Main University Road, Karachi- Sindh.**

Date of Sample Collection: 14-11-2022
Date of Sample Received: 01-12-2022
Samples collected /send by: Collected by EGELC
Sample type: Surface Water Sampling.
Sample Site Coordinates: 25°48'06.0"N 67°32'51.4"E

Site ID: Khakhar Dam Thano Bula Khan Jamshoro Sindh.
*Lab. Rpt. Rf. No.: **28371/NEST/AS/2122/0357***

Surface Water Analysis Results

Sr. No.	Parameter	Analysis Method	Result	SEQS Limits
	Field Analysis			
1	Temperature	SMWW 2550 B	26	≤ 3°C
	Lab Analysis			
2	pH	SMWW 4500 H^+ B	7.2	6-9
3	Biochemical Oxygen Demand (BOD_5)	SMWW 5210-B	93.1	250 mg/L
4	Chemical Oxygen Demand (COD)	SMWW 5220 B	145.7	400 mg/L
5	Total Suspended Solids (TSS)	SMWW 2540 D	70.1	400 mg/L
6	Total Dissolved Solids (TDS)	SMWW 2540 C	1490	3500 mg/L
7	Phenolic Compounds (as Phenols)	SMWW 5530 D	0.0	0.3 mg/L
8	Grease and Oil	USEPA 1664 B	0.0	10 mg/L
9	Chloride (Cl^-)	SMWW 4500 Cl- B	274.9	1000 mg/L
10	Fluoride (F^-)	SMWW 4500 F- C	0.0	10 mg/L
11	Cyanide (CN^-)	SMWW 4500 CN- F	0.0	1.0 mg/L
12	An-ionic Detergents (as MBAs)	SMWW 5540-C	0.0	20 mg/L
13	Sulfate (SO_4^{-2})	SMWW 4500 SO_4^{-2} C	42.8	600 mg/L
14	Sulfide (S^{-2})	SMWW 4500 S^{-2} F	0.0	1.0 mg/L
15	Ammonia (NH_3)	SMWW 4500-NH_3 D	0.0	40 mg/L
16	Cadmium (Cd)	SMWW 3113 B	0.0147	0.1 mg/L
17	Chromium (Cr)	SMWW 3113 B	0.00632	1.0 mg/L
18	Copper (Cu)	SMWW 3113 B	0.321	1.0 mg/L
19	Lead (Pb)	SMWW 3113 B	0.0155	0.5 mg/L
20	Mercury (Hg)	SMWW 3112 B	BDL	0.01 mg/L
21	Selenium (Se)	SMWW 3114 B	0.0839	0.5 mg/L
22	Nickel (Ni)	SMWW 3113 B	0.0363	1.0 mg/L
23	Silver (Ag)	SMWW 3113 B	0.00484	1.0 mg/L
24	Total Toxic Metals	Calculated Value	0.1296	2.0
25	Zinc (Zn)	SMWW 3111 B	0.0632	5.0 mg/L
26	Arsenic (As)	SMWW 3114 B	0.00538	1.0 mg/L
27	Barium (Ba)	SMWW 3113 B	0.00596	1.5 mg/L
28	Iron (Fe)	SMWW 3113 B	0.320	8.0 mg/L
29	Manganese (Mn)	SMWW 3111 B	0.0698	1.5 mg/L
30	Boron (B)	SMWW 3113 B	0.0725	6.0 mg/L
31	Residual Chlorine (Cl_2)	SMWW 4500 Cl- B	0.0	1.0 mg/L

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2014

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- The responsibility of the ethical use of the results reported in this report lies with the client.
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Annexure IV Environmental & Social Questionnaires

Scope of Guidelines

These guidelines are applicable to all dams and reservoirs with a storage volume of less than 25 million cubic meters or surface area of less than 4 square kilometers.

How to use these Guidelines?

The following steps are to be taken in this regard:

Step 1: Provide information on project [use Section I]

Step 2: Determine Applicability (Are you sure that IEE or EIA is not required?) [use Section II]

Step 3: Describe the physical, biological and social environment [use Section III]

Step 4: Assess potential impacts and applicable mitigation measures [use Section IV]

Section I: Project Description

File No _____ Date _____

1. General Information

1.1 Project Name or Title_____

1.2 Name of the person who conducted this assessment _____

1.3 Designation _____

2. Project Information

2.1 Project location _____

2.2 Cost of the project _____ 2.3 Purpose of the reservoir _____

2.4 Name of the river or stream_____2.5 Is the stream seasonal or perennial ____

2.6 Total area of the reservoir _____ m^2 2.7 Total storage capacity _____ m^3

2.8 Total volume of the embankment _____ m³

2.9 Brief Project Description

Please attach a map of the proposed project site showing the location of the key structures, access, etc.

3. Construction

3.1 Who owns the proposed land for the project? _____

3.2 What is the present use of the land? _____

3.3 Are there any structures on the proposed site now? ___Yes ___ No

If yes, will any structure be demolished? ___ Yes ___ No

If yes, where the demolition waste will be disposed? _____

3.4 Are there any trees on the proposed site? ___ Yes ___ No

3.5 Will any tree be removed? ___ Yes ___ No

If yes, how many? _____

3.6 Period of construction (start and end dates) _____

3.7 What major construction equipment (dozer, grader, crane, etc.) will be used? _____

3.8 Will any land be acquired? _____

If yes, please specify the total area: _____ Present ownership of land _____

What is the present use of the land? _____

How the land will be acquired (Through Land Acquisition Act or Direct Purchase)? _____

When the compensation will be paid? _____

3.9 In case of state land, are there any squatter settlements on the land? ____

If yes, please specify Number of settlements _____Will any compensation be paid? _____ When the compensation will be paid? _____

Section II: Screening

Is the proposed project or part of the project in an ecologically sensitive area?

Is the total storage capacity more than 25 million cubic meter? ___ Yes ___ No

Is the total area of the reservoir more than 4 square kilometers? ___ Yes __ No

If the answer to any of the above questions is yes, then the project would require an initial environmental examination or an environment impact assessment. Refer to the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000 for appropriate category.

Section III: Environmental Profile

1. Describe the terrain of the project area:

Flat or Level (Slope < 3%) Level to moderately steep (Slope 3%-30%)

Moderately steep to mountainous (Slope > 30%)

2. Are there signs of soil erosion or landslide anywhere within 2,000 m of the proposed site? Yes No

If yes, please describe (where, nature) _____

3. Please describe the hydrological conditions of the stream or river, run-off characteristics, rainfall, rainfall variability, groundwater, and drought patterns.

_____

_____

4. Is the stream polluted? Is domestic or other wastewater discharged to it?

_____

5. What are the present uses of the stream, e.g., agriculture, domestic, industrial, washing, fishery. _____

6. Is there any groundwater well on the proposed site or within 500 m of the proposed site? Yes No

If yes, describe each well:

Type (Dug well, tube well, hand pump)	**Location** (Village, road, mohalla, etc. and distance from the site)	**Depth and Yield**	**Uses** (Drinking, agriculture, domestic, industrial, washing, livestock)

7. Based on the interview of the surrounding population or a wildlife expert, is any form of wildlife found on, or around the proposed site of the project? ___Yes ___No

If yes, please describe _____

_____

8. Are there any existing trees or vegetation on the proposed site? ___ Yes ___ No

If yes, how many? _____

9. Are there any community forest, reserved forest or protected area within 2,000 m of the proposed site? _____ Yes _____ No

If yes, please describe? _____

10. What is the present land use of the proposed dam site and its vicinity (roughly a radius of 500 m) of the proposed site?

	Residential (Thick, Moderate, Sparse)	**Commercial** (Office, Shops, Fuel Stations)	**Open Land** (Parks, Farmlands, unutilized plots, barren land	**Industrial**	**Other**
Description					

11. For any agricultural farmland on the proposed site and a radius of 500 m around it, provide the following information: Main crop(s) and average yield _____

Source of irrigation water_____

Area affected by salinity or water logging _____

12. Please describe all the sensitive receptors within 500 m of the proposed site:

Type (schools, colleges, hospitals, and clinics)	**Name**	**Size** (Number of students or number of beds)	**Location** (Village, road, mohalla, etc.)	**Distance from Site**

13. What is the total population of the area? _____

14. What proportion of the houses in the area are *pukka, semi-pukka, and* kutcha?

_____

15. How are the general hygienic conditions of the project area?

_____ Generally clean _____Fair ____Poor

16. Is there any bad odor in the project area? ____Yes _____ No

What is the source of the odor? _____

17. What are the main sources of income of the surrounding community? _____

_____

18. Is there any site of cultural importance (graveyard, shrine, mosque, archeological site) within 1,000 m of the proposed scheme? _____Yes _____No

If yes, please describe? _____

_____

19. Will the reservoir submerge any:

Village or house_____ Wetland _____Forest _____

Sensitive vegetation _____ Wildlife habitat_____

Tomb or graveyard _____ Archeologically important site _____

Section IV: Impact Assessment

Potential Negative Environmental Impacts	*Tick, if relevant*	*Mitigation Measures*	*Tick, if proposed*	*Monitoring Plan*
Socioeconomic Impact	☐	To the extent possible, local labor will be used for unskilled, semi skilled and skilled jobs	☐	
		A formal resettlement plan will be prepared	☐	
Water-related diseases	☐	Sanitation and health-care programs will be initiated for the population around the reservoir	☐	
		As far as possible, the reservoir water level will be fluctuated to discourage growth of disease carrying insects.	☐	
Wildlife and vegetation	☐	Minimum flow required to maintain vegetation will be determined and it will be ensured that the flow is maintained	☐	
		Operational rules will be defined for regulating downstream flows at critical times to protect habitat for reproduction or migratory routes.	☐	
		Provisions for the migration of fish and other aquatic organisms will be provided, if needed	☐	
Safety Concerns	☐	The surrounding communities will be informed about the construction schedule and will be briefed about the safety procedures	☐	
		A comprehensive plan for operation, maintenance and rehabilitation will be prepared. This should include inspections, evaluations, modifications and upgrades of the dams to ensure that they meet safety standards.	☐	
		Emergency action plans will be prepared. Training will be provided to dam operators.	☐	
		Safety exercises will also involve the local government officials and community.	☐	
		A periodic and thorough review of the rainfall and runoff characteristics as well as the identification of other changes in the hydrology of the basin will be undertaken to monitor the changes in the hydrologic characteristics of the stream basin.	☐	
Risk of erosion and landslide	☐	Stabilization measures will be undertaken	☐	
Construction	☐	Construction waste (excess rock and soil, demolition waste, etc.) will be disposed at _____ (location)	☐	
		All properties, utility lines and other structures damaged during the construction will be restored	☐	

SINDH RESILIENCE PROJECT (SRP)

SOCIO-ECONOMIC BASELINE CONDITIONS

Household Profile (Sample Survey)

District		Tehsil	
UC Name			
Village			
Urban		Rural	

Interviewer's Name _____

Name of the Respondent _____

Father's Name of the Respondent _____

NIC No. of the Respondent _____

Name of the Head of Household _____

CNIC No. of Head of Household _____

Date of Interview | | | - | | | - | | | | |

DD/MM/YYYY

Section 1: Basic Information of the Household

Sr. No.	Details	Answers
1.	Gender of Respondent	1. Male 2. Female
2.	What is your approximate age? (Write in figures only)	
3.	Relation with Head of Household	1. Self 2. Father 3. Brother 4. Son Others (Please specify)_____
4.	Gender of the Head of Household	1. Male 2. Female
5.	Tribe	
6.	What is the highest level of education you have reached or completed?	1. No education 2. Primary (up to 5 Years) 3. Secondary (up to 10 years) 4. High School (up to 12 Years) 5. University Other (Please specify)_____
7.	What is your Religion?	
8.	Settlement Status	1. Local 2. Migrated Settler Others (Please specify)_____
9.	If Migrated/Settler, Years of Settlement?	
10.	Reasons of Migration	

Section 2: Awareness Regarding the Project

Sr. No.	Details	Answers
1.	Are you aware of the upcoming Water Resources Management and Development Project? (if respondent is not aware of the project, brief him about the project)	1. Yes 2. No
2.	If "Yes" to question 1, do you know when the project will be implemented? (if respondent is not aware of the project, brief him about the project implementation)	1. Yes 2. No

Section 3: Demographic Details

Sr. No.	Name of Head of Household	No. of Family Members	Gender		CNIC No.	Education Level	Occu -pation	Any Special Person (Yes/No)
			M	F				
1.					-			
2.					-			
3.					-			
4.					-			
5.					-			
6.					-			
7.					-			
8.					-			
9.					-			
10.					-			

Gender: a. Male b. Female

Education Level: a. Literate, b. Upto Primary, c. Upto Matric, d. Graduate, e. Higher Education/Masters

Occupation: a. Farming, b. Business, c. Handicraft, d. Artisan, e. Skilled Works, f. Govt. Service, g. Private Service, h. Agriculture Labor, i. Livestock Grazing, j. Labor, k. Others (Specify)

- 3 -

Section 4 Available Facilities in the House

Sr. No.	Details	Answers
1.	Do you have Telephone Connection (landline)?	1. Yes 2. No
2.	If "Yes" to question 1, when connected?	
3.	Is your house electrified?	1. Yes 2. No
4.	When connected: (Give dates as mm/dd/yyyyy)	
5.	Do you have sewerage System?	1. Yes 2. No

Section 5: Fuel Consumption in the House for illumination, cooking & heating

Type	Units	Average Quantity Consumed (unit/ month)		Price per Unit (Rs)	Monthly Expenditure (Rs.)	Source (e.g. forest, market)
		Winter	Summer			
1. Fuel wood						
2. Electricity						
3. LPG						
4. Kerosene						
Other (Please specify)---------- ----------						

Section 6: Social Issues

Sr. No.	Details	Answers
1.	Do married family members live with you in the same house?	1. Yes 2. No
2.	Do you marry children outside your tribe?	1. Yes 2. No
3.	Number of child births in your family during last year	
4.	Were there any illnesses during the past 12 months?	
5.	For how long treatment continued (Months)	
6.	Place of treatment	

7.	Distance from village/hamlet (km)	
8.	Expenses incurred (Rs.)	
9.	Number of deaths in the family during last year	
10.	Cause/s of Death	1. _____ 2. _____ 3. _____ 4. _____

11. Did you borrow money during the last year? 1. Yes ☐ 2. No ☐

12. If "Yes" to question 11, provide details as below:

Sr. No.	Source	Amount Borrowed (Rs.)	Purpose	Amount Yet to Return (Rs.)	Sources 1. Relative/friends 2. NGO 3. Bank 4. Others (specify) Purpose 1. Marriage 2. Purchase of land 3. Purchase of built-up prpoerty 4. Establishment of business 5. Others (Please specify) _____
1.					
2.					
3.					

13.	Do you have to go to the city for fulfillment of various needs?	1. Yes 2. No
14.	If "Yes" to question 13, then how offenly?	1. Daily 2. Weekly 3. Monthly 4. Occasionally 5. Others (Specify) _____
16.	Social issues of the community	_____ _____ _____ _____ _____

Section 7: Livestock (Domestic Animals)

1. Number of Livestock heads of each type owned by you?

Type	Buffalo	Cow	Goat	Sheep	Oxen	Calve	Donkey	Horse	Chicken	Others (Please specify)
Number										
Value Rs./ Unit										

2. From where do you get fodder for livestock? _____

3. Estimated cost for purchasing feed / fodder for your animals (Rs./Month) ? _____

Section 8: Livelihood

1.	What is your occupation?	1. Primary 2. Secondary
2.	What is your place of work?	1. Same village 2. Nearby Town 3. Nearby city 4. Others (Please specify) _____

4. Involvement of household members in income earning activities.

Sr. No.	Activity	Number of Persons Involved					
		Men (between 16-65)	Women (between 16-65)	Old Men (65 years and above)	Old Women (65 years and above)	Children (below 16 years)	Average Monthly Income (Rs.)
1.	Farming						
2.	Small Business						
3.	Handicraft						
4.	Artisan Services*						
5.	Skilled Works**						
6.	Govt. Service						
7.	Pvt.Service						
8.	Agri. Labor Permanent						
9.	Fisherman						
10.	Livestock Rearing						

11.	Labour						
12.	Other (Pls. specify)----------						
Total							

*Artisans: Carpenter, Black-Smith, Barber, Potter, Shoe Menders/Maker, etc.
**Skilled Workers: Tailor, Carpet Weaver, Stone Masonry, Plumber, Mechanic, Driver, Electrician, Furnisher, etc.

5. Average monthly expenditures?

Sr. No.	Detail	Expenditures (Rs./Month)
1.	Food Items	
2.	Firewood/ Energy Source	
3.	Education	
4.	Health	
5.	Social/Recreation Activities	
6.	Others (Please specify)	

Section 9: Housing

1.	Type of the ownership	1. Owned 2. Rented 3. Free 4. Others _____
2.	Nature of the construction of the house	1. Pucca (Bricks/blocks/stones) 2. Semi Pucca 3. Katcha 4. Wood/Bamboo 5. Others (Pls. specify)_____
3.	Number of rooms in the house	
4.	Availability of bathroom in the house?	1. Yes 2. No
5.	Aproximate Plot size of the house	Marla _____
6.	Covered area (sq.ft)	_____
7.	Year of construction of the house	_____
8.	Do you have separate room/rooms for animals in your house?	1. Yes 2. No
9.	If "Yes" to question 8, then number of rooms	_____

10.	Construction Type	1. Pucca (Bricks/blocks/stones) 2. Semi Pucca 3. Katcha 4. Wood/Bamboo 5. Others (Pls. specify)_____
11.	Is your house being affected by the project?	1. Yes 2. No
12.	If "Yes" to question 11, then do you have any other place of residence to move	1. Yes 2. No
13.	If "Yes" to question 12 please specify	

Section 10: Land holding and land use by the household

1. Size of land holding with its approximate price?

Sr. No.	Land Use	Overall Land (Kanals)	Approximate Size of Land Perceived to be Affected (Kanals)	Perceived Approx. Unit Price (Rs./Kanal)
1.	Cultivated			
2.	Un-cultivated			
3.	Banjar jaded			
4.	Banjar qadeem			
5.	Ghair mumkin/pahar			
6.	Fruit orchard area			
7.	Other (Please specify) _____			
	Total			

8.	Nature of farming	1. Owner 2. Contract 3. Owner cum tenant 4. Tenant 5. Share cropping 6. Others (Pls. specify)_____
11.	Which of the following agricultural implements do you have	1. Plough for oxen 2. Plough for tractor

		3. Tractor 4. Spray machine 5. Trolley for tractor 6. Thresher 7. Other (Please specify)_____

12. What do you grow mostly in your agricultural land?

Sr. No.	Crop	Area under Cultivation (Kanals)	Yield / Kanal
1.	Wheat		
2.	Maize		
3.	Vegetables		
4.	Fodder		
5.	Other (Pls. specify) _____		

13. What are the expenditures to grow crops in your agricultural land?

Sr. No.	Inputs	Unit	Unit Price (Rs.)	Quantity/ Season	Seasonal Cost
1.	Seeds	Kgs/Kanal			
2.	Fertilizers	Kgs/Kanal			
3.	Pesticides	Liter/Kanal			
4.	Plowing	No.			
5.	Harvesting	days			
6.	Other (Please specify)				
Total					

14. What is your average seasonal earning(Rs./Season)?

a. Rabi [ ] b. Kharif [ ]

1. If your agricultural land /commercial asset are to be acquired for Project, do you have any other sources of income?
   a. Yes ☐ b. No ☐

1.1 If "Yes" specify the source. _____

2. In case of relocation, where will you prefer to resettle?
   a. Shifting to other village/UC ☐ b. Project developed resettlement site ☐
   c. Within the tehsil ☐ d. Within the district ☐
   e. Out of province ☐ f. Don't know ☐
   g. Any other place (Please specify) _____

3. What mode of compensation for land will be your choice?
   a. Cash ☐ b. Alternate Land ☐ c. Other (Please specify) _____

4. If cash payments are made, then expected utilization of the money?
   a. Business ☐ b. Property ☐
   c. Agricultural Land ☐ d. Others (Please specify) ☐

15. What do you suggest for livelihood restoration?

_____

_____

_____

Signature:	_____	Signature:	_____
Name:	_____	Name:	_____
CNIC No.	_____	CNIC No.	_____
	(Respondent)		**(Community Representative)**
Signature:	_____	Signature:	_____
Name:	_____	Name:	_____
CNIC No.	_____	CNIC No.	_____
	(Interviewer)		**(SID Representative)**

Dated: _____

Annexure V TOR of Ecologist

“Ecologist will be required to perform following tasks; Scope of work for each task will be as follows;

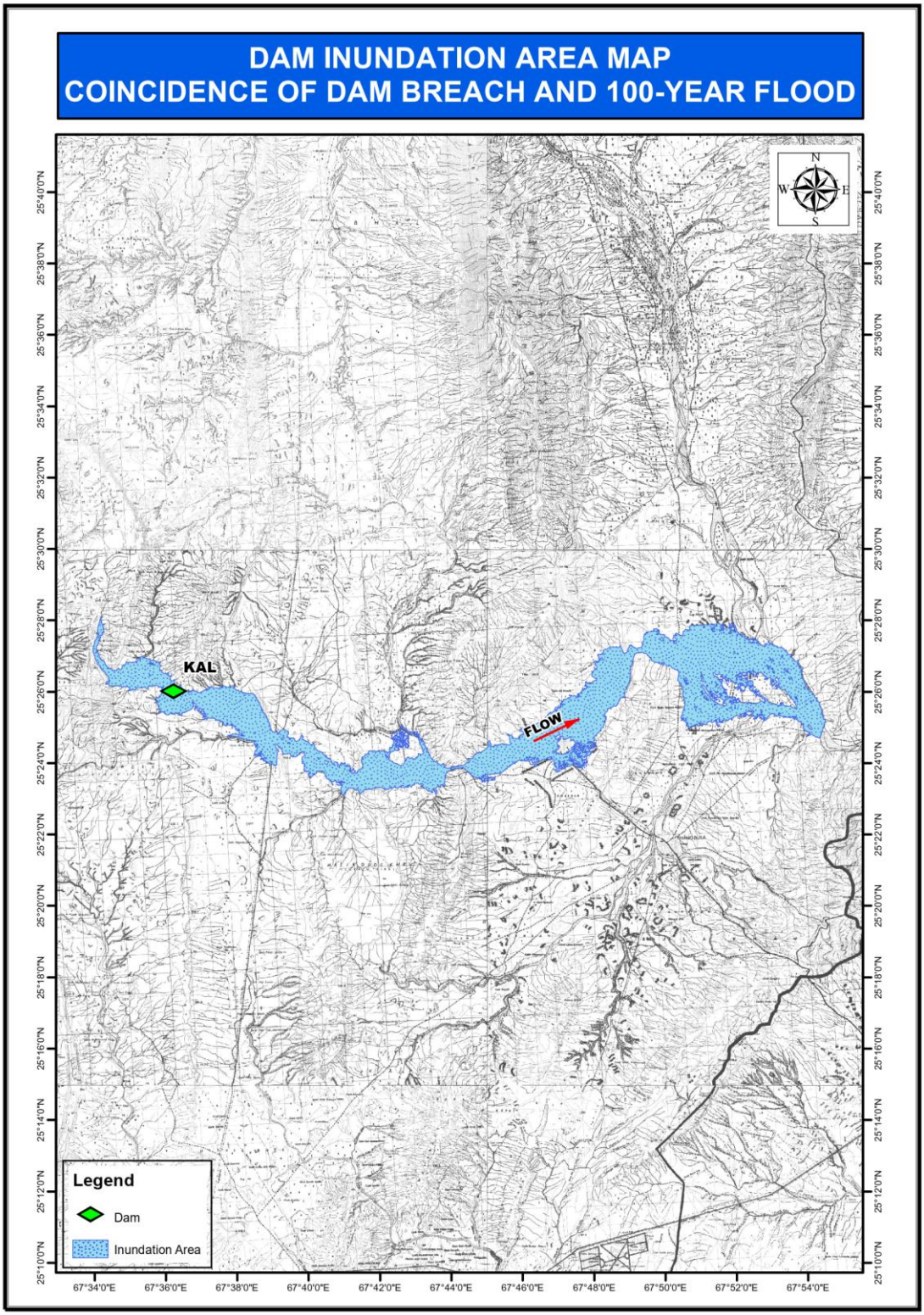
MONITORING PERFORMANCE OF OVERALL ECOLOGICAL IMPACTS OF CIVIL WORKS AT KNP;

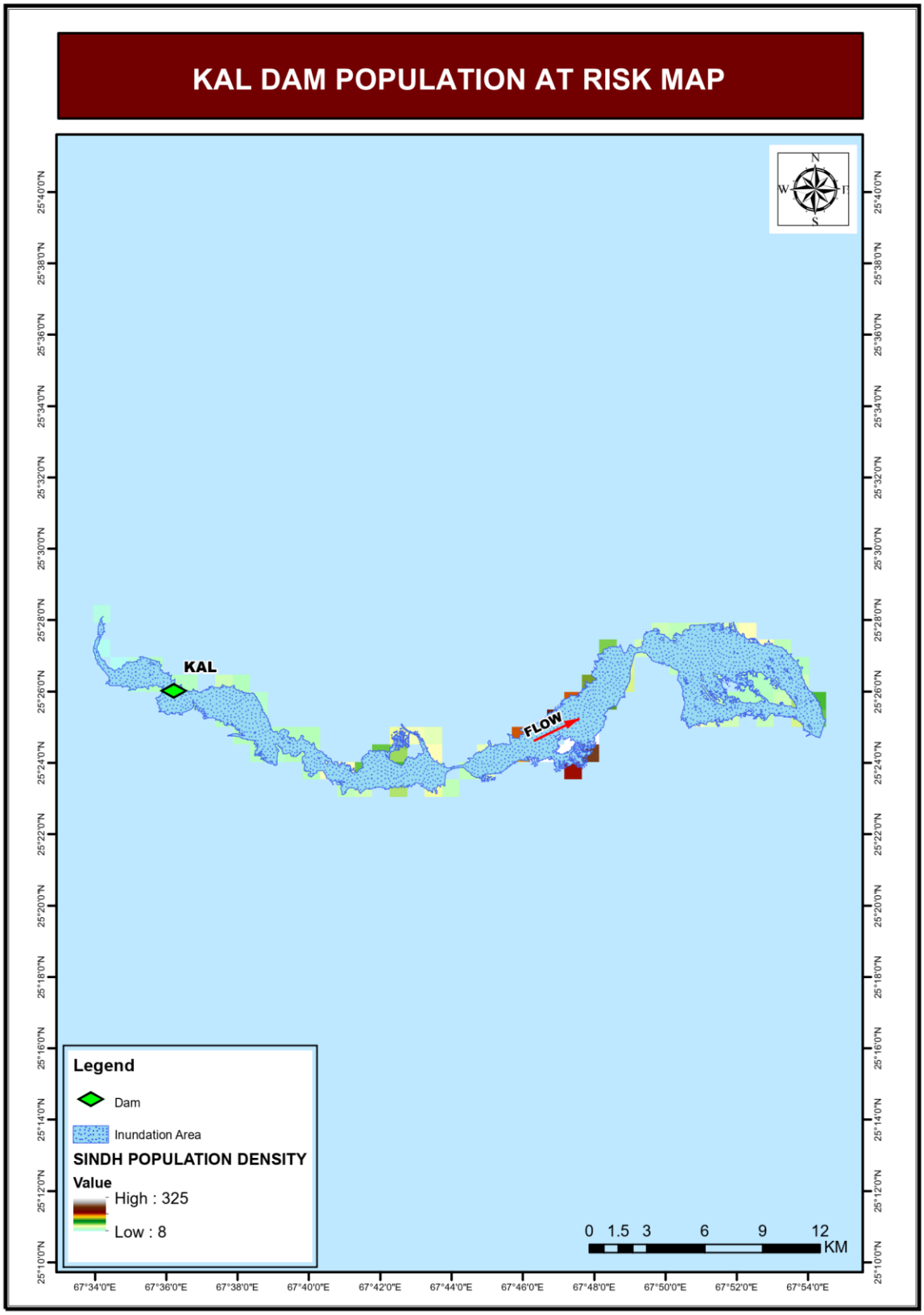
Under this task the Ecologist will be required to monitor the overall compliance of the Ecological /Biodiversity Management Plan of SCRP sub-project, which will include but not be limited to the following;

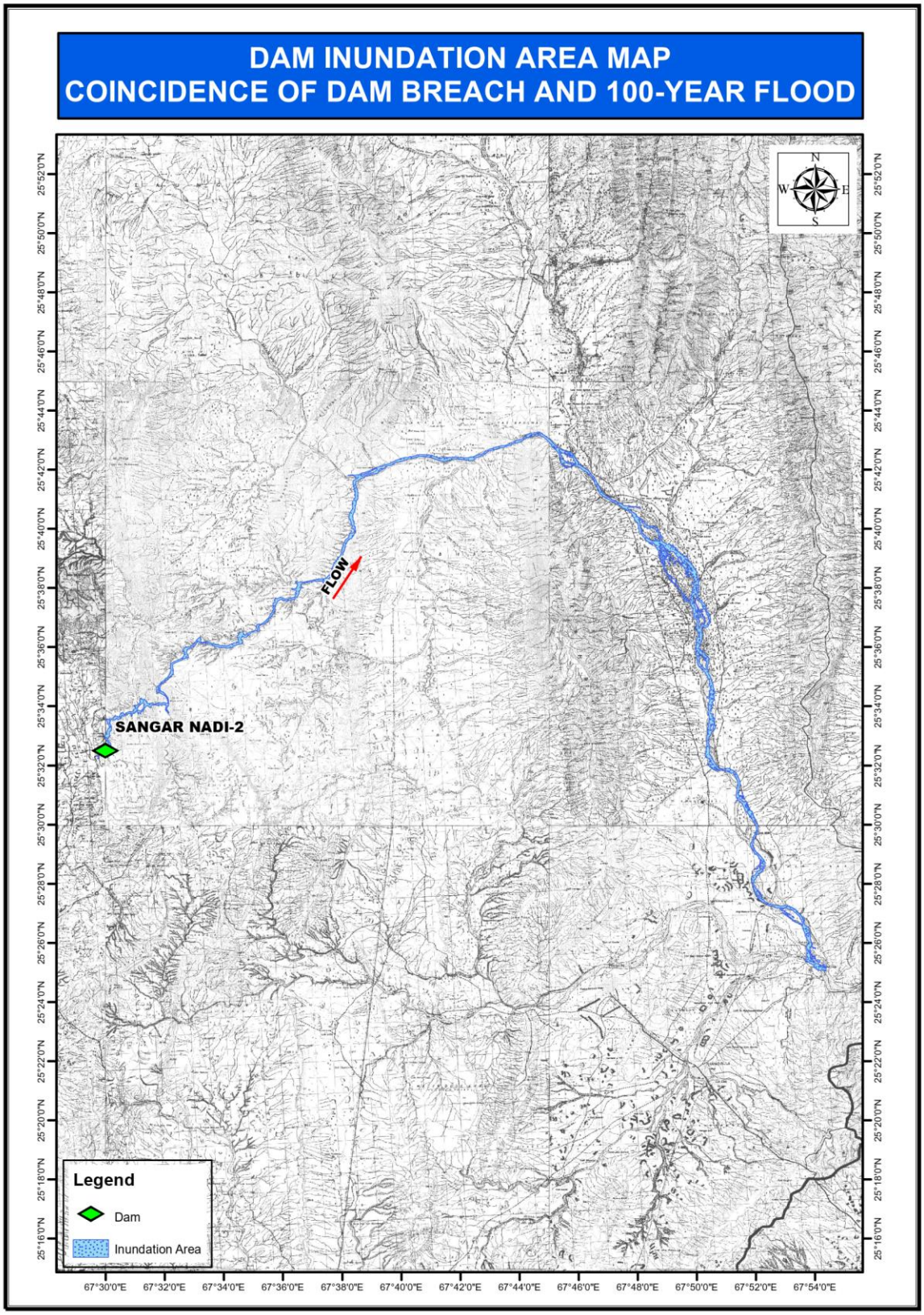
- Ecological monitoring during the construction period of 26 Small Dams sub-project.
- Develop training modules on the subject of the environment, ecology, environmental management systems and impart training to the Construction team and other organizations likely to work under ecological management plant component as and when required;
- Conduct capacity building training activities for the project team and other key stakeholders
- Advice and guide project team for effective implementation of all the mitigation measures already developed under the ESIA document to mitigate the adverse environmental impacts associated with civil works of 26 dams;
- Close coordination with the construction team to ensure minimal ecological/environmental degradation and disturbance during construction work.
- Conduct a periodic ecological assessment of the area and hotspot sites and report any ecological development like the breeding period of local birds, bird migratory period, etc.
- Develop service of safe handling/rescue of wildlife in case of accident or encounter in sub-project site.
- Conduct tree plantation activity in sub-project area, involving project team and the local community to develop a sense of ownership.
- Report and discuss, any adverse impacts of sub-projects during the construction or predict future threats.

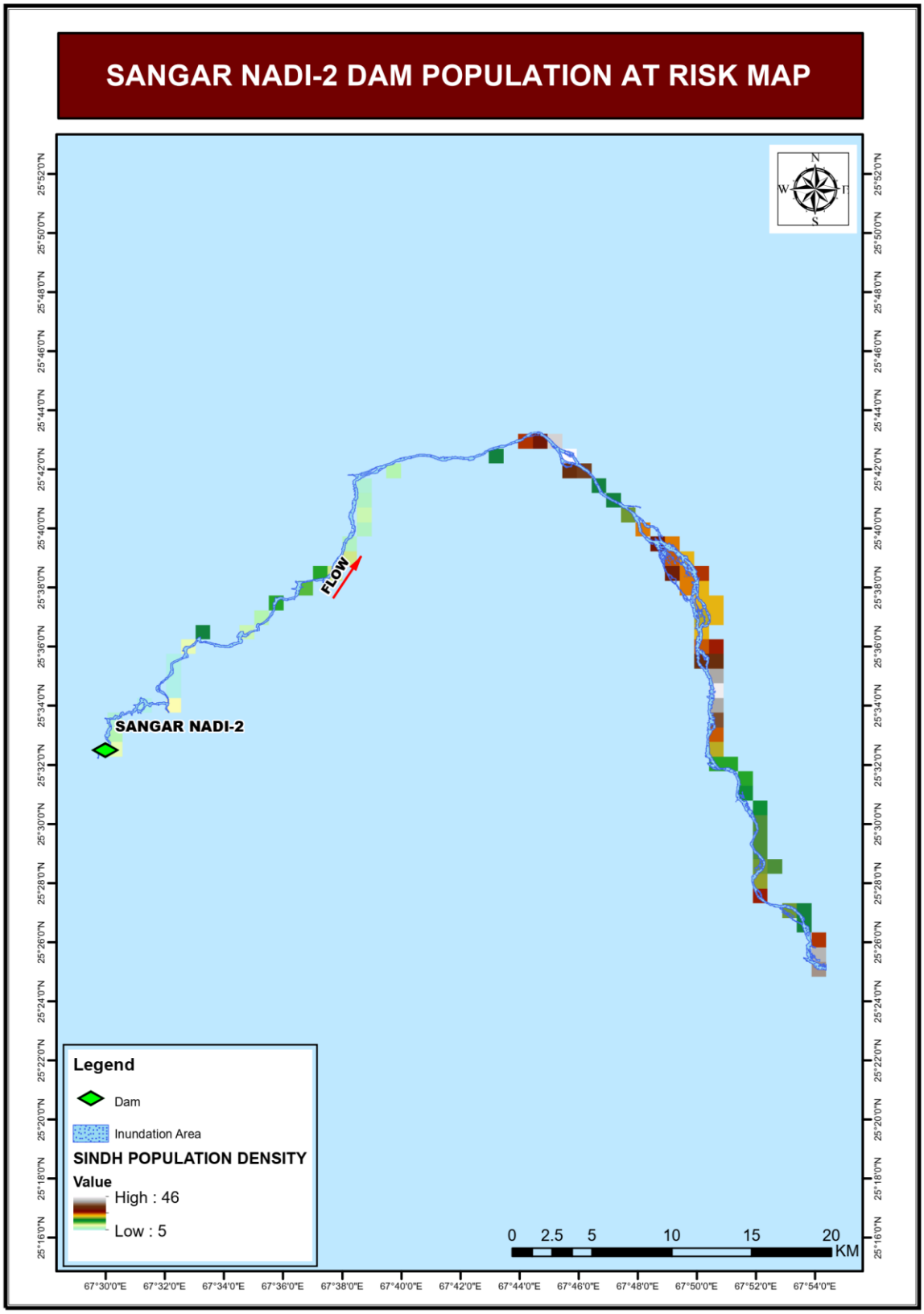
Conduct quarterly review meeting with PIU team regarding ESMP Component Implementation Progress and prepare implementation progress report describing; the activities performed by the consultant to monitor and strengthen the effective implementation of ESIA;

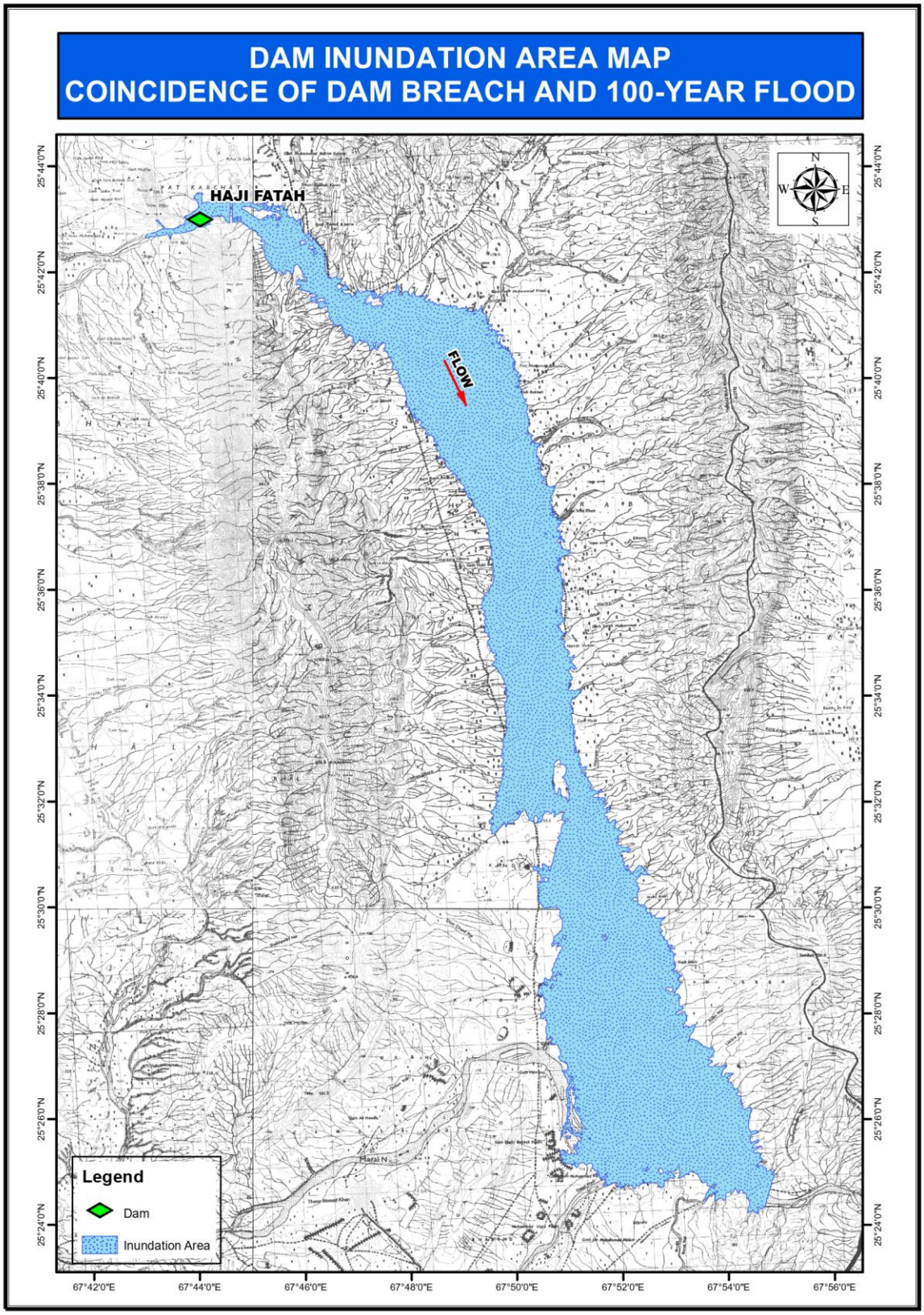
Annexure VI Map showing Area Inundated & impacted Population- Dams Break

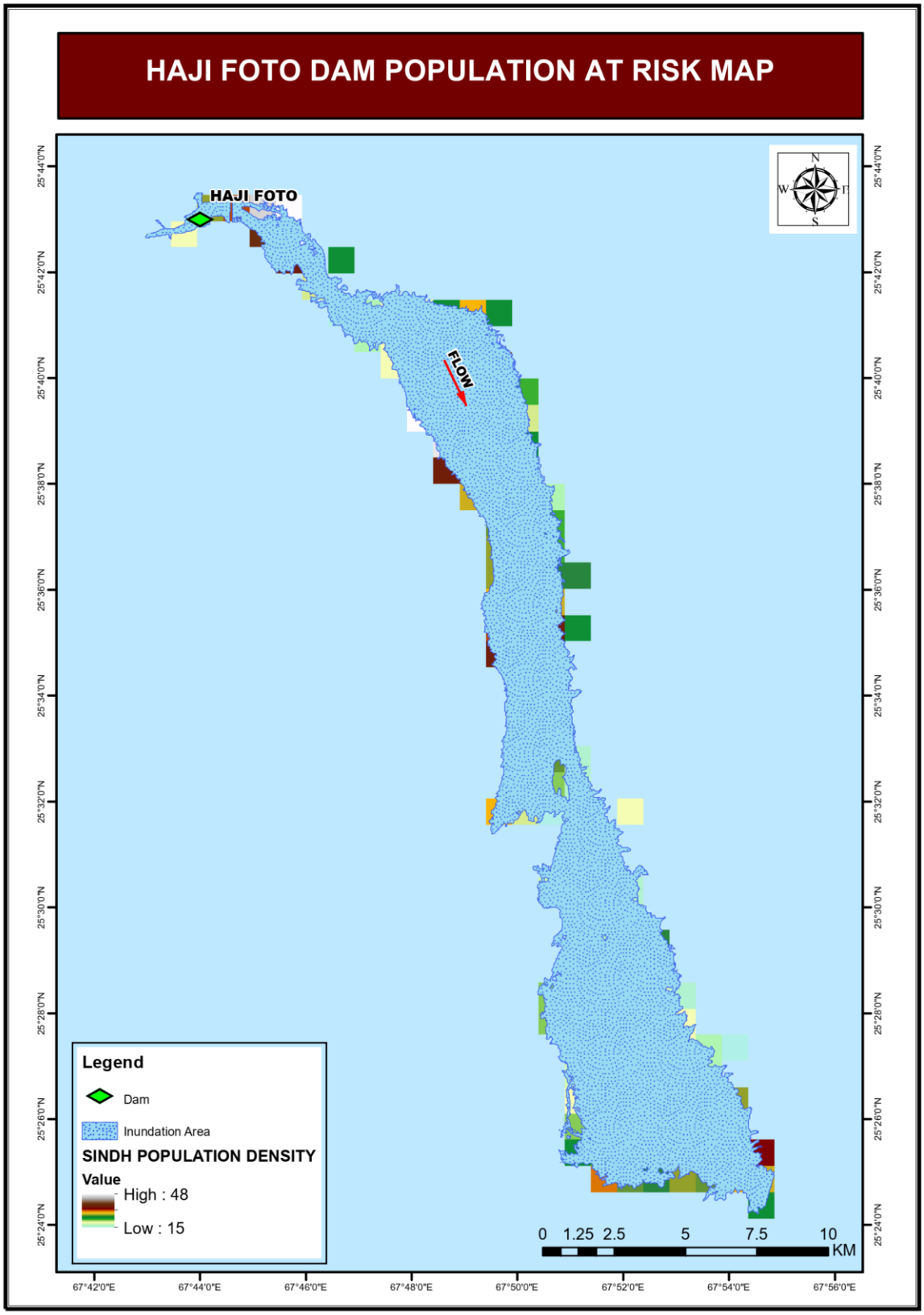


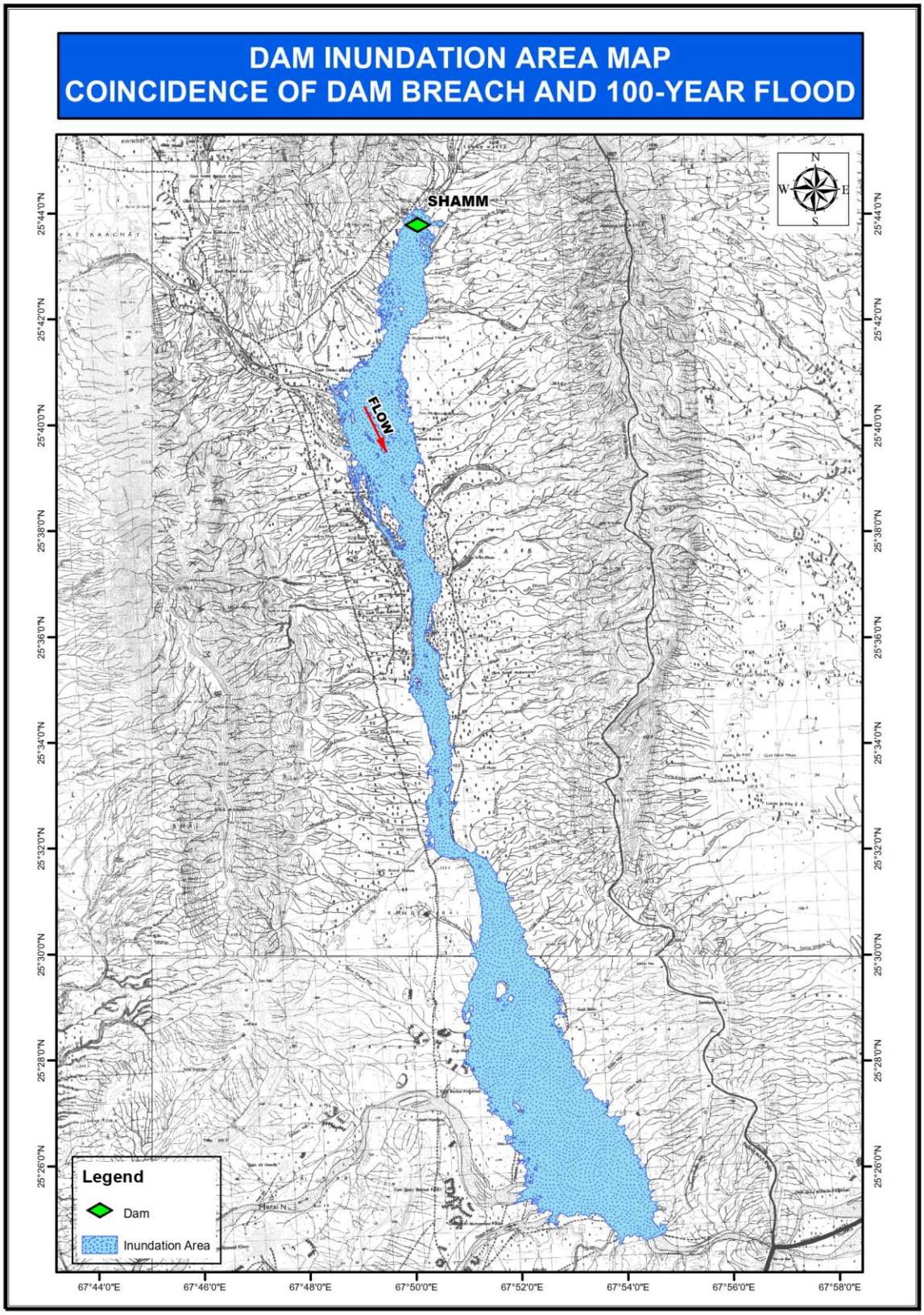

KAL DAM POPULATION AT RISK MAP
N
W
E
S
KAL
FLOW
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 325
Low : 8
0 1.5 3 6 9 12
KM
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
25°12'0"N
25°10'0"N
67°34'0"E
67°36'0"E
67°38'0"E
67°40'0"E
67°42'0"E
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E

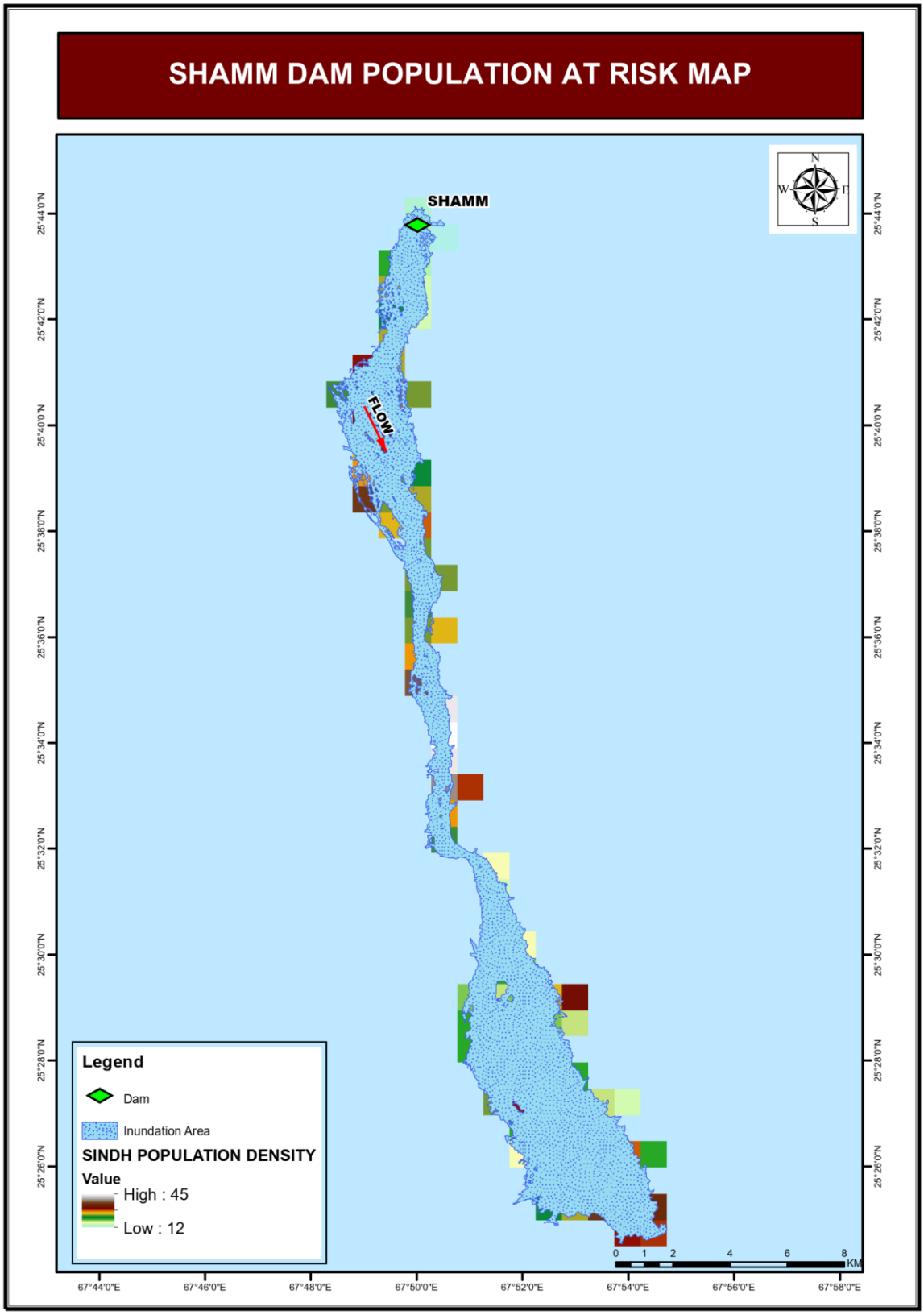

DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
N
W
E
S
FLOW
SANGAR NADI-2
Legend
Dam
Inundation Area
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
67°30'0"E
67°32'0"E
67°34'0"E
67°36'0"E
67°38'0"E
67°40'0"E
67°42'0"E
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E

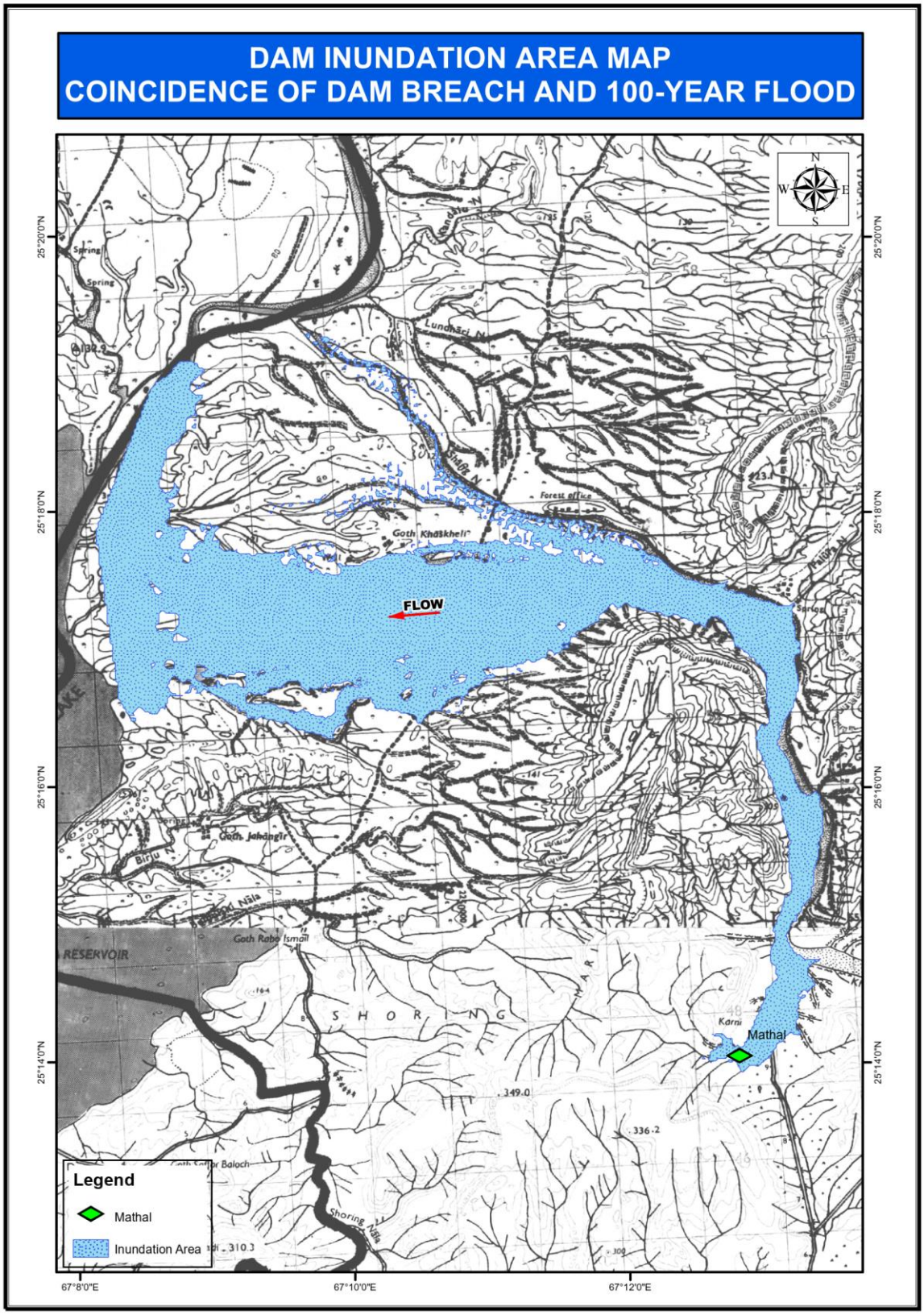

SANGAR NADI-2 DAM POPULATION AT RISK MAP
N
W
E
S
FLOW
SANGAR NADI-2
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 46
Low : 5
0 2.5 5 10 15 20
KM
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
67°30'0"E
67°32'0"E
67°34'0"E
67°36'0"E
67°38'0"E
67°40'0"E
67°42'0"E
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E

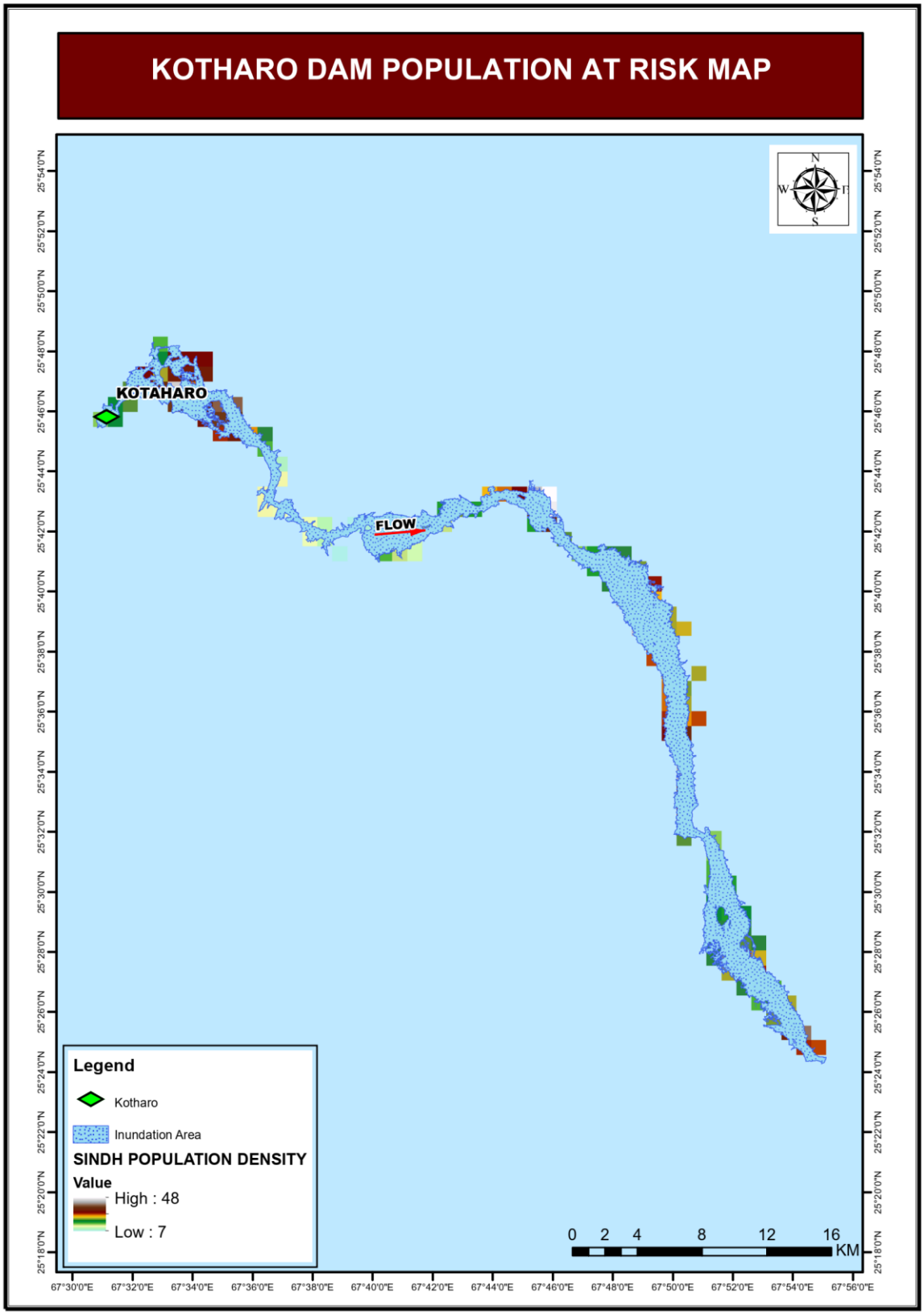

DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
HAJI FATAH
FLOW
N
W
E
S
Legend
Dam
Inundation Area
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
67°42'0"E
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E
67°56'0"E


HAJI FOTO DAM POPULATION AT RISK MAP
HAJI FOTO
FLOW
N
W
E
S
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
67°42'0"E
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E
67°56'0"E
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 48
Low : 15
0 1.25 2.5 5 7.5 10
KM


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
SHAMM
FLOW
N
S
E
W
Legend
Dam
Inundation Area
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E
67°56'0"E
67°58'0"E


SHAMM DAM POPULATION AT RISK MAP
SHAMM
FLOW
N
W
E
S
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 45
Low : 12
0 1 2 4 6 8
KM
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
67°44'0"E
67°46'0"E
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E
67°56'0"E
67°58'0"E


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
N
W
E
S
FLOW
Goth Khaskheli
Goth Jahangir
Goth Rabo Ismail
RESERVOIR
SHORING
Karni
Mathal
349.0
336.2
Legend
Mathal
Inundation Area
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°8'0"E
67°10'0"E
67°12'0"E


KOTHARO DAM POPULATION AT RISK MAP
KOTAHARO
FLOW
N
W
E
S
Legend
Kotharo
Inundation Area
SINDH POPULATION DENSITY
Value
High : 48
Low : 7
0 2 4 8 12 16
KM
25°54'0"N
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
67°30'0"E
67°32'0"E
67°34'0"E
67°36'0"E
67°38'0"E
67°40'0"E
67°42'0"E
67°44'0"E
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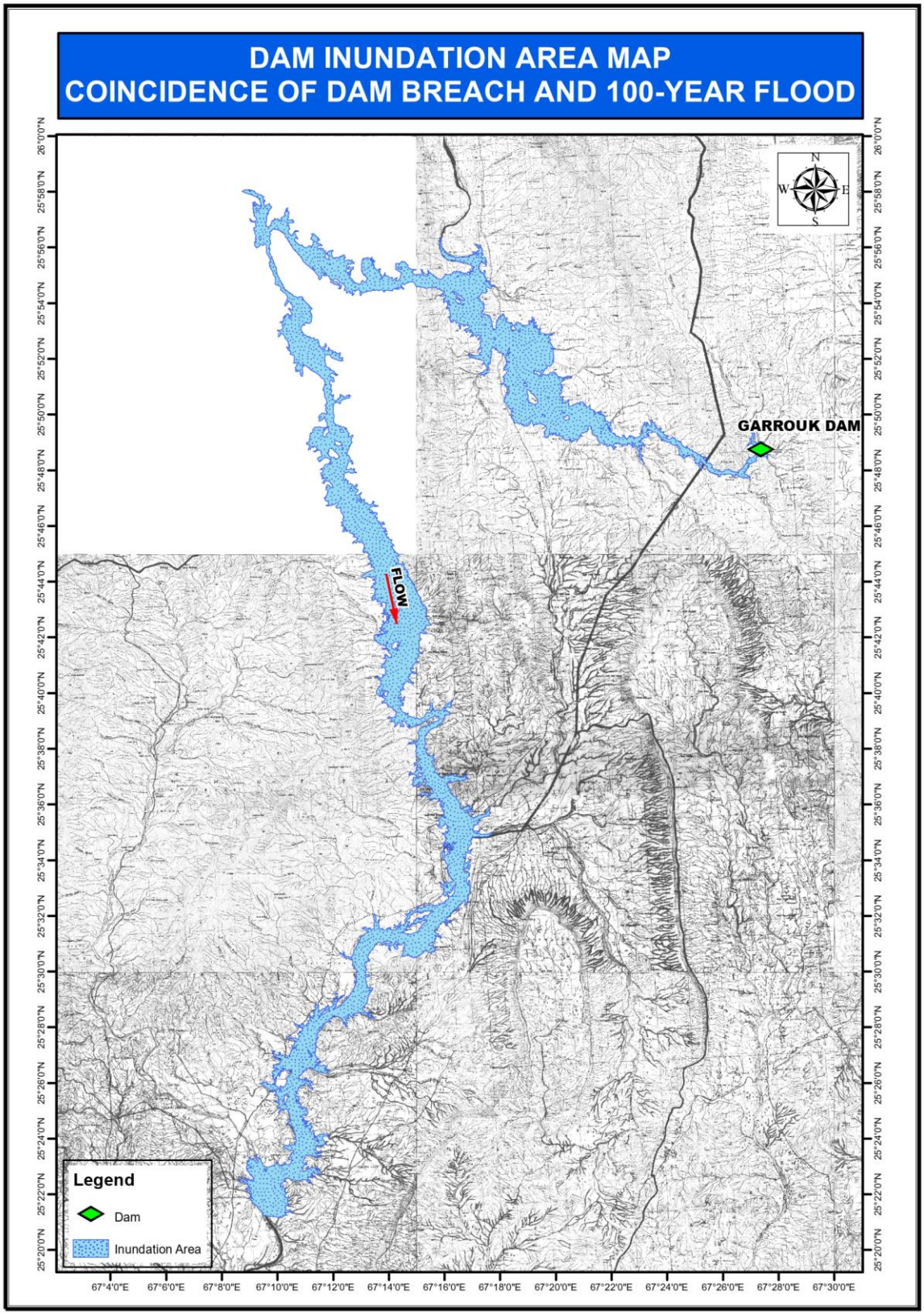
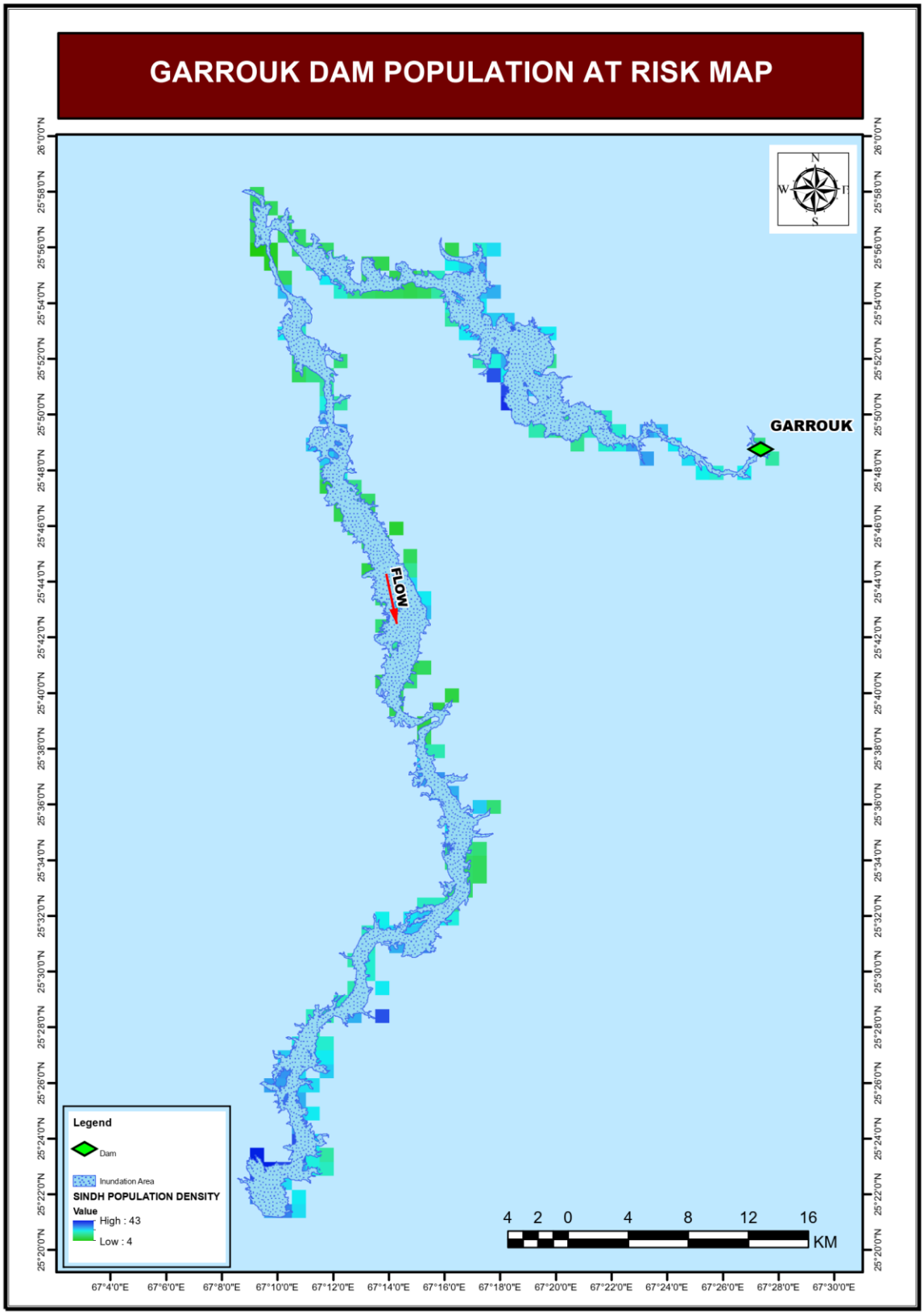
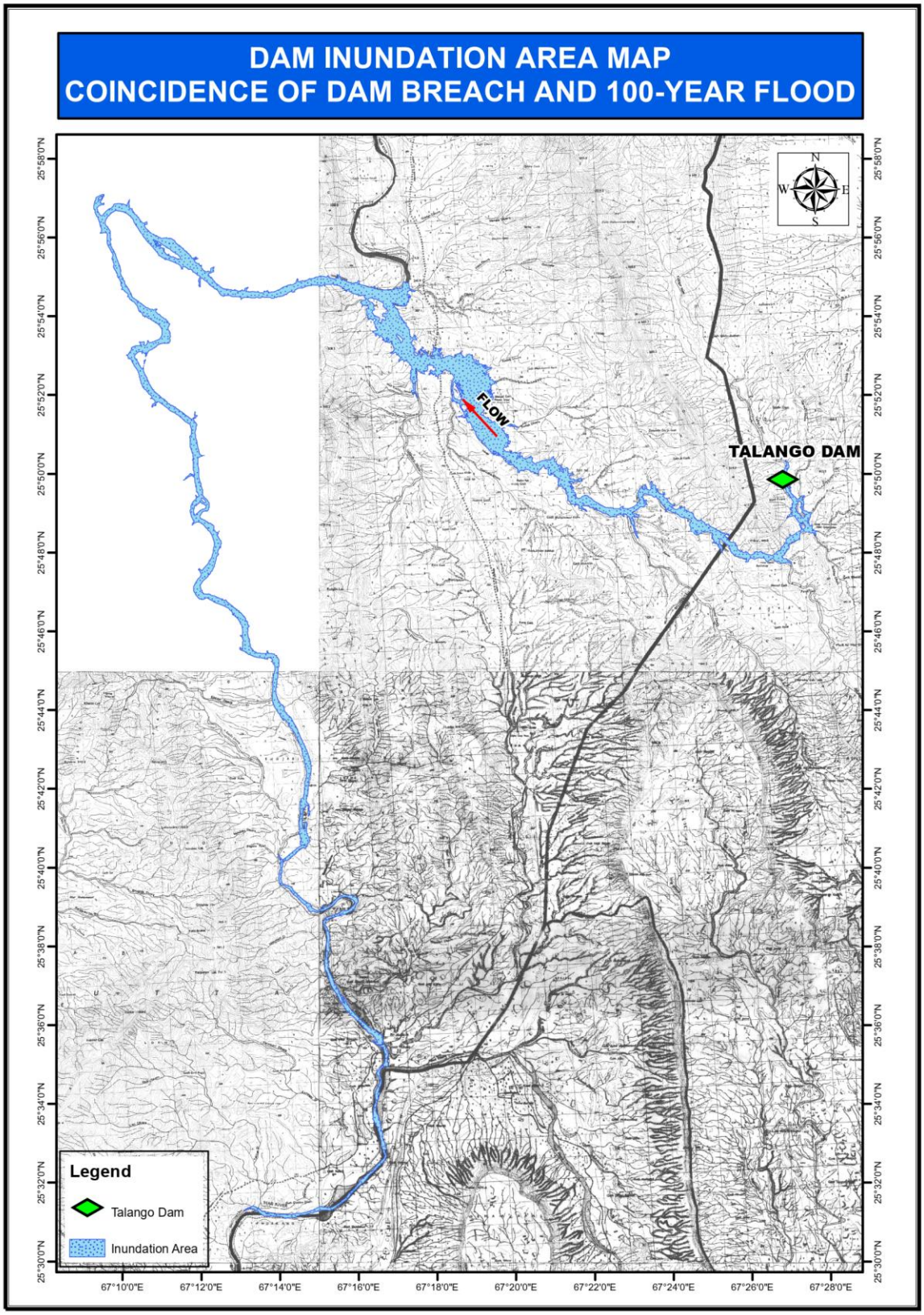
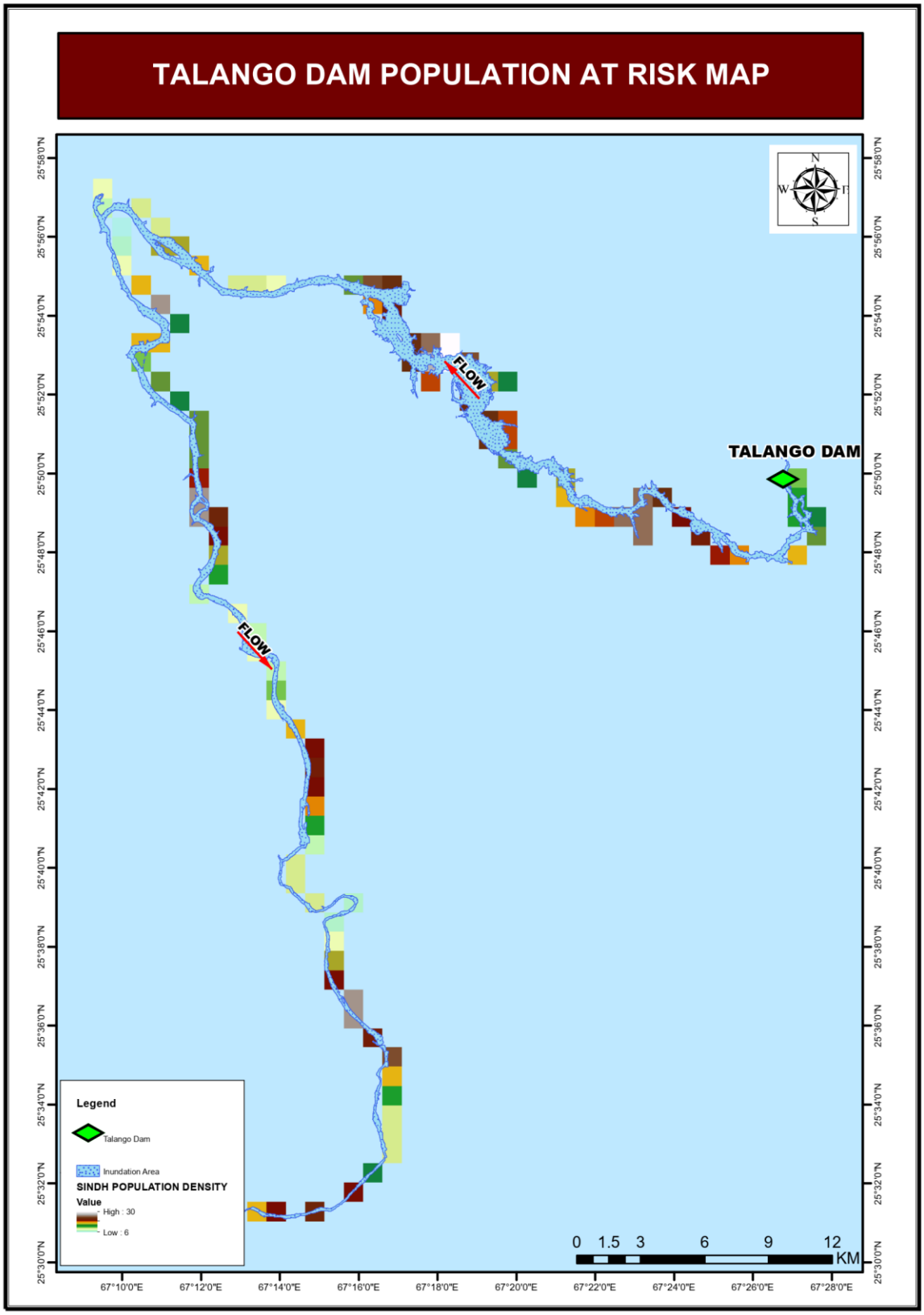
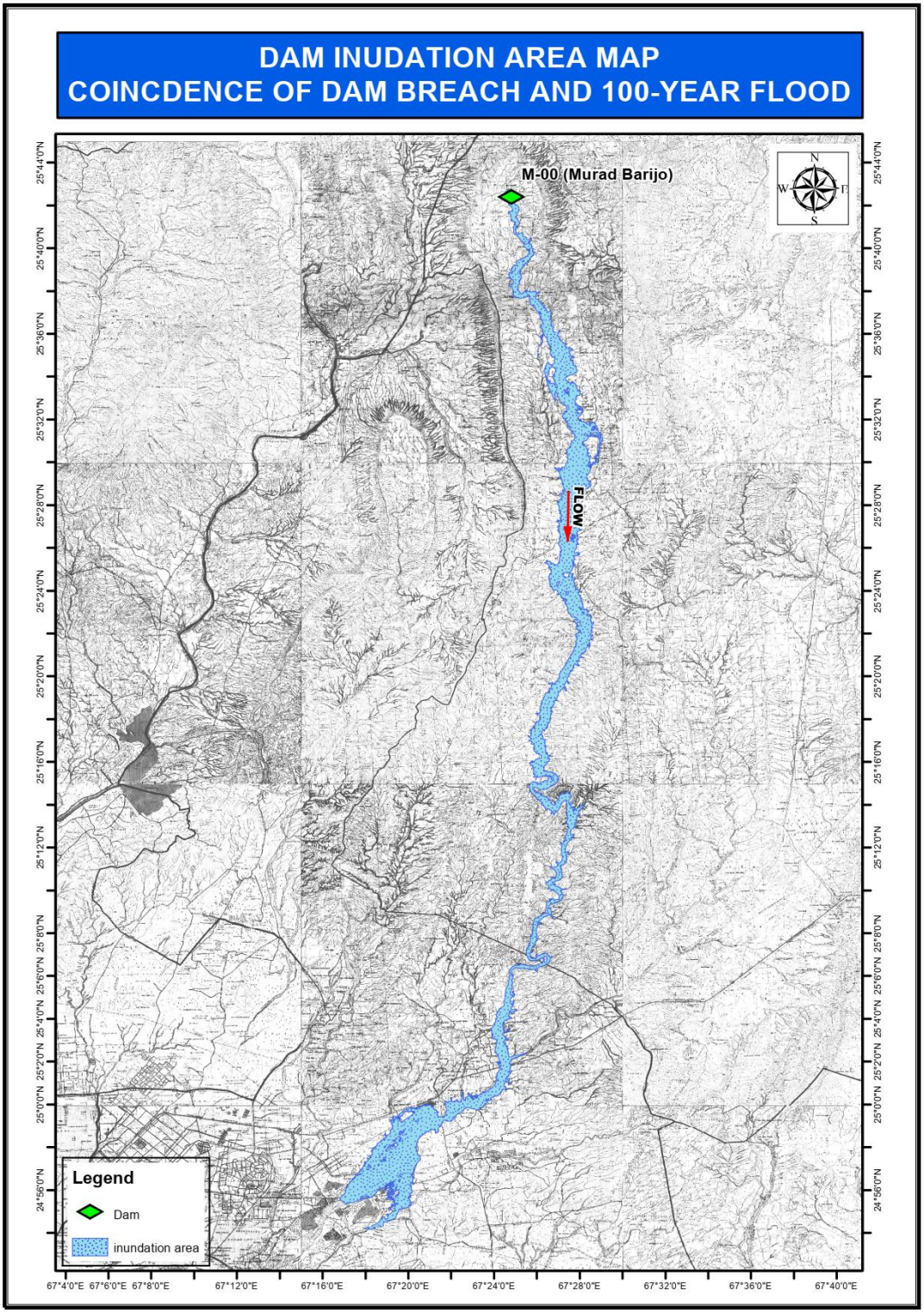
67°48'0"E
67°50'0"E
67°52'0"E
67°54'0"E
67°56'0"E

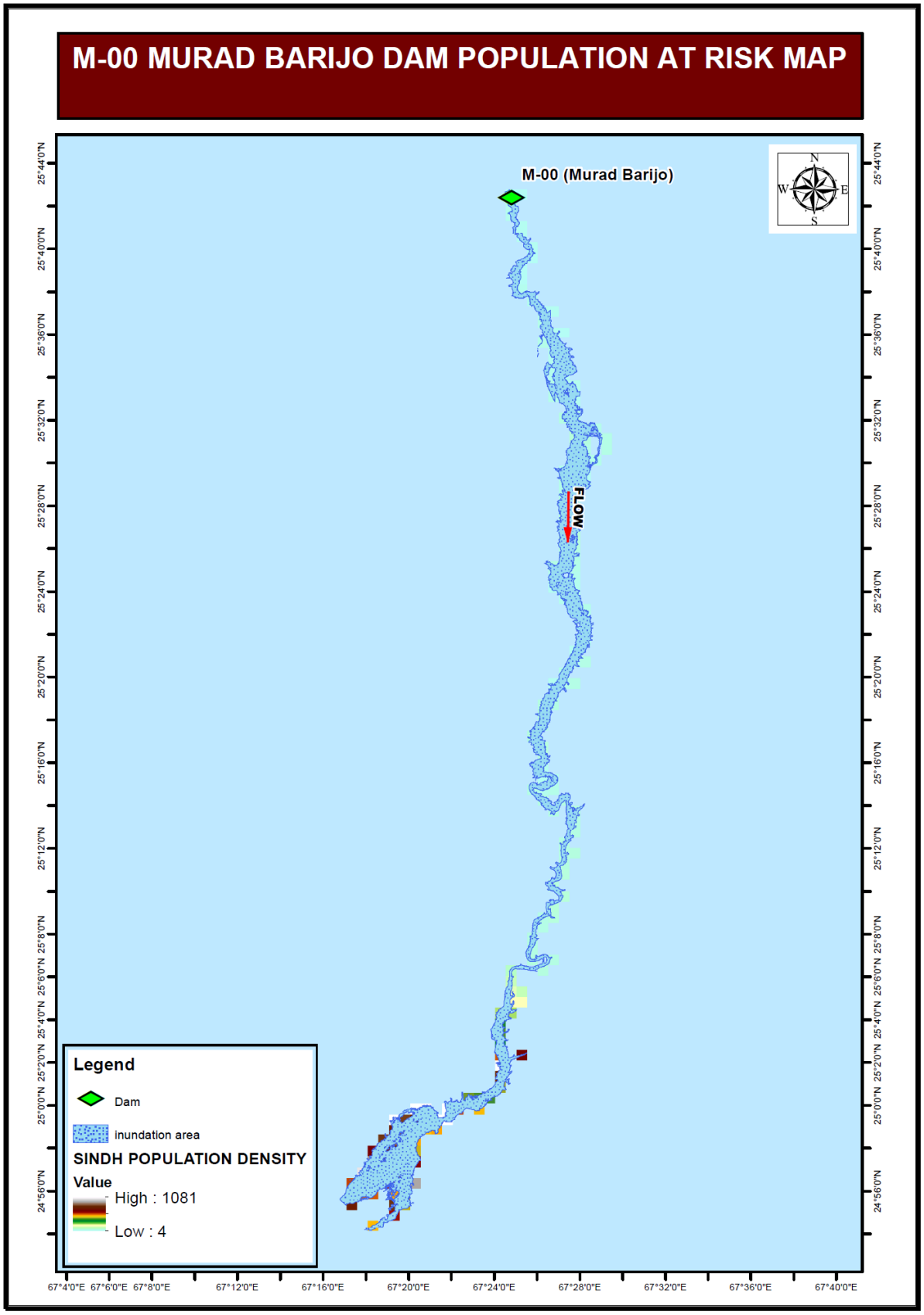

DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
GARROUK DAM
FLOW
N
S
E
W
Legend
Dam
Inundation Area
26°0'0"N
25°58'0"N
25°56'0"N
25°54'0"N
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
67°4'0"E
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E
67°26'0"E
67°28'0"E
67°30'0"E

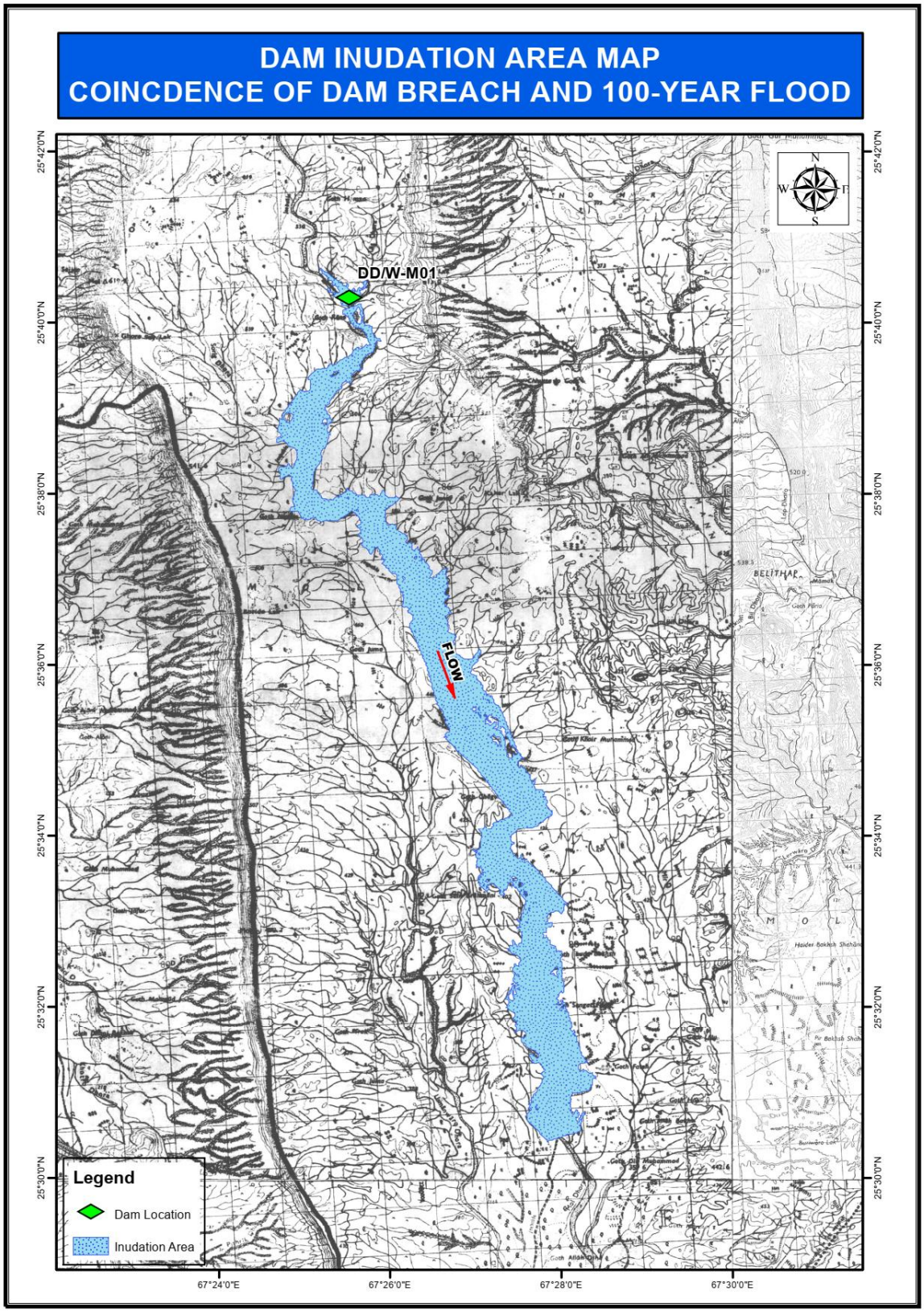

GARROUK DAM POPULATION AT RISK MAP
GARROUK
FLOW
N
W
E
S
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 43
Low : 4
4 2 0 4 8 12 16
KM
26°0'0"N
25°58'0"N
25°56'0"N
25°54'0"N
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
67°4'0"E
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E
67°26'0"E
67°28'0"E
67°30'0"E

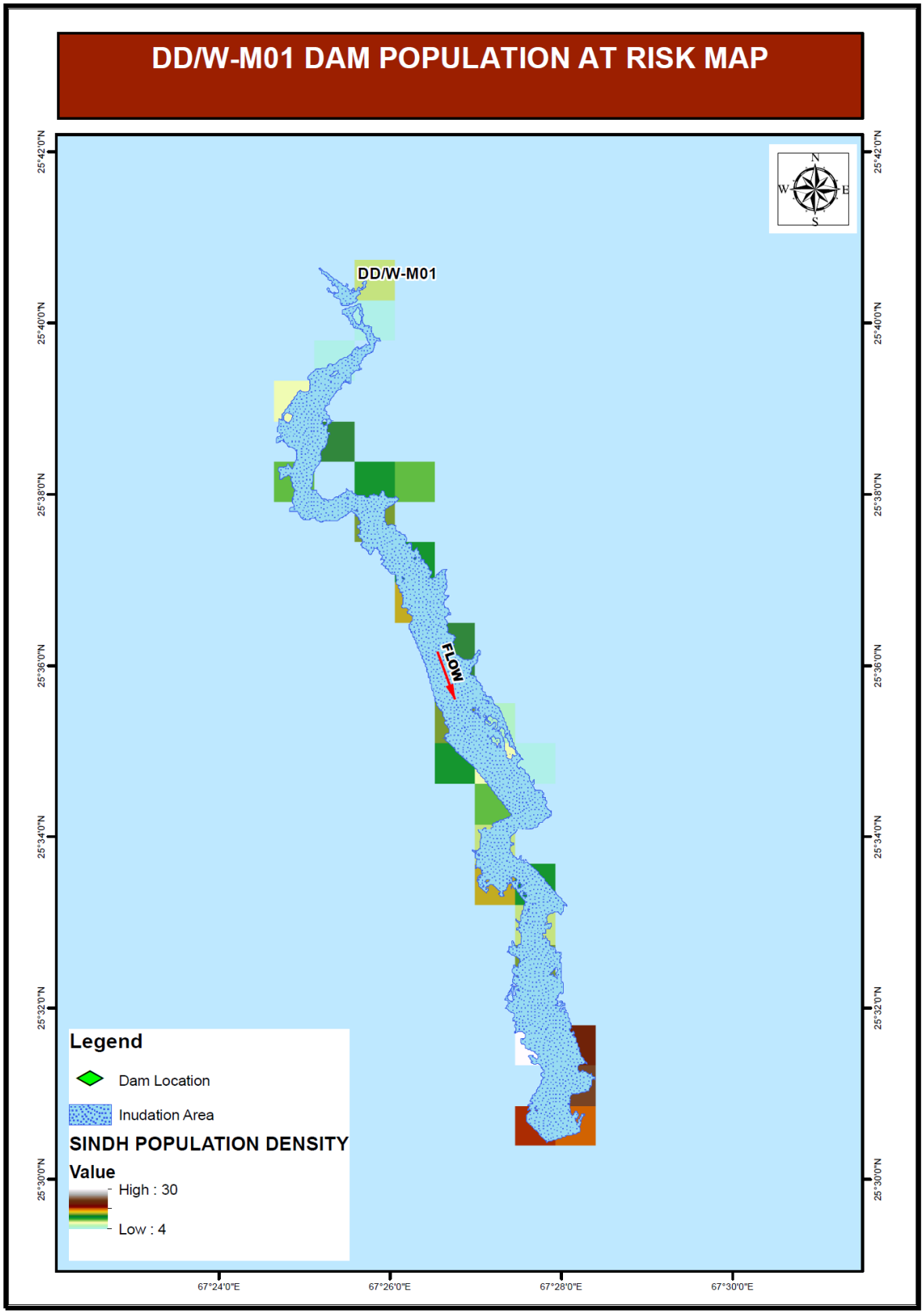

DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
FLOW
TALANGO DAM
N
W
E
S
Legend
Talango Dam
Inundation Area
25°58'0"N
25°56'0"N
25°54'0"N
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E
67°26'0"E
67°28'0"E


TALANGO DAM POPULATION AT RISK MAP
TALANGO DAM
FLOW
FLOW
N
W
E
S
Legend
Talango Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 30
Low : 6
0 1.5 3 6 9 12
KM
25°58'0"N
25°56'0"N
25°54'0"N
25°52'0"N
25°50'0"N
25°48'0"N
25°46'0"N
25°44'0"N
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E
67°26'0"E
67°28'0"E

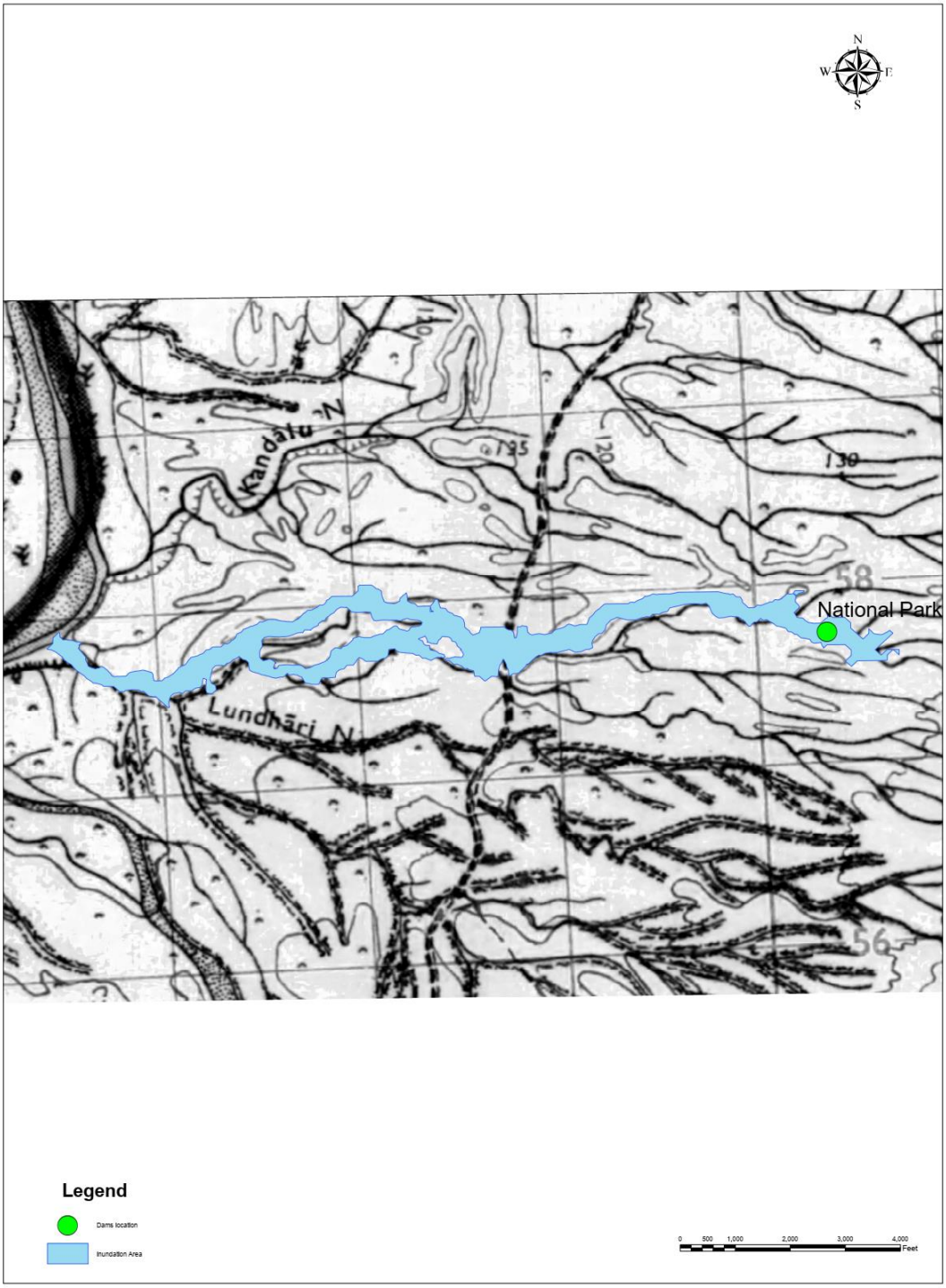

DAM INUDATION AREA MAP
COINCDENCE OF DAM BREACH AND 100-YEAR FLOOD
M-00 (Murad Barijo)
FLOW
N
W
E
S
Legend
Dam
inundation area
25°44'0"N
25°40'0"N
25°36'0"N
25°32'0"N
25°28'0"N
25°24'0"N
25°20'0"N
25°16'0"N
25°12'0"N
25°8'0"N
25°4'0"N
25°0'0"N
24°56'0"N
67°4'0"E
67°6'0"E
67°8'0"E
67°12'0"E
67°16'0"E
67°20'0"E
67°24'0"E
67°28'0"E
67°32'0"E
67°36'0"E
67°40'0"E

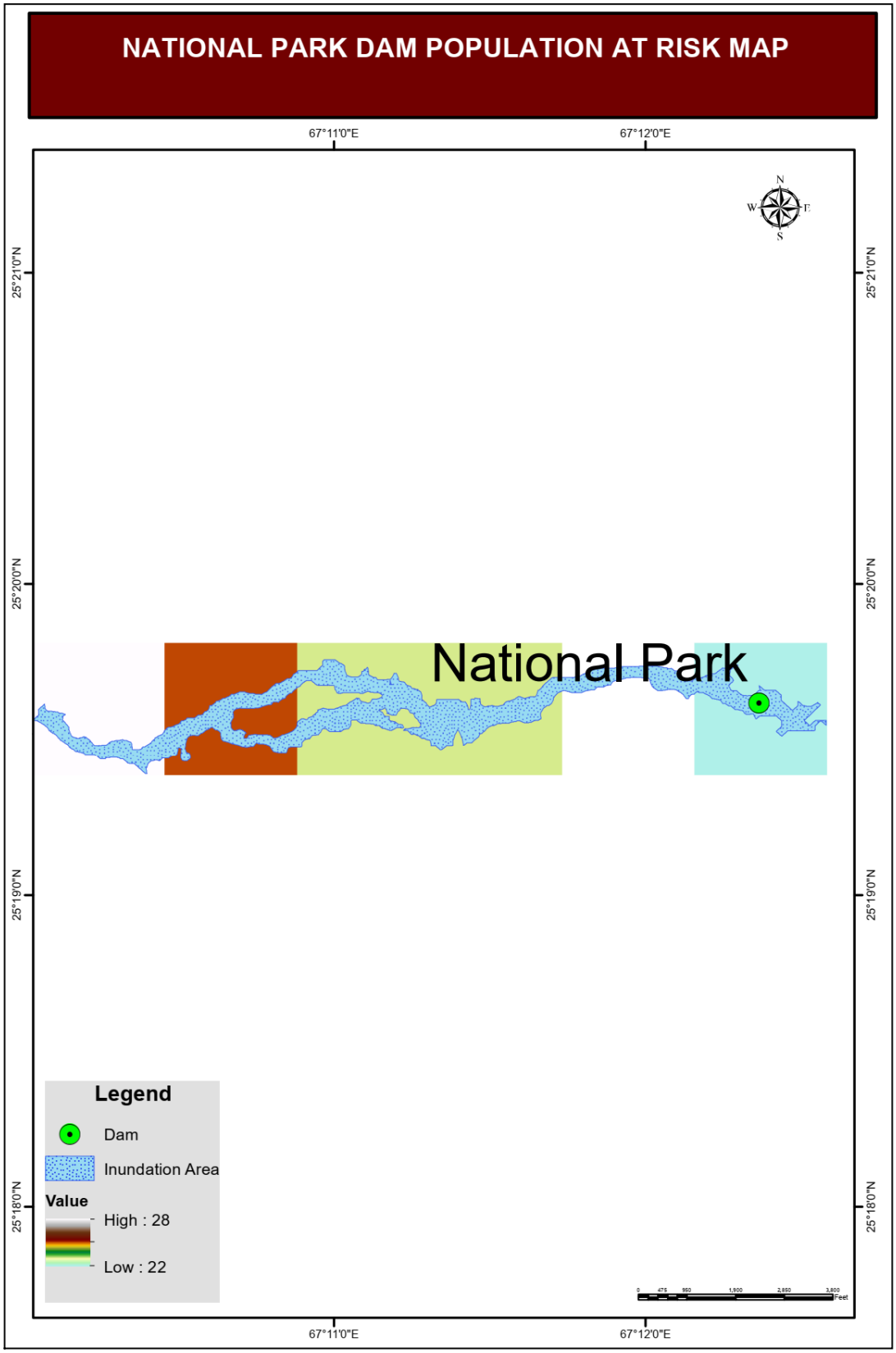

M-00 MURAD BARIJO DAM POPULATION AT RISK MAP
M-00 (Murad Barijo)
FLOW
N
S
E
W
Legend
Dam
inundation area
SINDH POPULATION DENSITY
Value
High : 1081
Low : 4
25°44'0"N
25°40'0"N
25°36'0"N
25°32'0"N
25°28'0"N
25°24'0"N
25°20'0"N
25°16'0"N
25°12'0"N
25°8'0"N
25°4'0"N
25°0'0"N
24°56'0"N
67°4'0"E
67°6'0"E
67°8'0"E
67°12'0"E
67°16'0"E
67°20'0"E
67°24'0"E
67°28'0"E
67°32'0"E
67°36'0"E
67°40'0"E

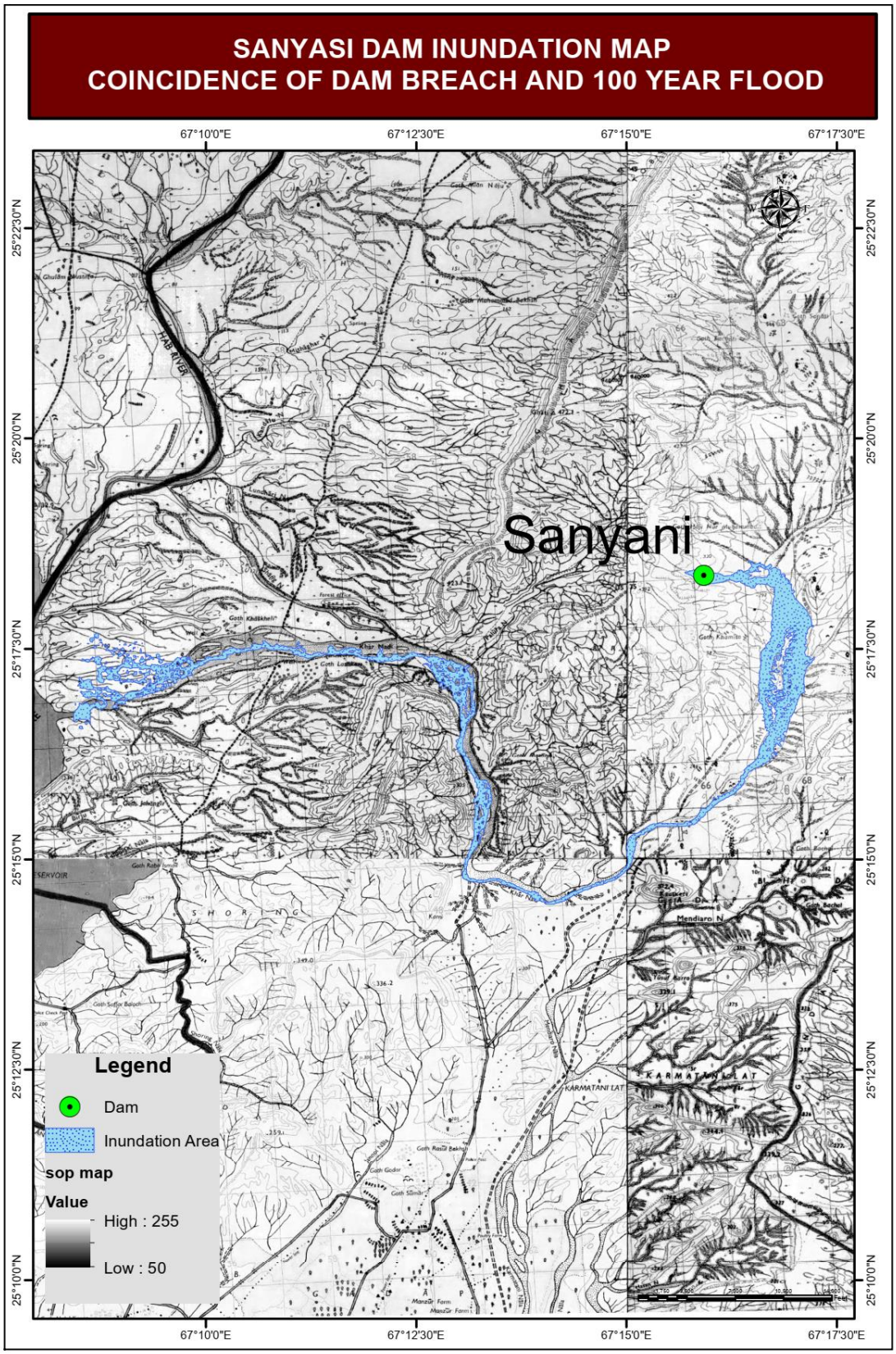

DAM INUDATION AREA MAP
COINCDENCE OF DAM BREACH AND 100-YEAR FLOOD
DD/W-M01
FLOW
BELITHAR
Legend
Dam Location
Inudation Area
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
67°24'0"E
67°26'0"E
67°28'0"E
67°30'0"E

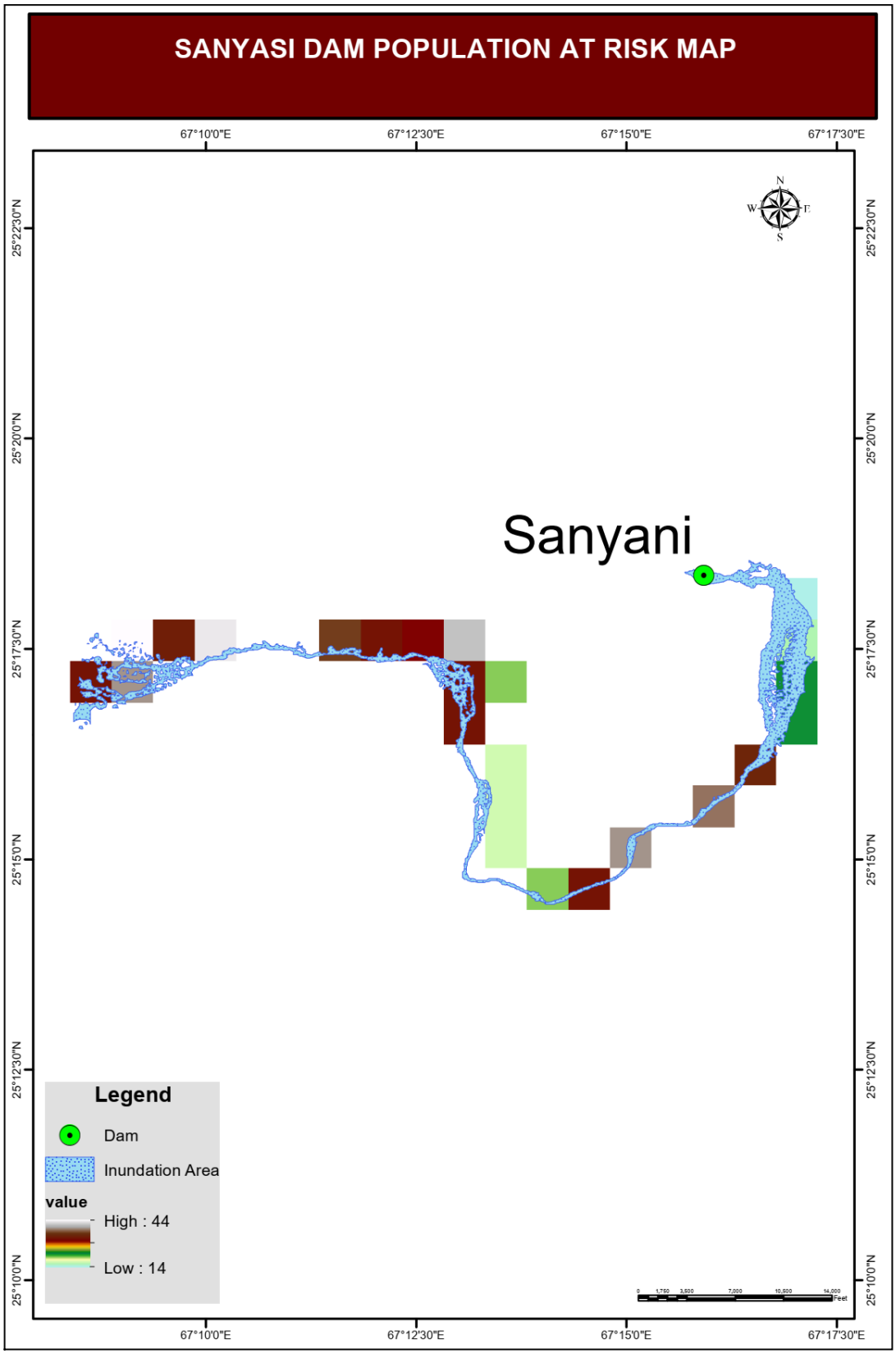

DD/W-M01 DAM POPULATION AT RISK MAP
DD/W-M01
FLOW
N
S
E
W
25°42'0"N
25°40'0"N
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
67°24'0"E
67°26'0"E
67°28'0"E
67°30'0"E
Legend
Dam Location
Inudation Area
SINDH POPULATION DENSITY
Value
High : 30
Low : 4

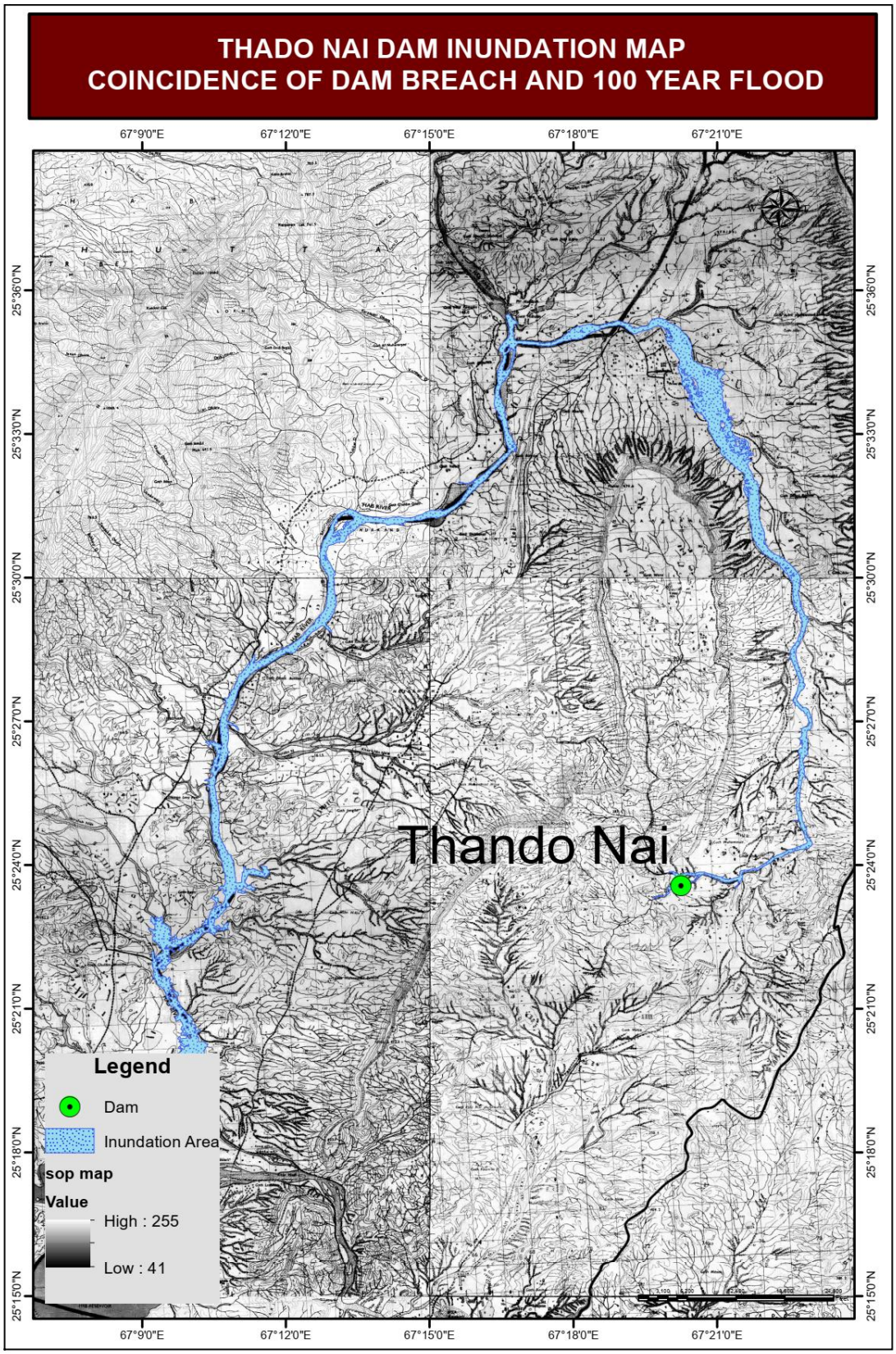
NATIONAL PARK DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD

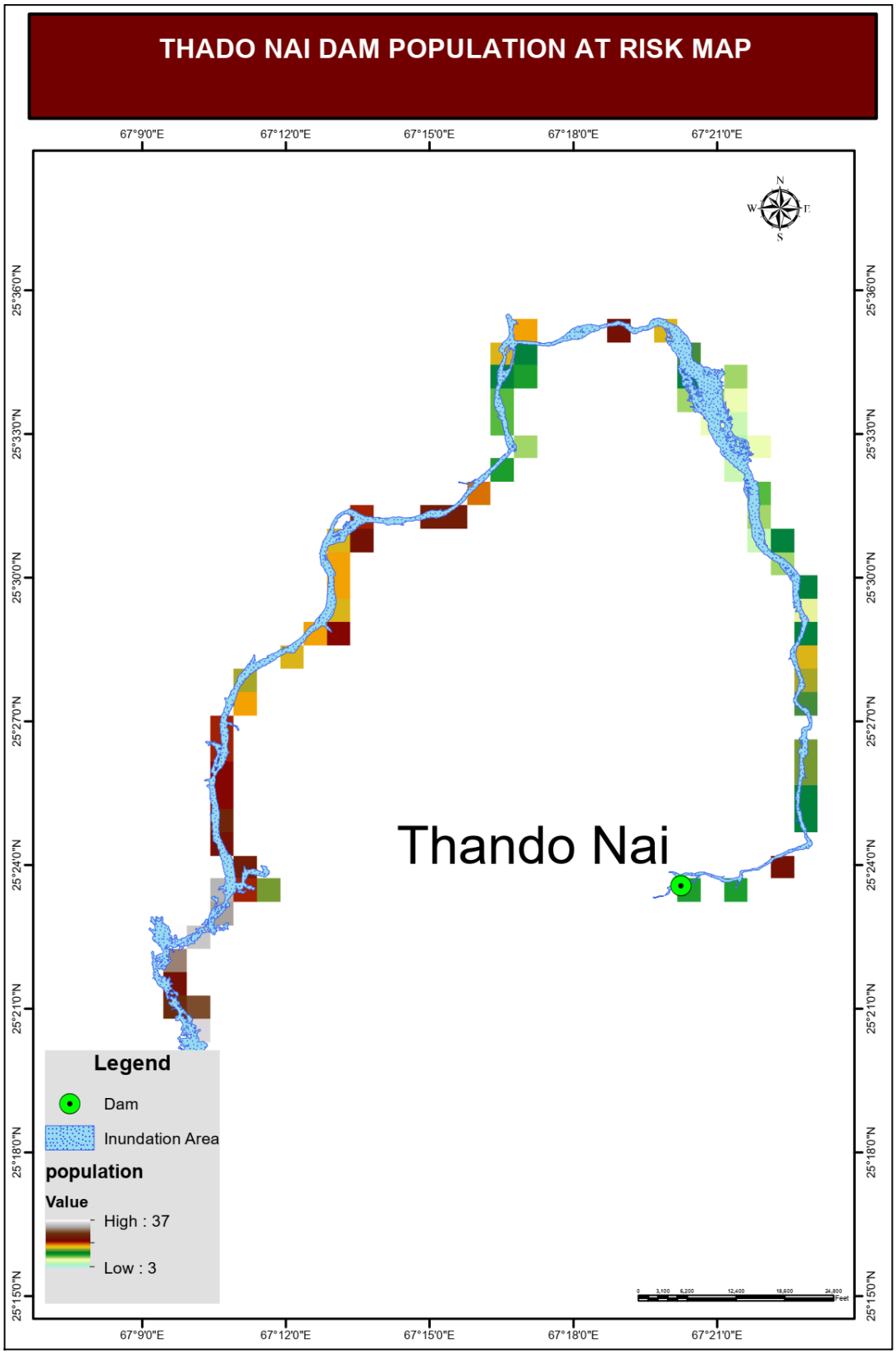


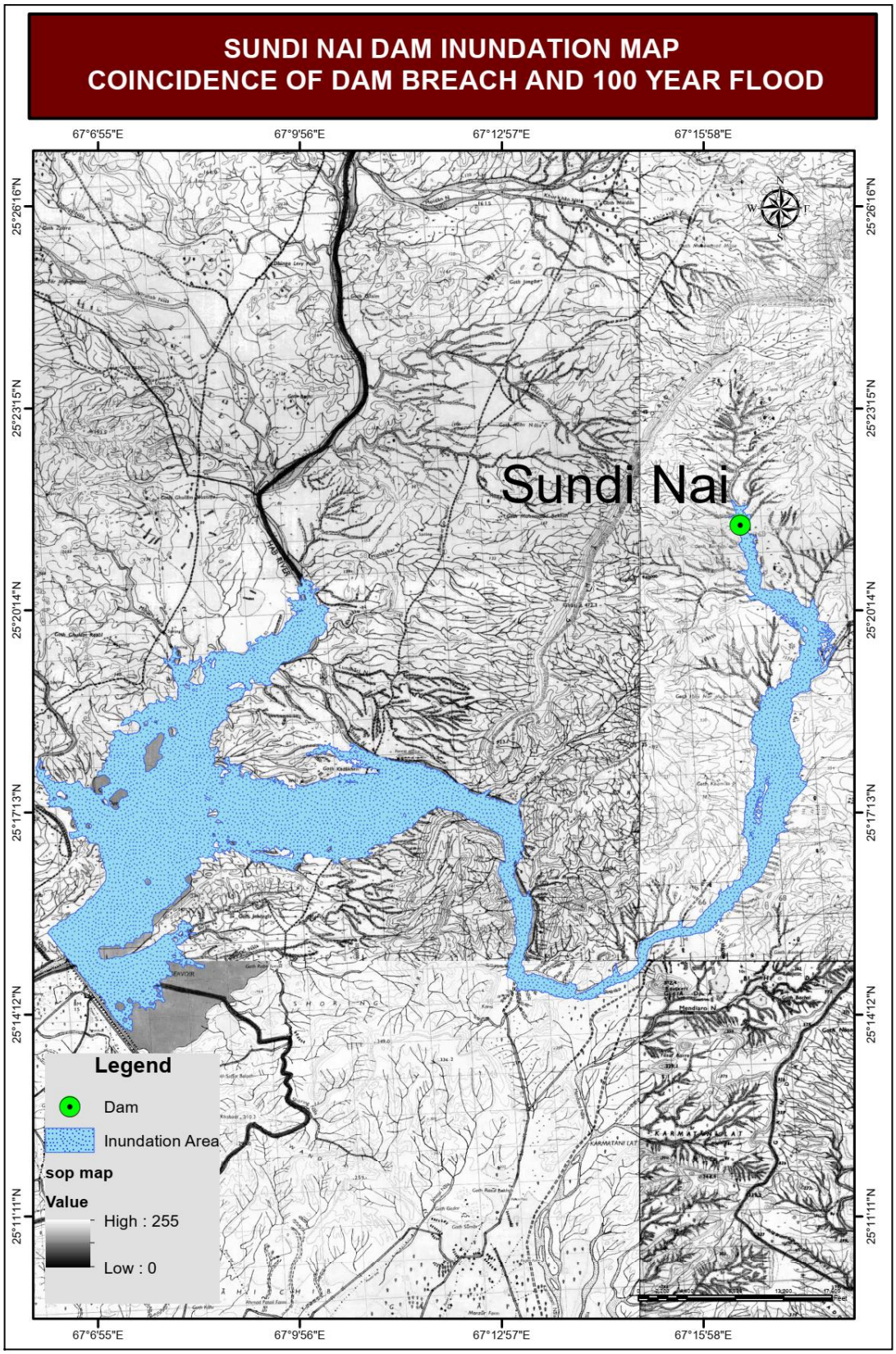

NATIONAL PARK DAM POPULATION AT RISK MAP
67°11'0"E
67°12'0"E
25°21'0"N
25°20'0"N
25°19'0"N
25°18'0"N
N
W
E
S
National Park
Legend
Dam
Inundation Area
Value
High : 28
Low : 22
Feet

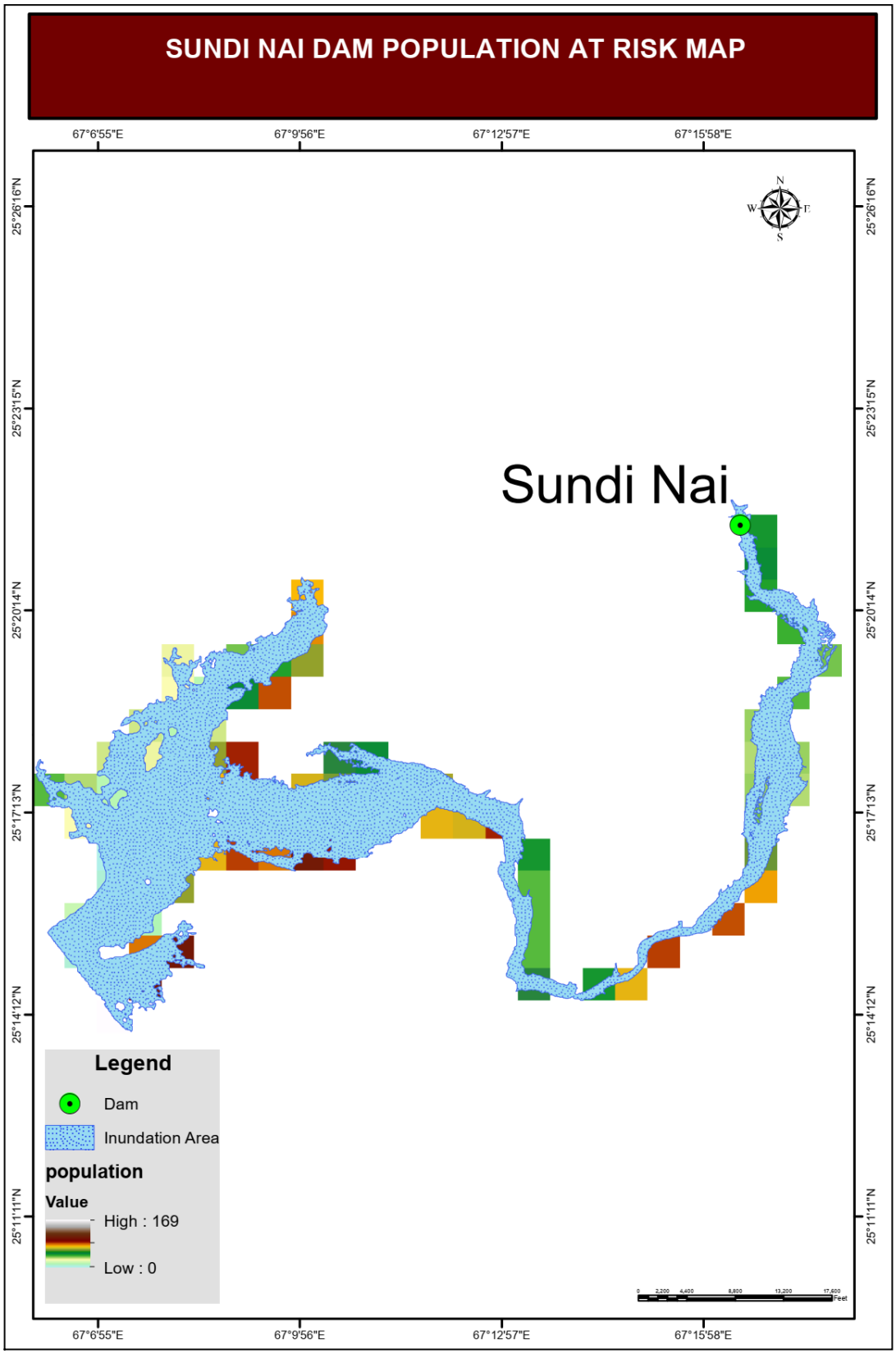

SANYASI DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°10'0"E
67°12'30"E
67°15'0"E
67°17'30"E
25°22'30"N
25°20'0"N
25°17'30"N
25°15'0"N
25°12'30"N
25°10'0"N
Sanyani
HAB RIVER
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 50


SANYASI DAM POPULATION AT RISK MAP
67°10'0"E
67°12'30"E
67°15'0"E
67°17'30"E
25°22'30"N
25°20'0"N
25°17'30"N
25°15'0"N
25°12'30"N
25°10'0"N
N
W
E
S
Sanyani
Legend
Dam
Inundation Area
value
High : 44
Low : 14
Feet

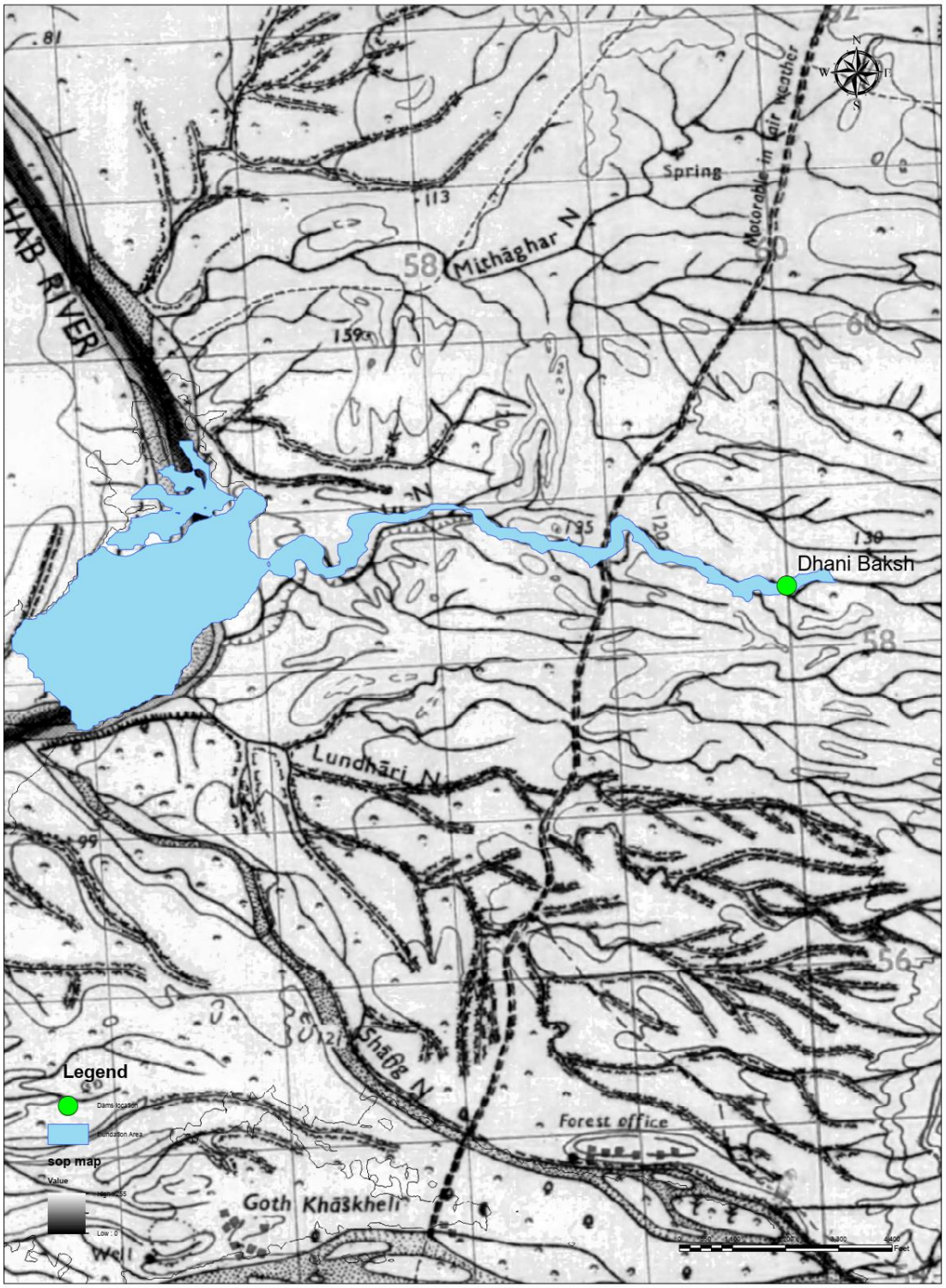

THADO NAI DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°36'0"N
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
Thando Nai
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 41


THADO NAI DAM POPULATION AT RISK MAP
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°36'0"N
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
N
W
E
S
Thando Nai
Legend
Dam
Inundation Area
population
Value
High : 37
Low : 3
Feet


SUNDI NAI DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°6'55"E
67°9'56"E
67°12'57"E
67°15'58"E
25°26'16"N
25°23'15"N
25°20'14"N
25°17'13"N
25°14'12"N
25°11'11"N
Sundi Nai
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 0


SUNDI NAI DAM POPULATION AT RISK MAP
67°6'55"E
67°9'56"E
67°12'57"E
67°15'58"E
25°26'16"N
25°23'15"N
25°20'14"N
25°17'13"N
25°14'12"N
25°11'11"N
N
W
E
S
Sundi Nai
Legend
Dam
Inundation Area
population
Value
High : 169
Low : 0
Feet

DHANI BAKHSH BIKAK DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD



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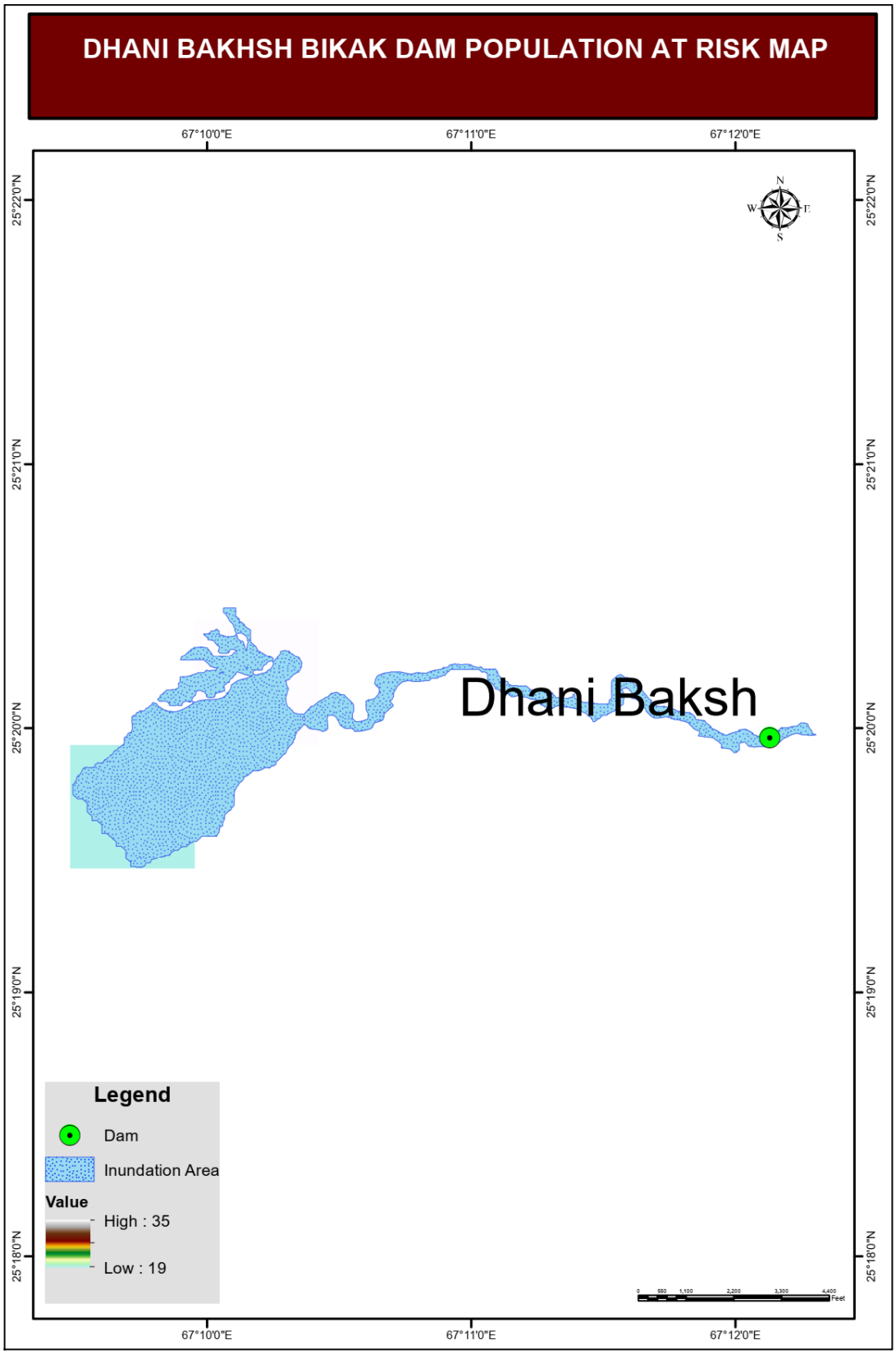
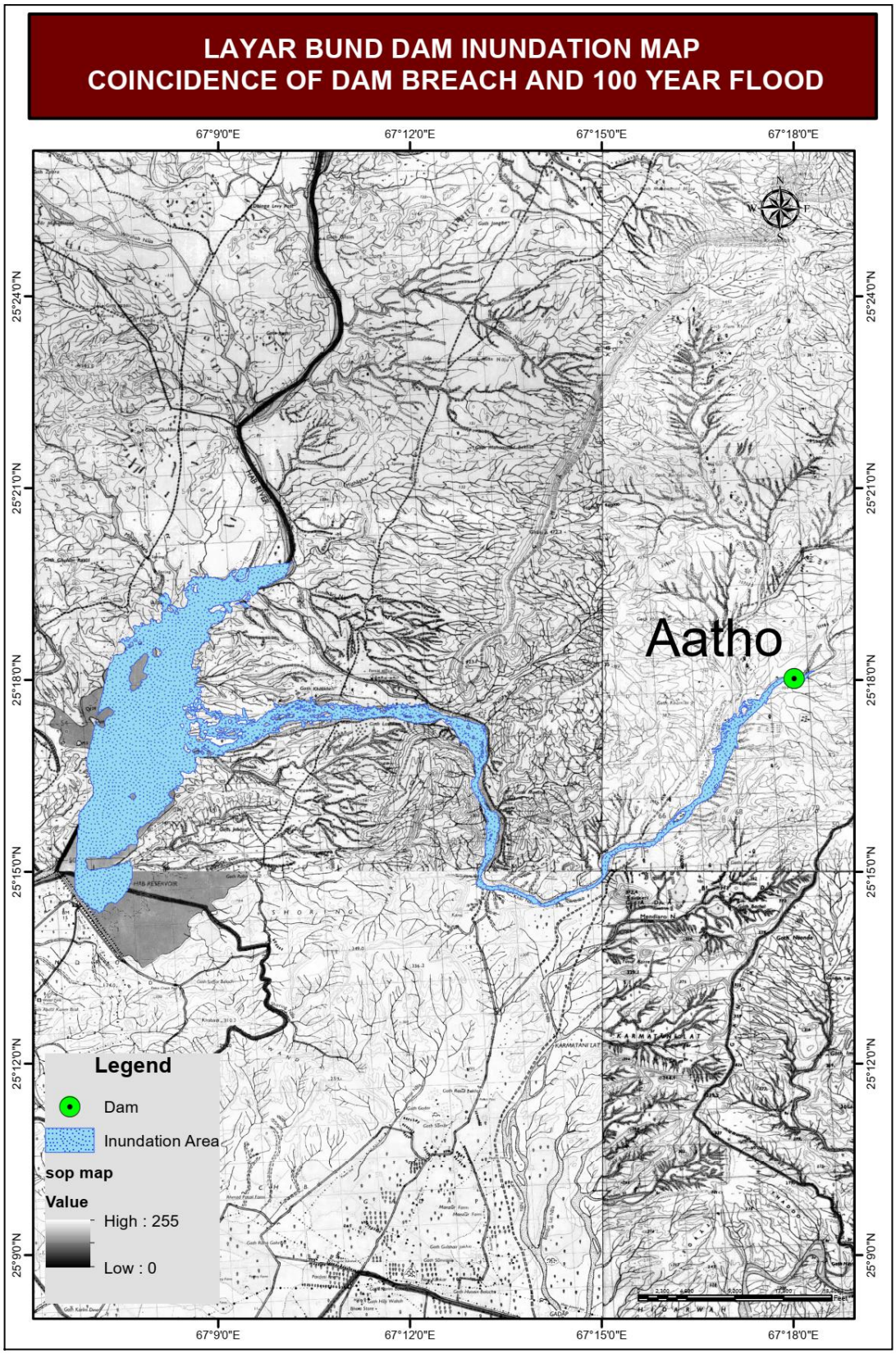
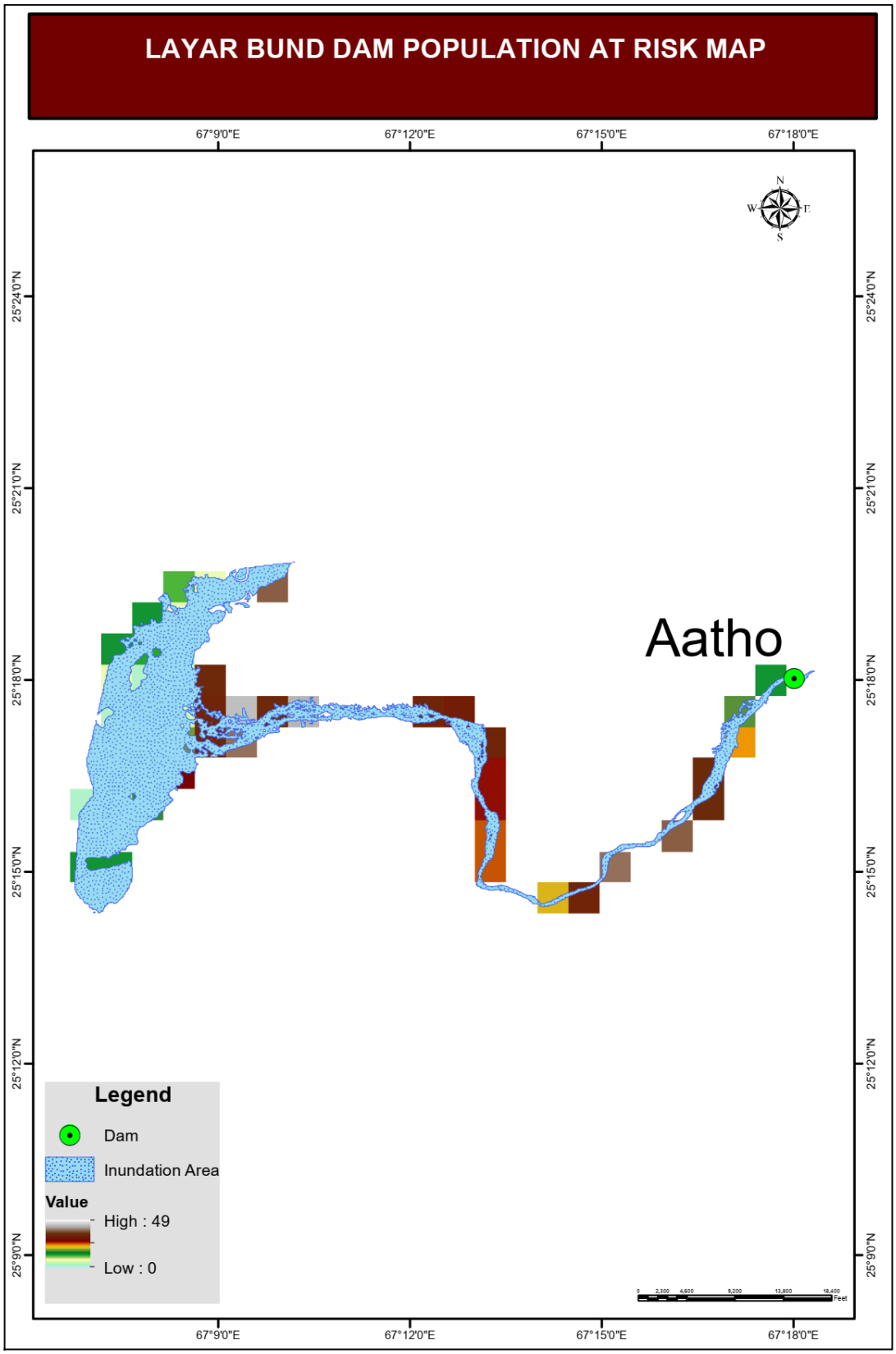
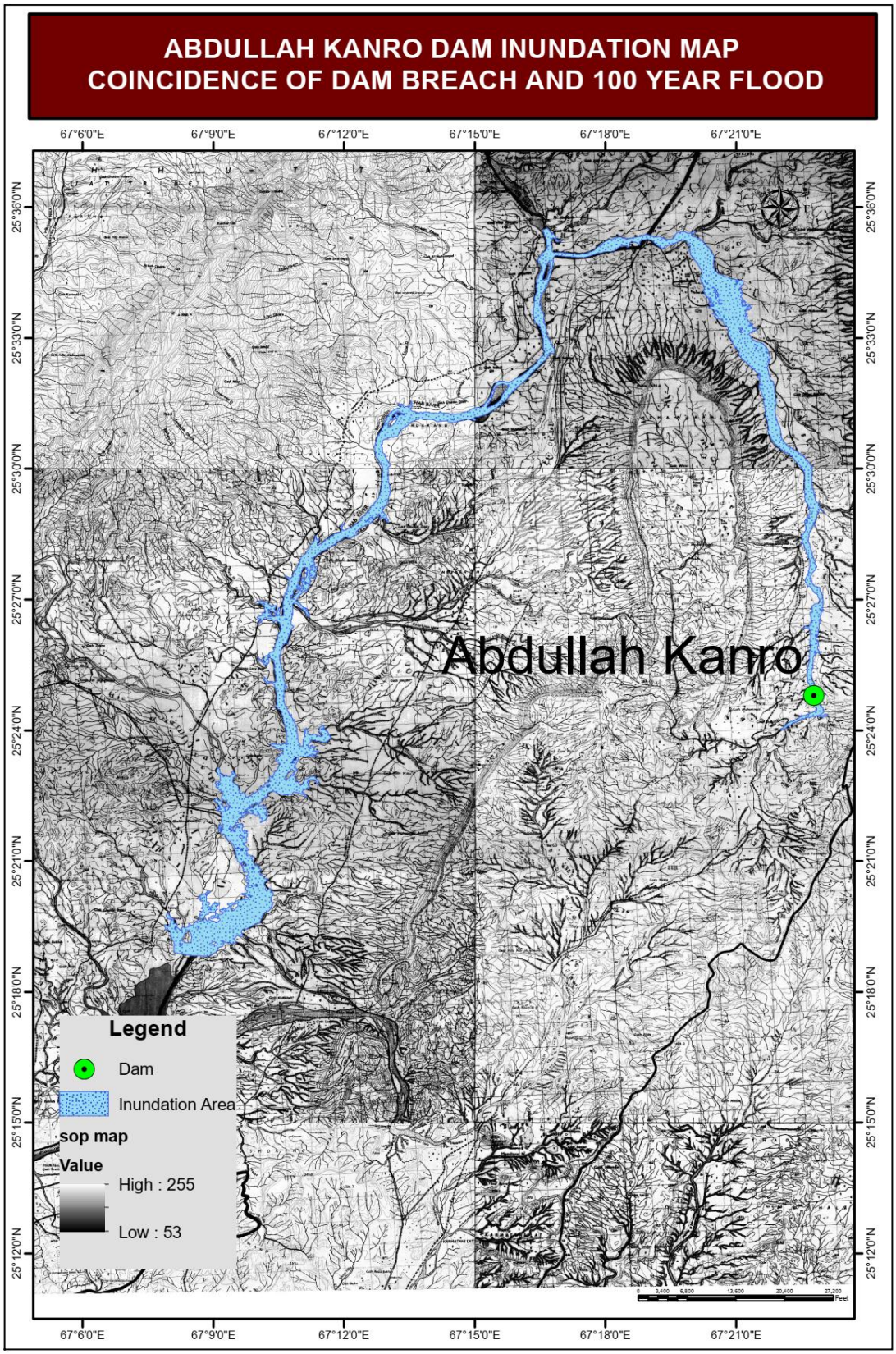
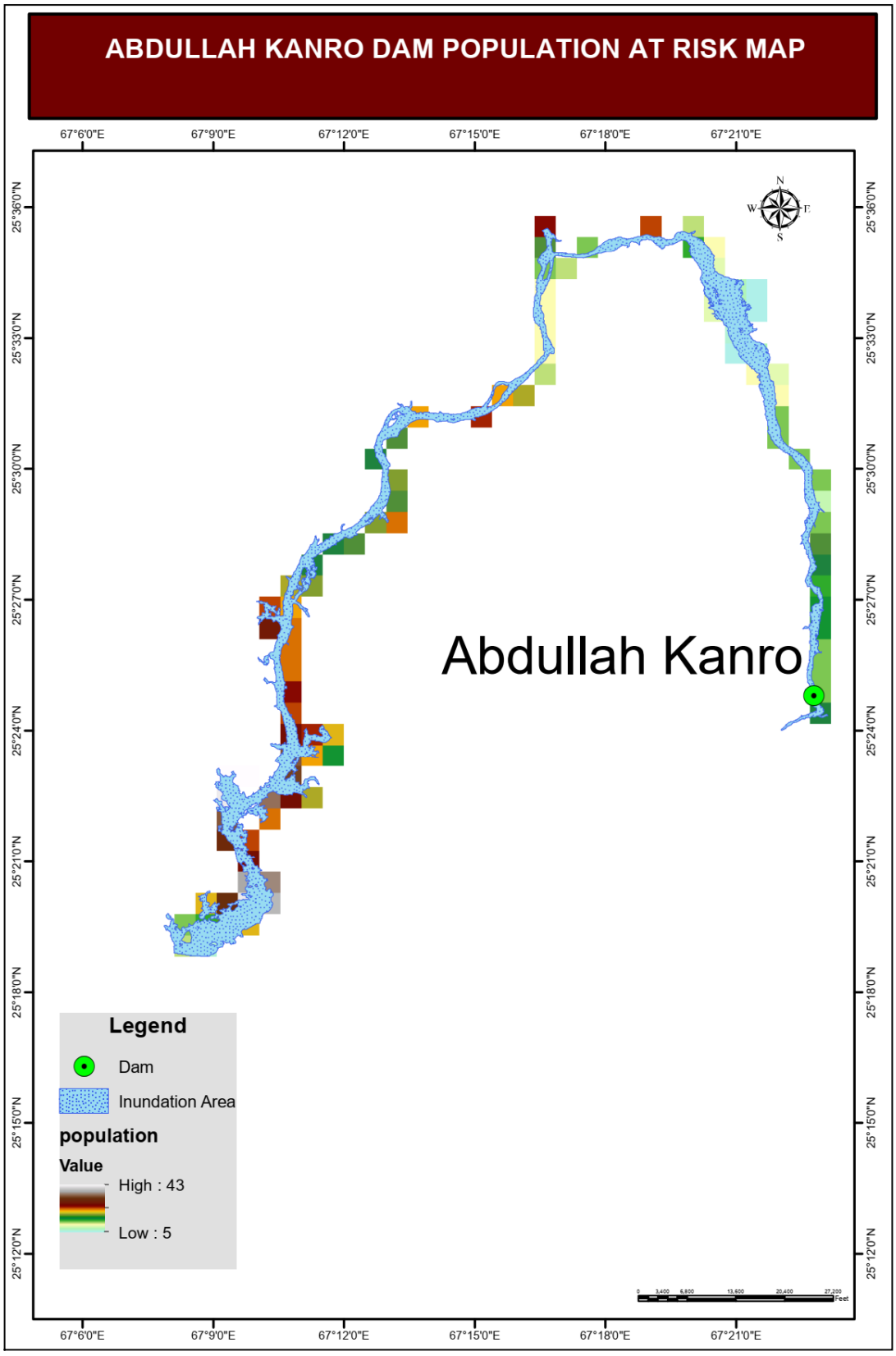
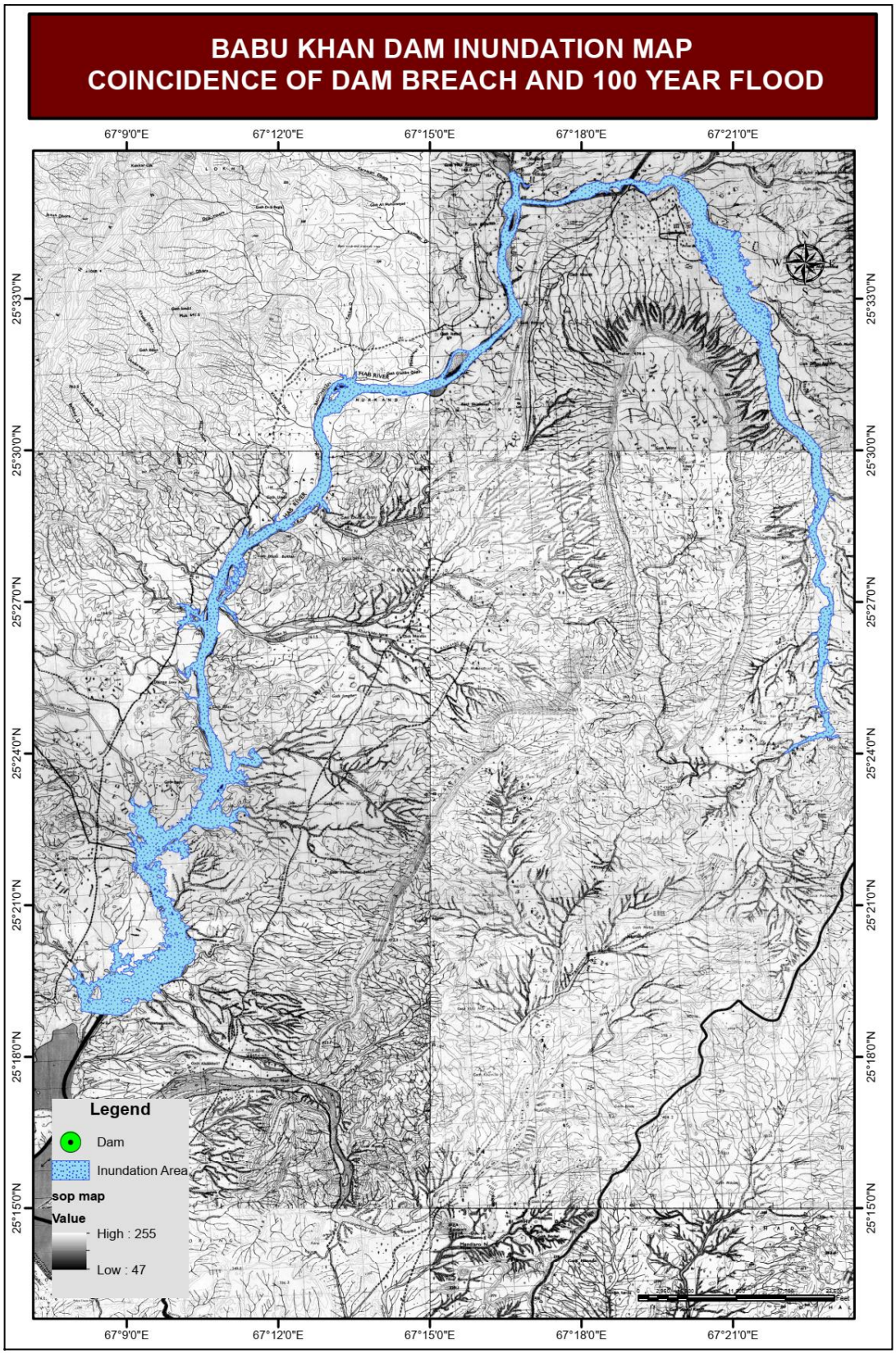

DHANI BAKHSH BIKAK DAM POPULATION AT RISK MAP
67°10'0"E
67°11'0"E
67°12'0"E
25°22'0"N
25°21'0"N
25°20'0"N
25°19'0"N
25°18'0"N
N
W
E
S
Dhani Baksh
Legend
Dam
Inundation Area
Value
High : 35
Low : 19
Feet

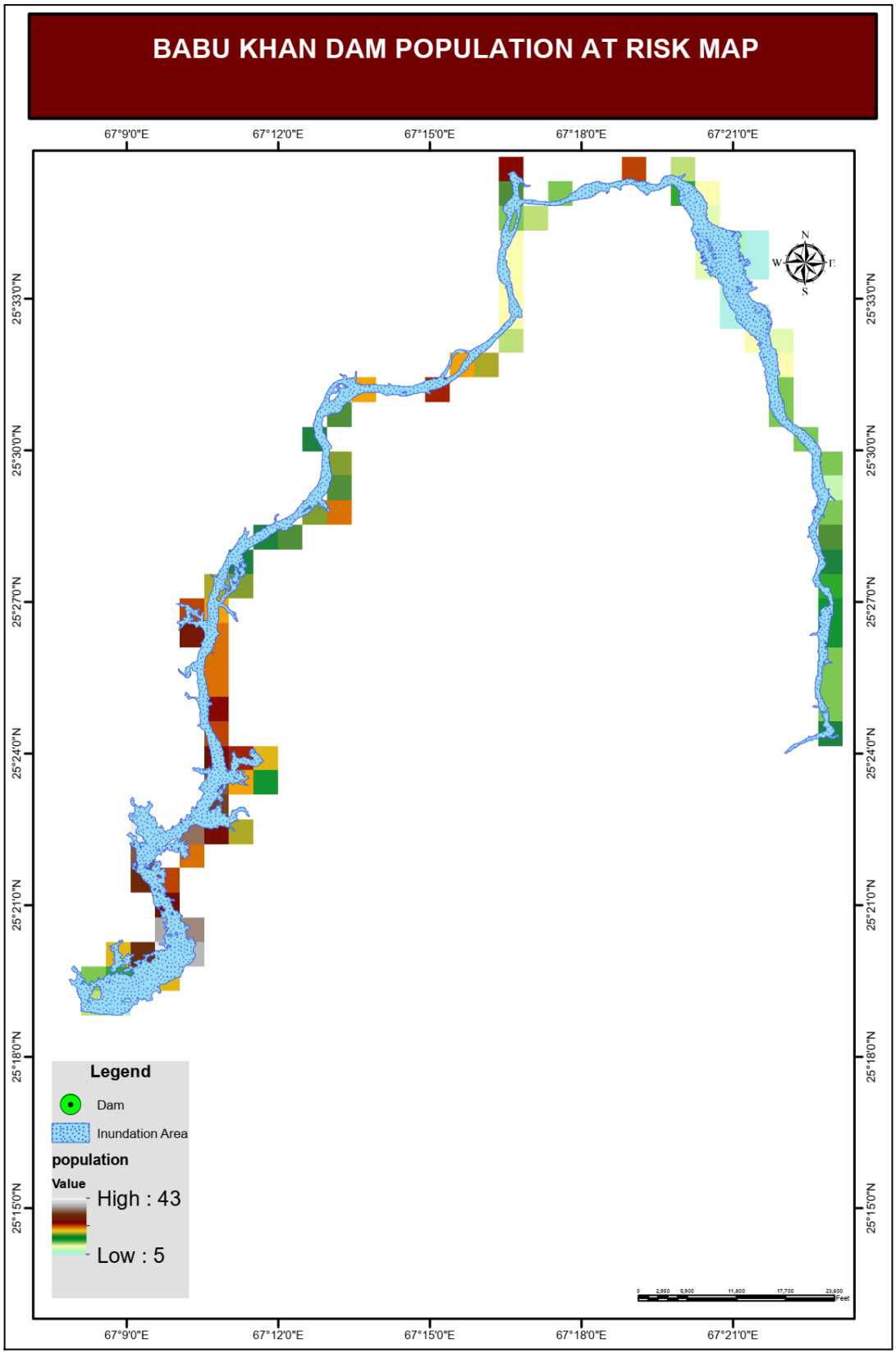

LAYAR BUND DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
25°12'0"N
25°9'0"N
Aatho
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 0

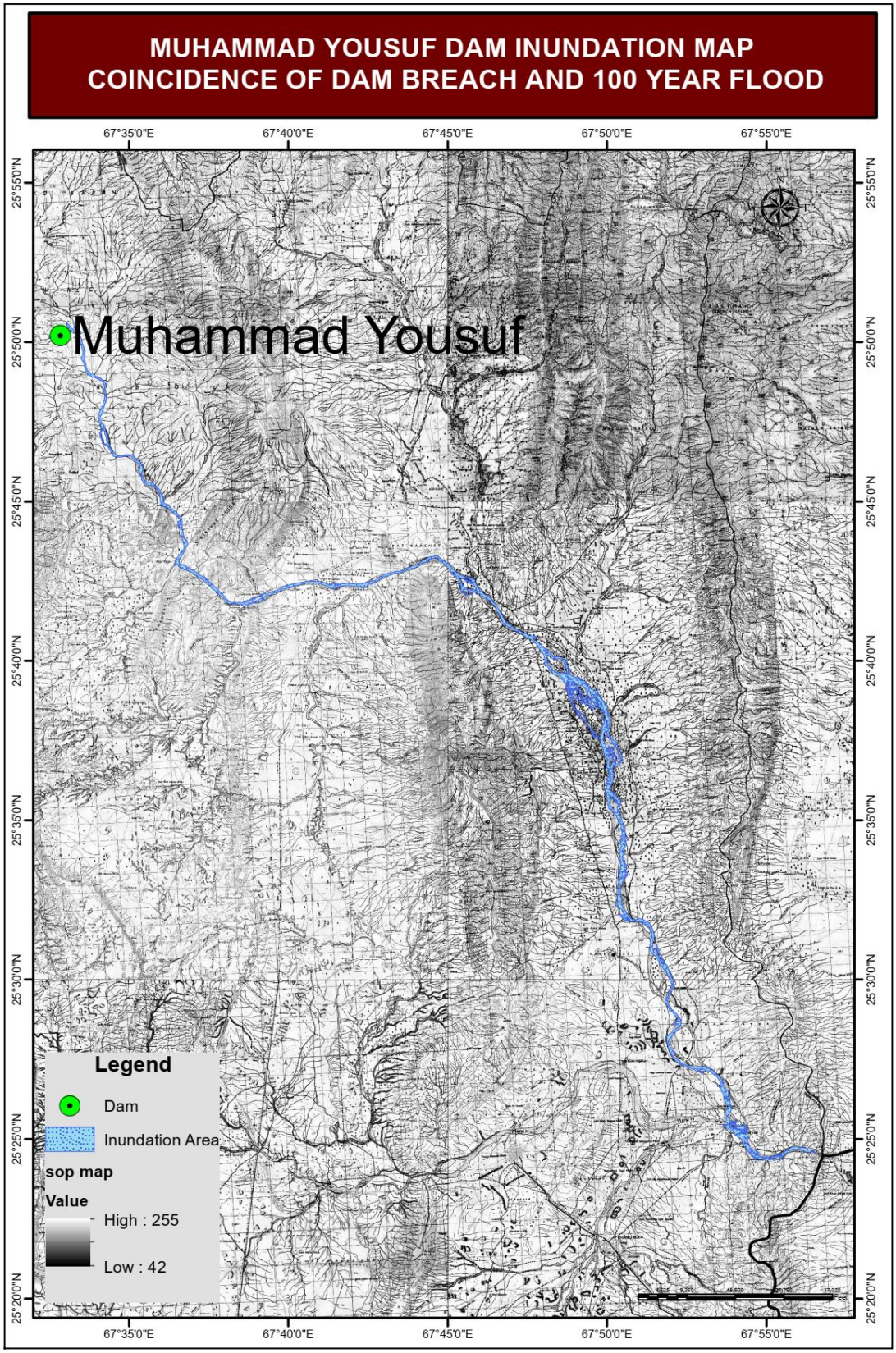

LAYAR BUND DAM POPULATION AT RISK MAP
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
25°12'0"N
25°9'0"N
N
W
E
S
Aatho
Legend
Dam
Inundation Area
Value
High : 49
Low : 0
Feet

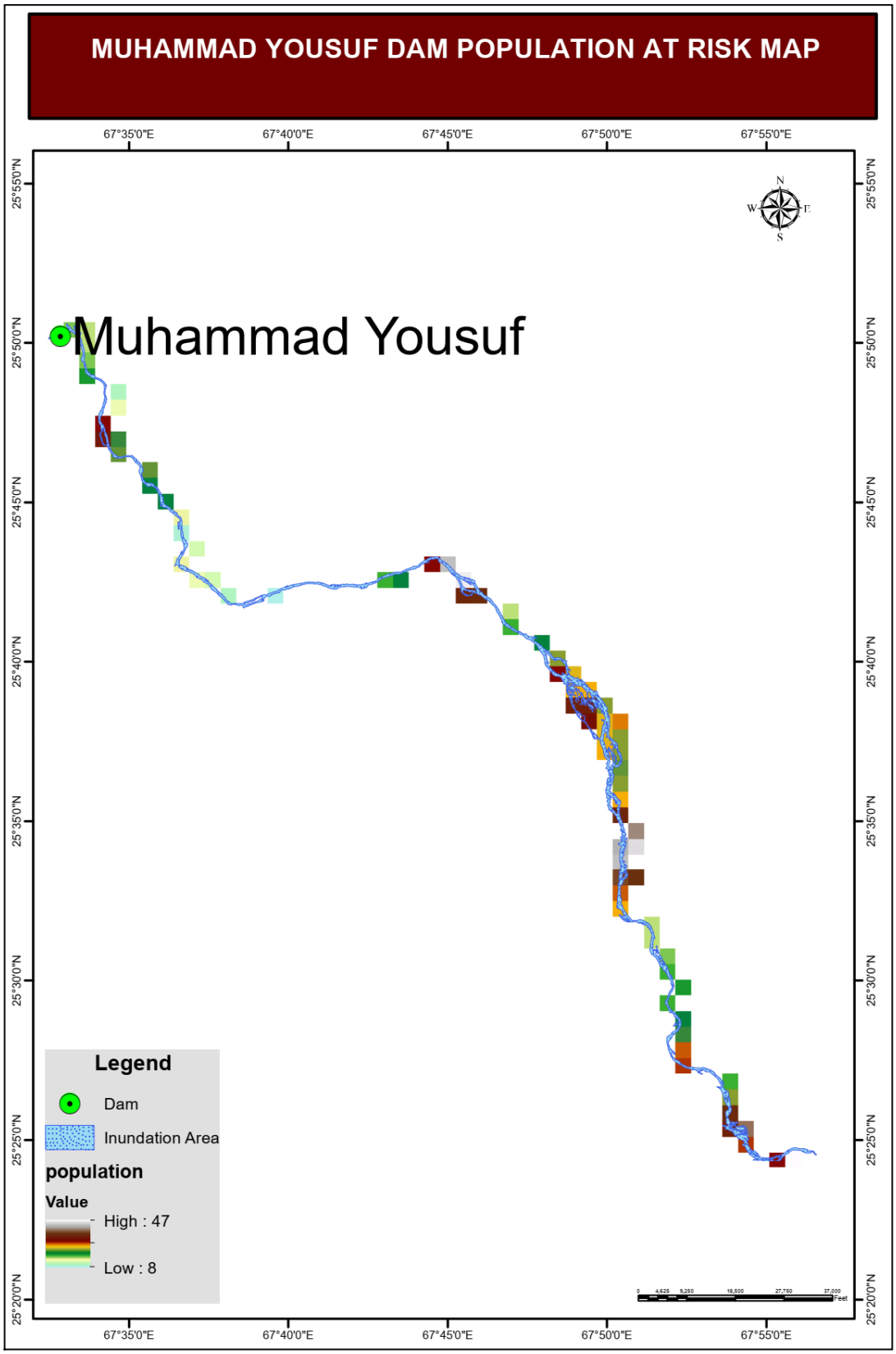

ABDULLAH KANRO DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°6'0"E
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°36'0"N
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
25°12'0"N
Abdullah Kanro
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 53

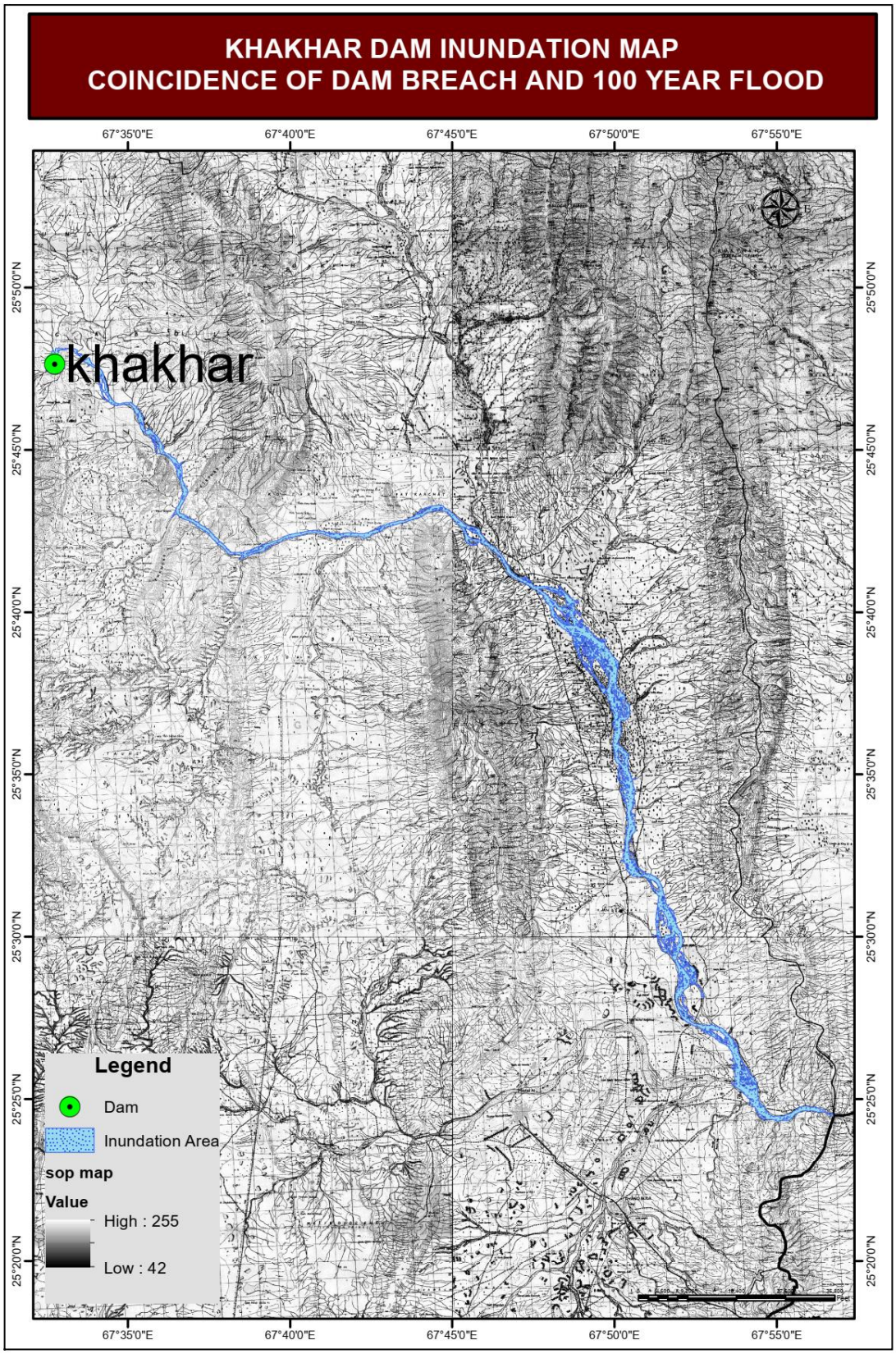

ABDULLAH KANRO DAM POPULATION AT RISK MAP
67°6'0"E
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°36'0"N
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
25°12'0"N
N
W
E
S
Abdullah Kanro
Legend
Dam
Inundation Area
population
Value
High : 43
Low : 5
Feet

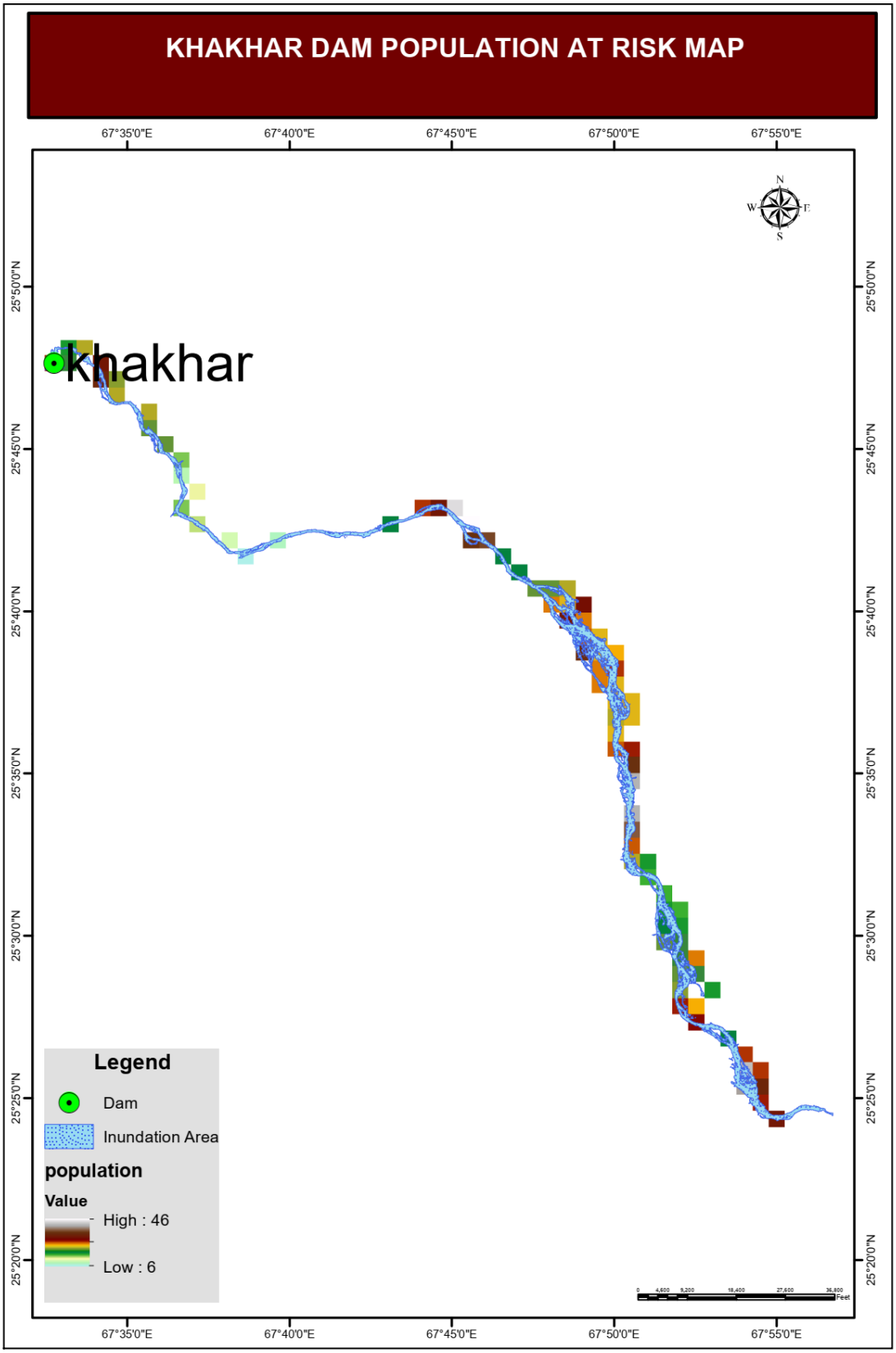

BABU KHAN DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 47


BABU KHAN DAM POPULATION AT RISK MAP
67°9'0"E
67°12'0"E
67°15'0"E
67°18'0"E
67°21'0"E
25°33'0"N
25°30'0"N
25°27'0"N
25°24'0"N
25°21'0"N
25°18'0"N
25°15'0"N
N
W
E
S
Legend
Dam
Inundation Area
population
Value
High : 43
Low : 5
Feet


MUHAMMAD YOUSUF DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
Muhammad Yousuf
67°35'0"E
67°40'0"E
67°45'0"E
67°50'0"E
67°55'0"E
25°55'0"N
25°50'0"N
25°45'0"N
25°40'0"N
25°35'0"N
25°30'0"N
25°25'0"N
25°20'0"N
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 42


MUHAMMAD YOUSUF DAM POPULATION AT RISK MAP
67°35'0"E
67°40'0"E
67°45'0"E
67°50'0"E
67°55'0"E
25°55'0"N
25°50'0"N
25°45'0"N
25°40'0"N
25°35'0"N
25°30'0"N
25°25'0"N
25°20'0"N
N
W
E
S
Muhammad Yousuf
Legend
Dam
Inundation Area
population
Value
High : 47
Low : 8
Feet


KHAKHAR DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°35'0"E
67°40'0"E
67°45'0"E
67°50'0"E
67°55'0"E
25°50'0"N
25°45'0"N
25°40'0"N
25°35'0"N
25°30'0"N
25°25'0"N
25°20'0"N
khakhar
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 42


KHAKHAR DAM POPULATION AT RISK MAP
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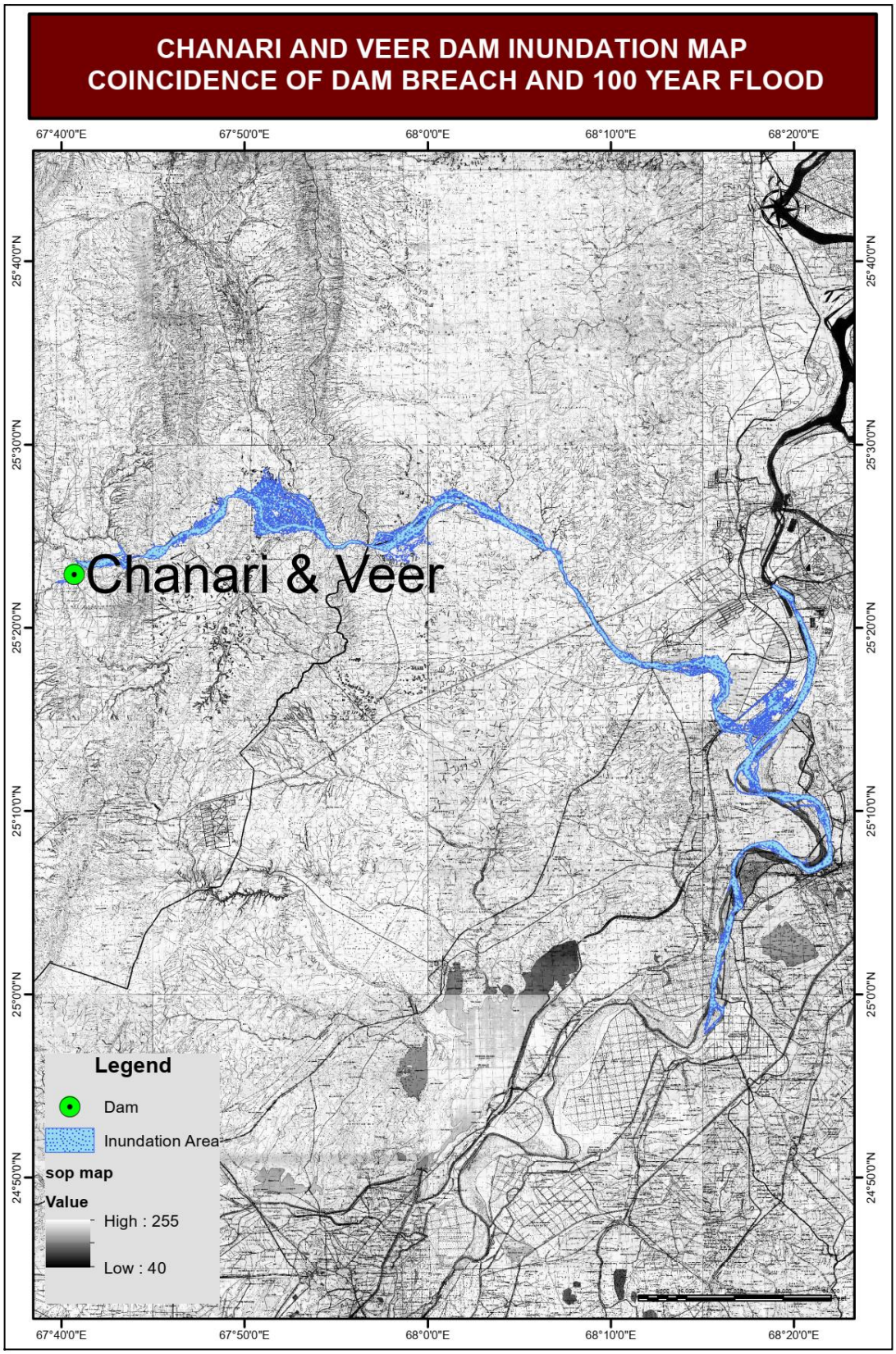
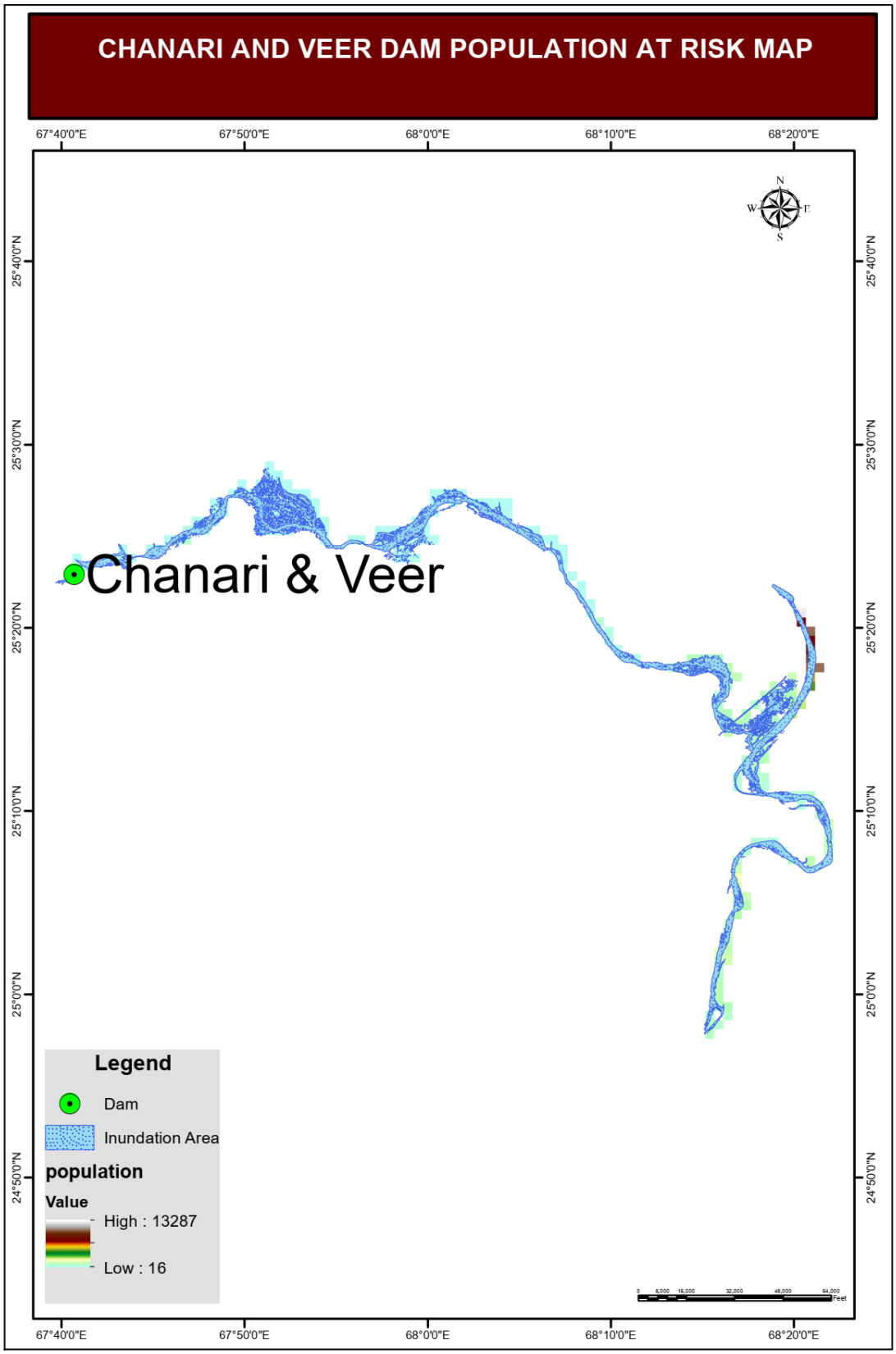
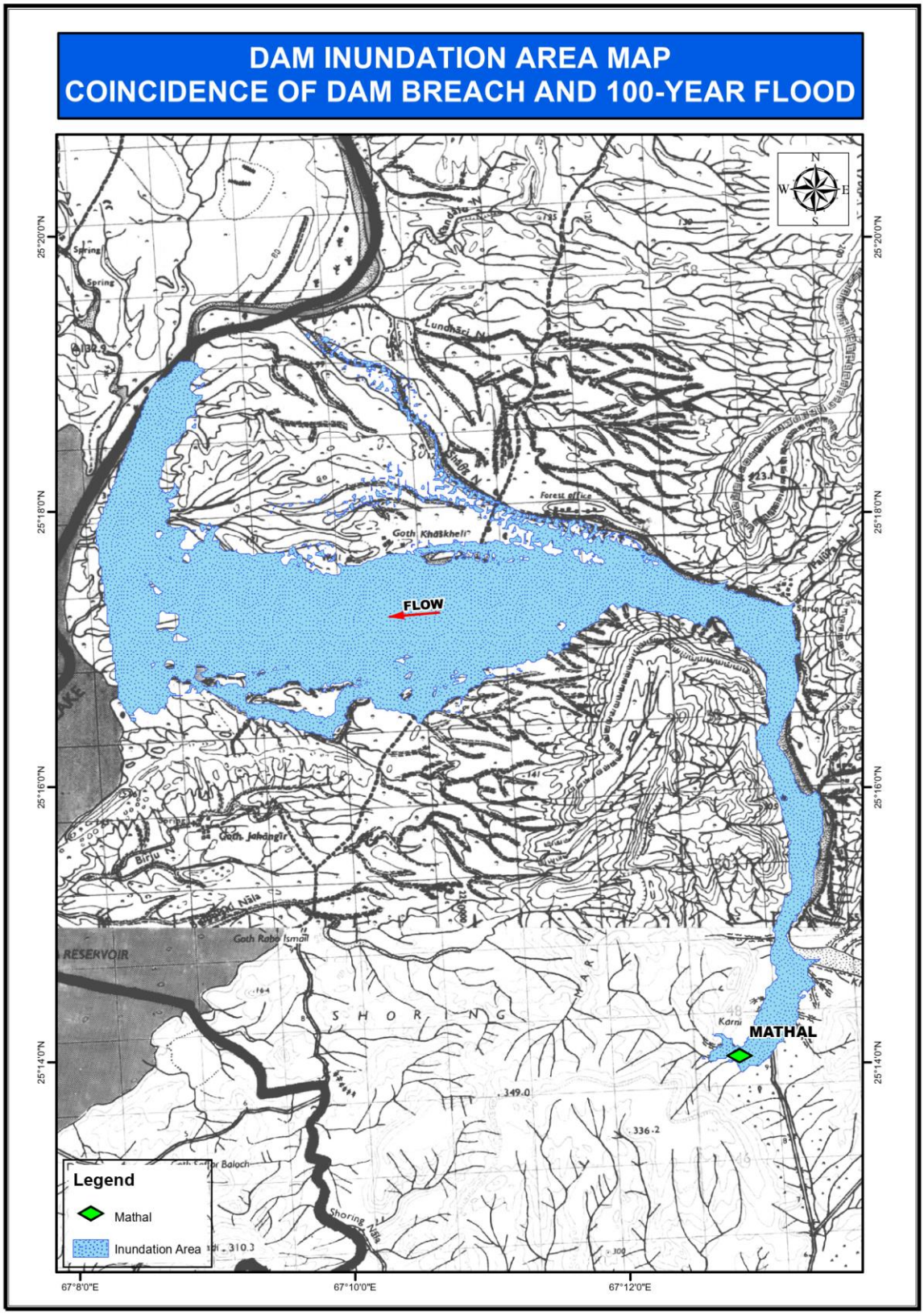
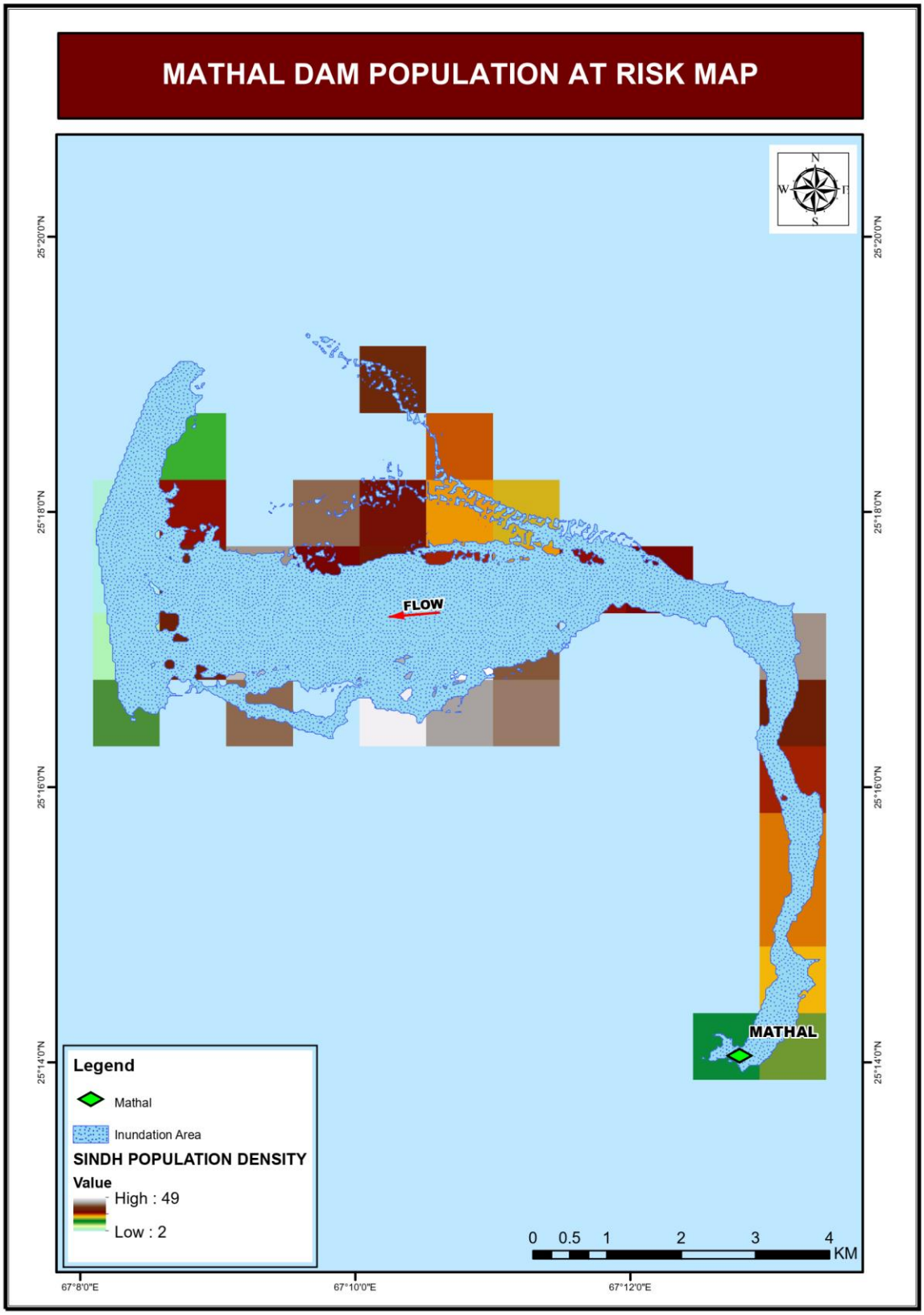
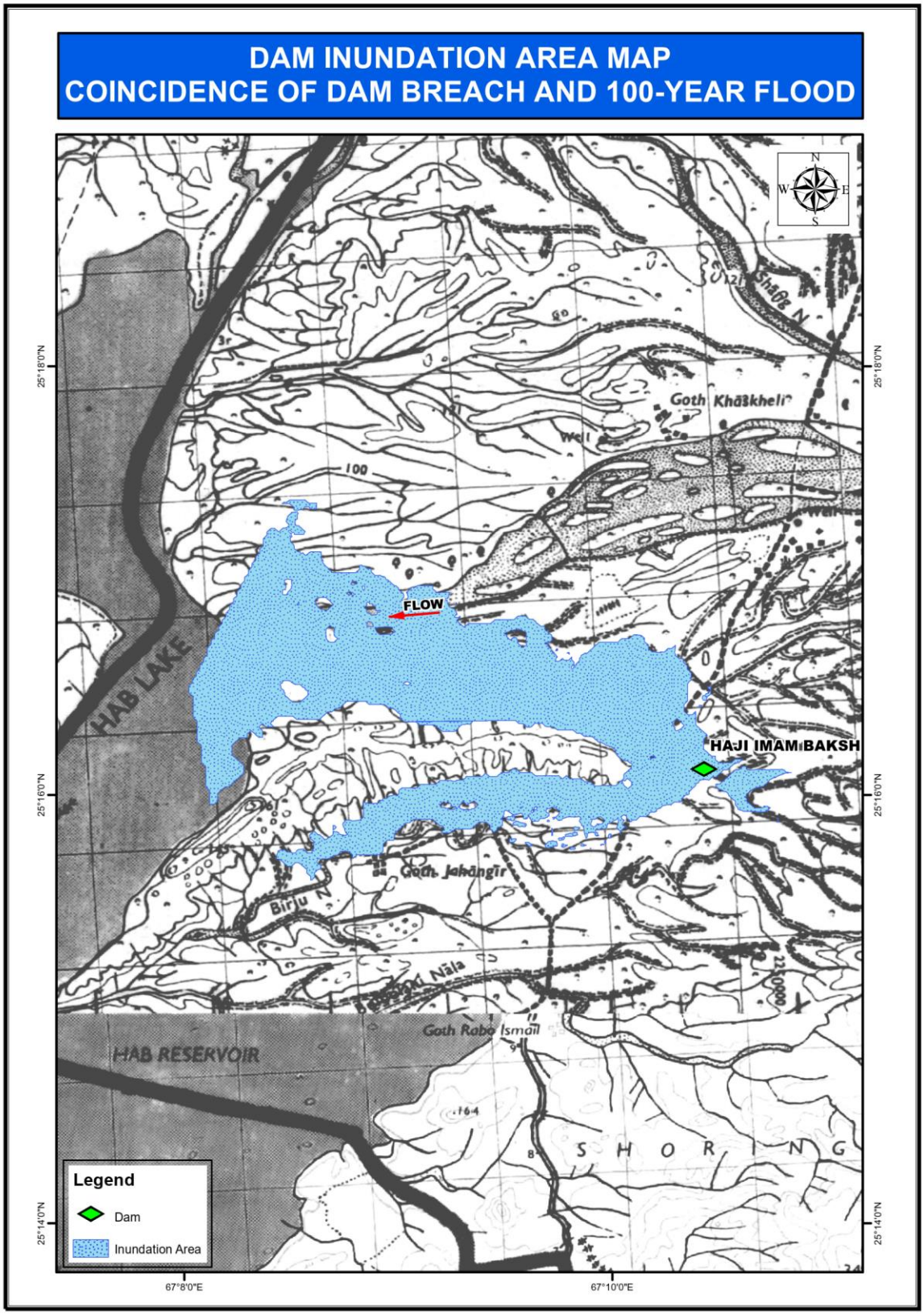
67°40'0"E
67°45'0"E
67°50'0"E
67°55'0"E
25°50'0"N
25°45'0"N
25°40'0"N
25°35'0"N
25°30'0"N
25°25'0"N
25°20'0"N
N
W
E
S
khakhar
Legend
Dam
Inundation Area
population
Value
High : 46
Low : 6

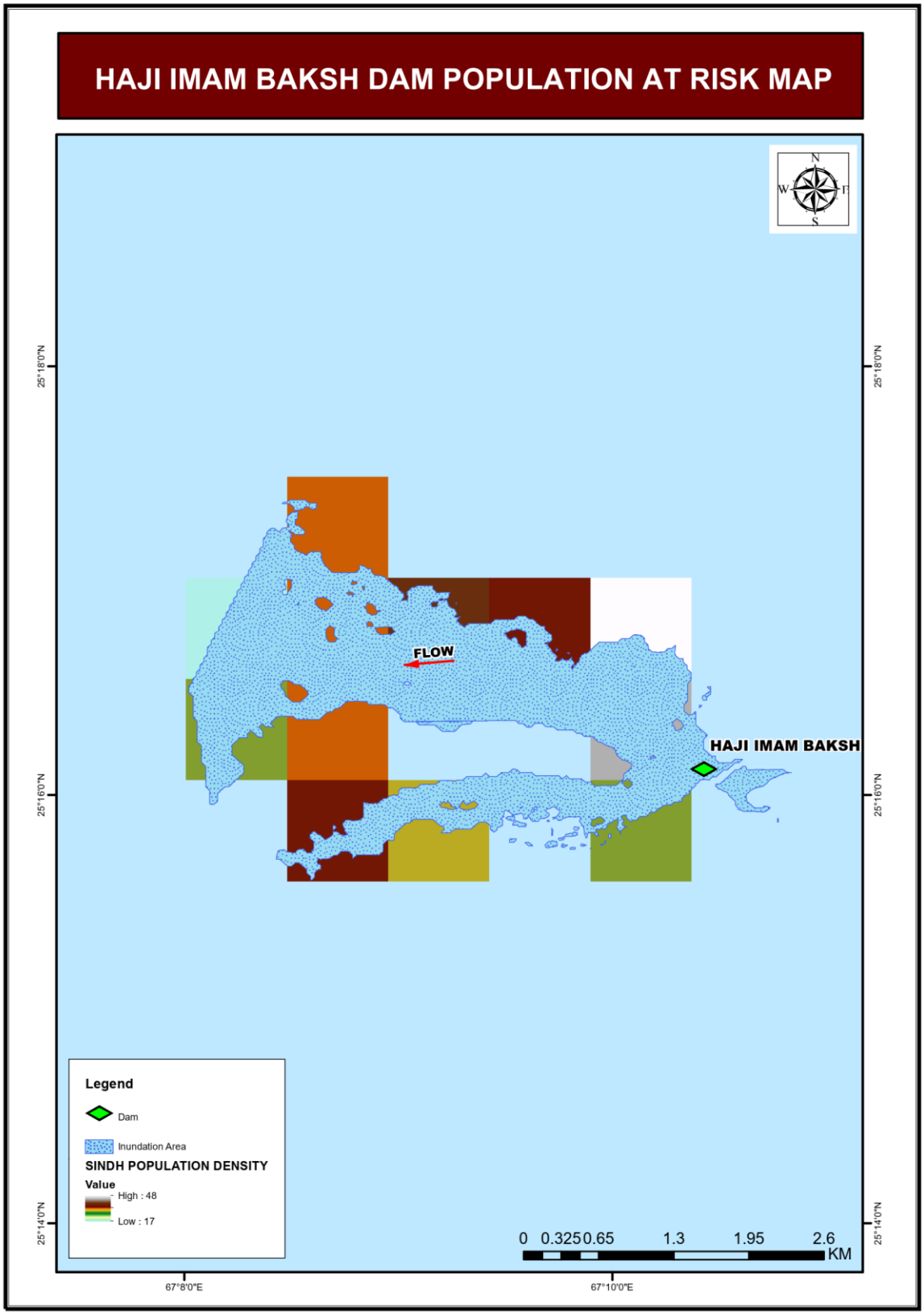

CHANARI AND VEER DAM INUNDATION MAP
COINCIDENCE OF DAM BREACH AND 100 YEAR FLOOD
67°40'0"E
67°50'0"E
68°0'0"E
68°10'0"E
68°20'0"E
25°40'0"N
25°30'0"N
25°20'0"N
25°10'0"N
25°0'0"N
24°50'0"N
Chanari & Veer
Legend
Dam
Inundation Area
sop map
Value
High : 255
Low : 40

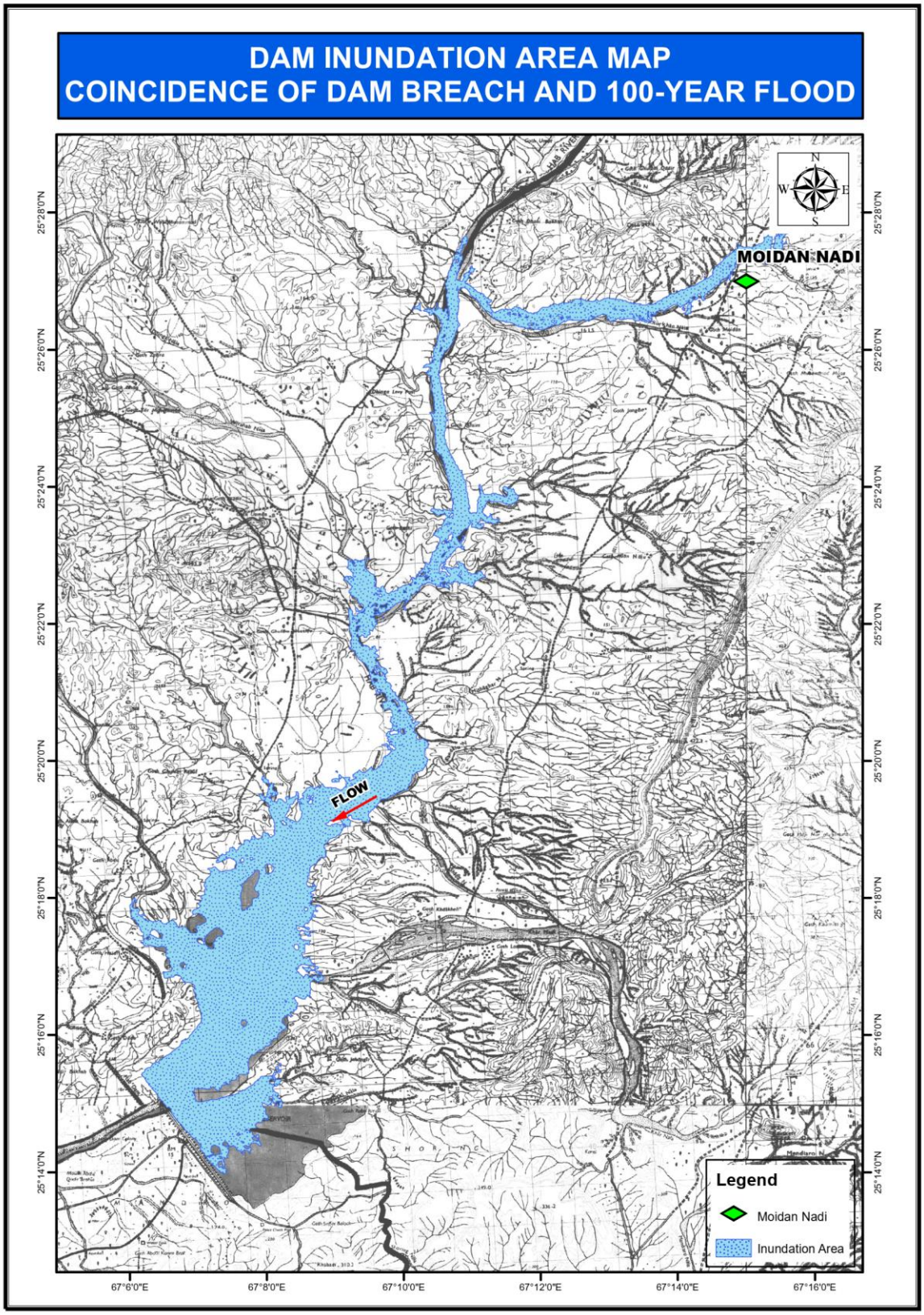

CHANARI AND VEER DAM POPULATION AT RISK MAP
67°40'0"E
67°50'0"E
68°0'0"E
68°10'0"E
68°20'0"E
25°40'0"N
25°30'0"N
25°20'0"N
25°10'0"N
25°0'0"N
24°50'0"N
N
W
E
S
Chanari & Veer
Legend
Dam
Inundation Area
population
Value
High : 13287
Low : 16
Feet


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
N
W
E
S
FLOW
MATHAL
Karni
RESERVOIR
S H O R I N G
Goth Khaskheli
Goth Jahangir
Goth Rabo Ismail
Legend
Mathal
Inundation Area
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°8'0"E
67°10'0"E
67°12'0"E


MATHAL DAM POPULATION AT RISK MAP
N
W
E
S
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
FLOW
MATHAL
Legend
Mathal
Inundation Area
SINDH POPULATION DENSITY
Value
High : 49
Low : 2
0 0.5 1 2 3 4
KM
67°8'0"E
67°10'0"E
67°12'0"E


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
N
W
E
S
Goth Khāskheli
100
FLOW
HAB LAKE
HAJI IMAMBAKSH
Goth Jahangir
Birju N
Goth Rabo Ismail
HAB RESERVOIR
SHORING
Legend
Dam
Inundation Area
25°18'0"N
25°16'0"N
25°14'0"N
67°8'0"E
67°10'0"E


HAJI IMAM BAKSH DAM POPULATION AT RISK MAP
N
W
E
S
FLOW
HAJI IMAM BAKSH
25°18'0"N
25°16'0"N
25°14'0"N
67°8'0"E
67°10'0"E
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 48
Low : 17
0 0.325 0.65 1.3 1.95 2.6
KM


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
MOIDAN NADI
FLOW
N
S
E
W
Legend
Moidan Nadi
Inundation Area
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
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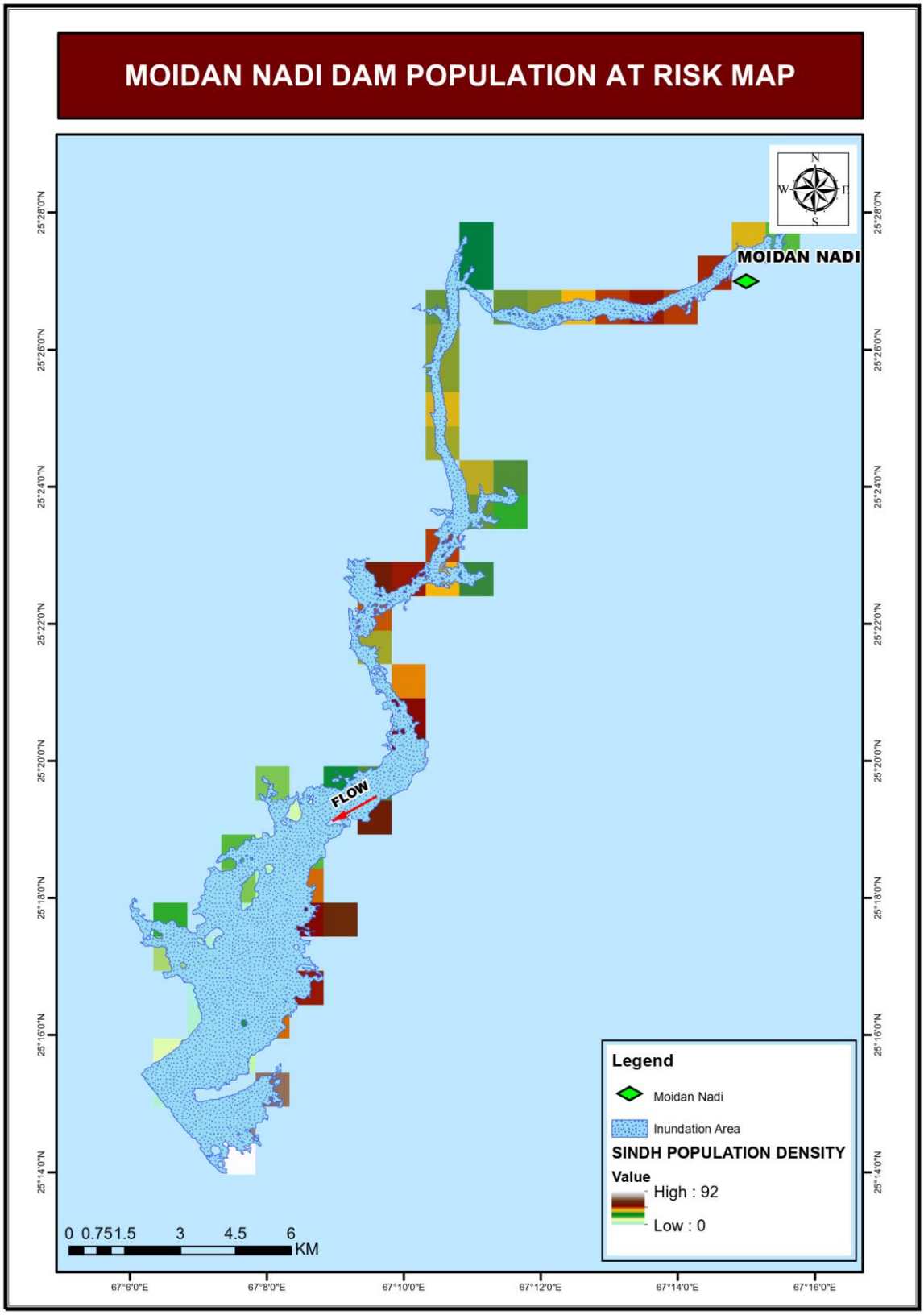
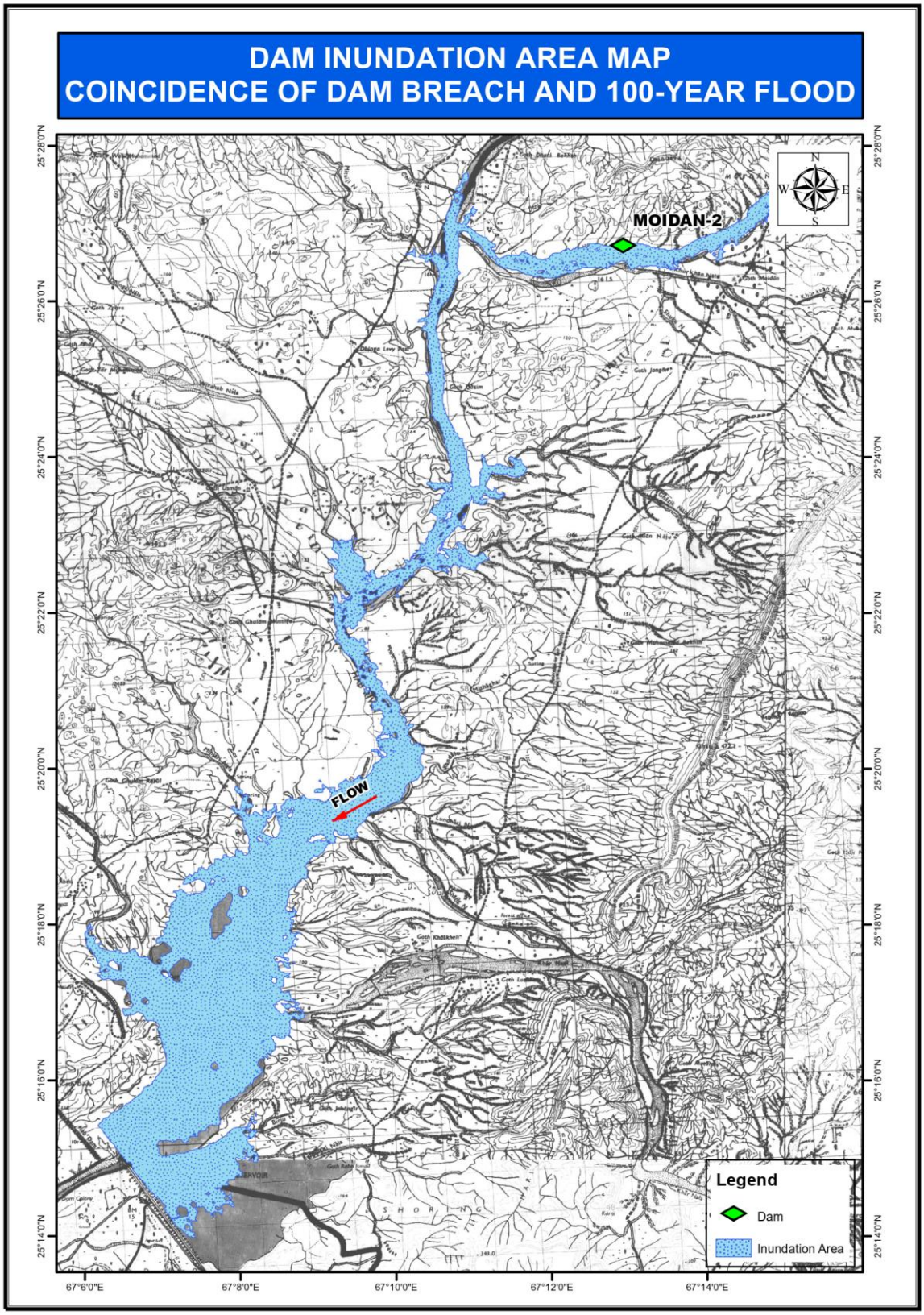
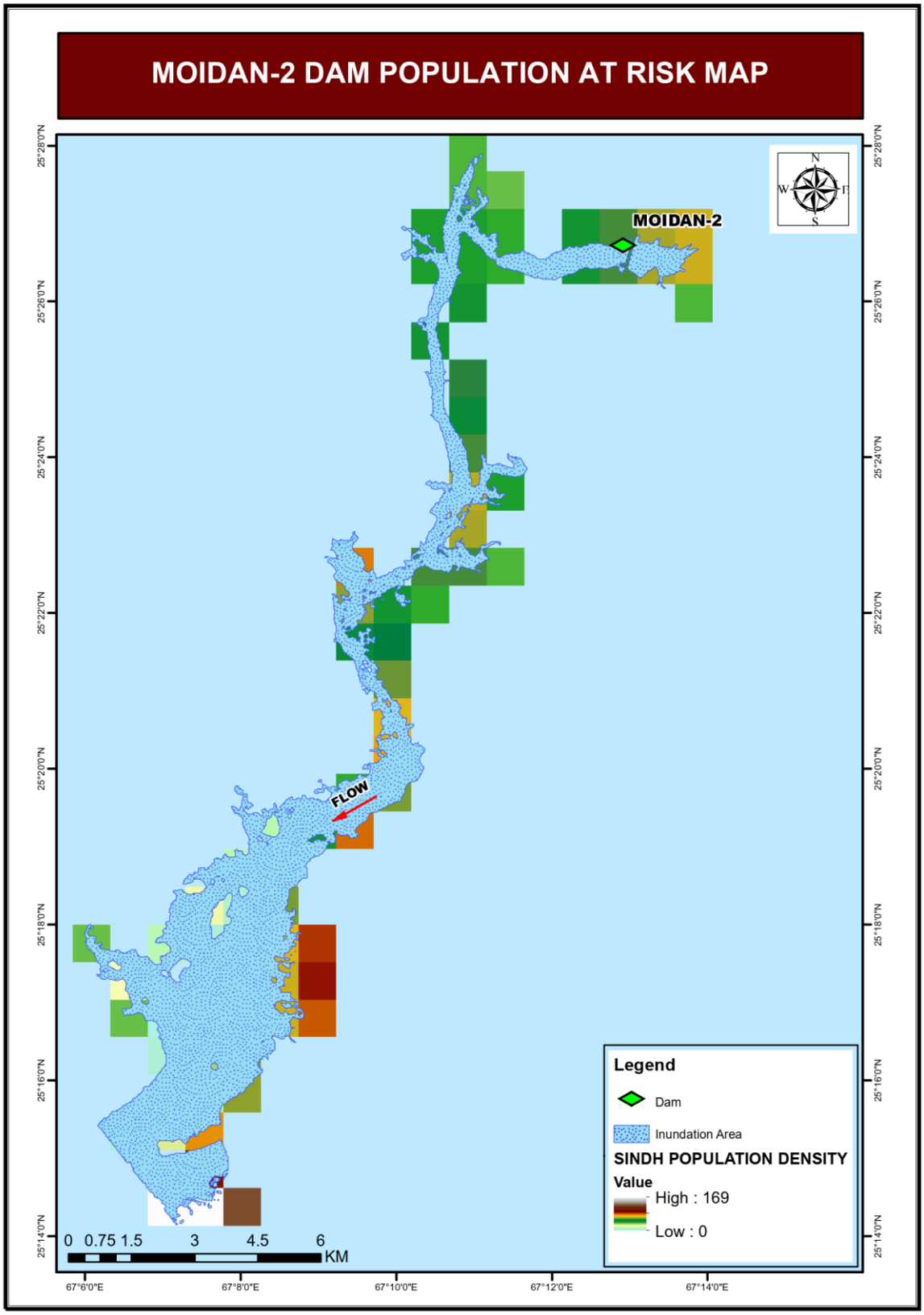
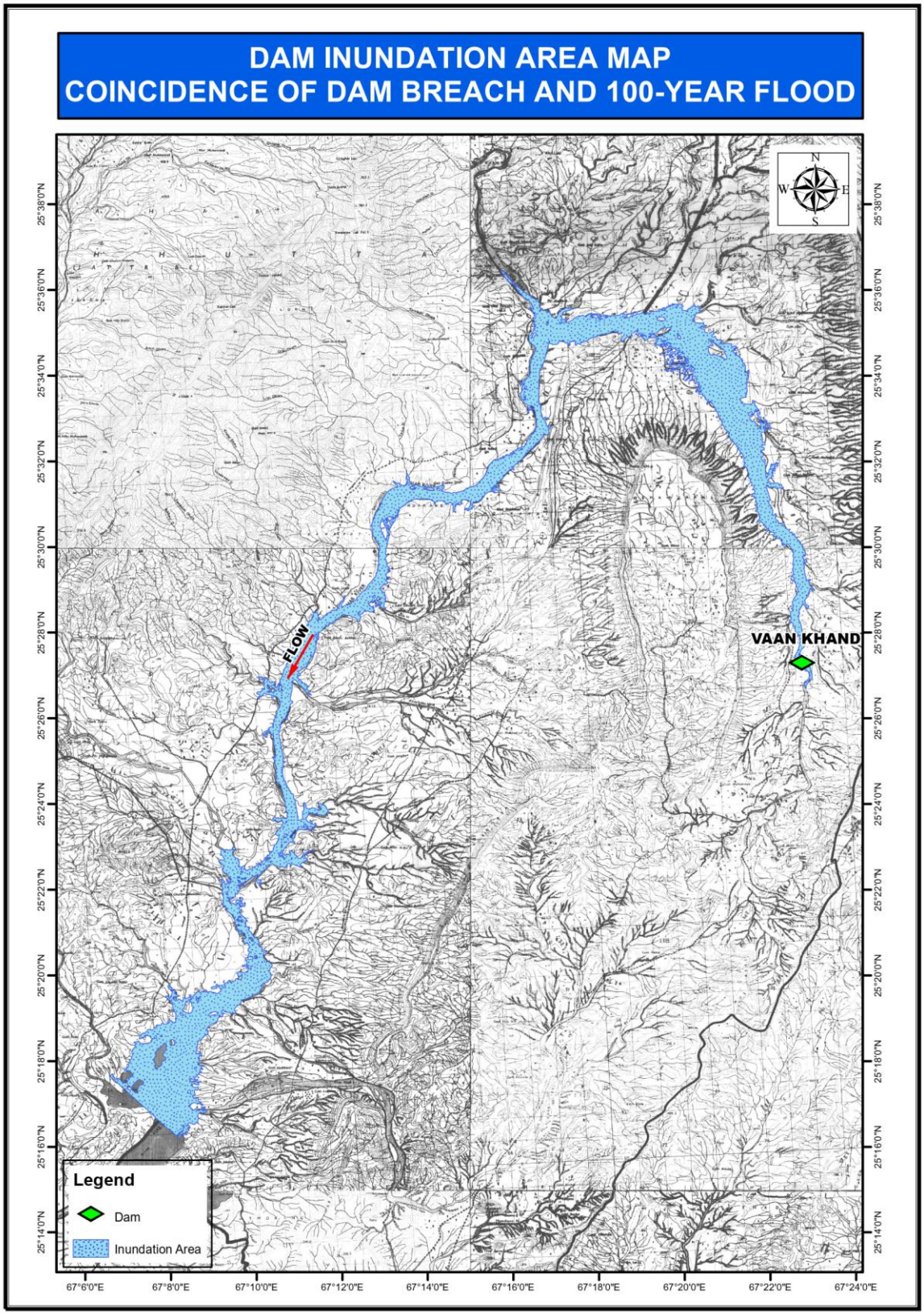
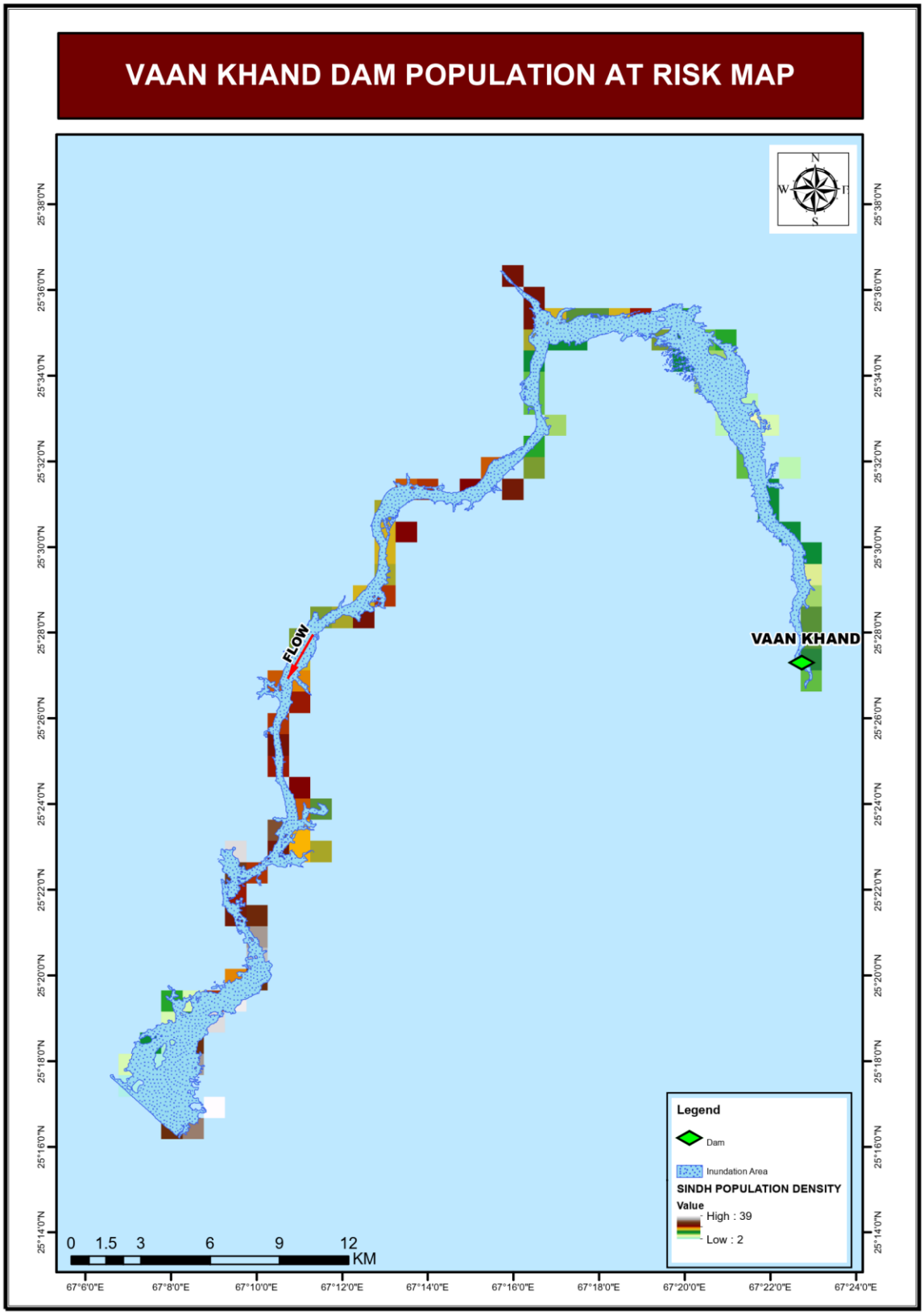
67°12'0"E
67°14'0"E
67°16'0"E

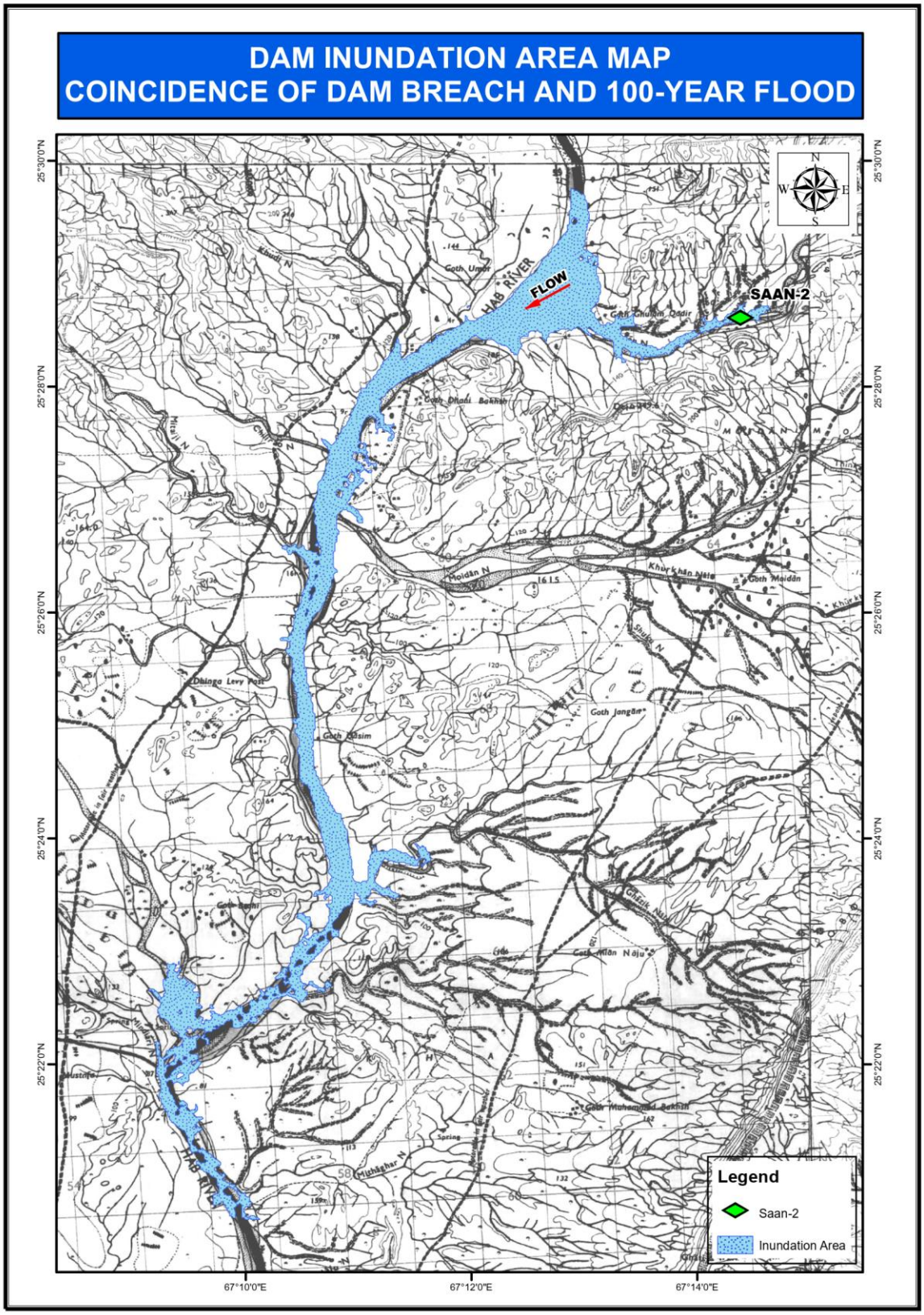

MOIDAN NADI DAM POPULATION AT RISK MAP
MOIDAN NADI
FLOW
N
W
E
S
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
0 0.751.5 3 4.5 6
KM
Legend
Moidan Nadi
Inundation Area
SINDH POPULATION DENSITY
Value
High : 92
Low : 0

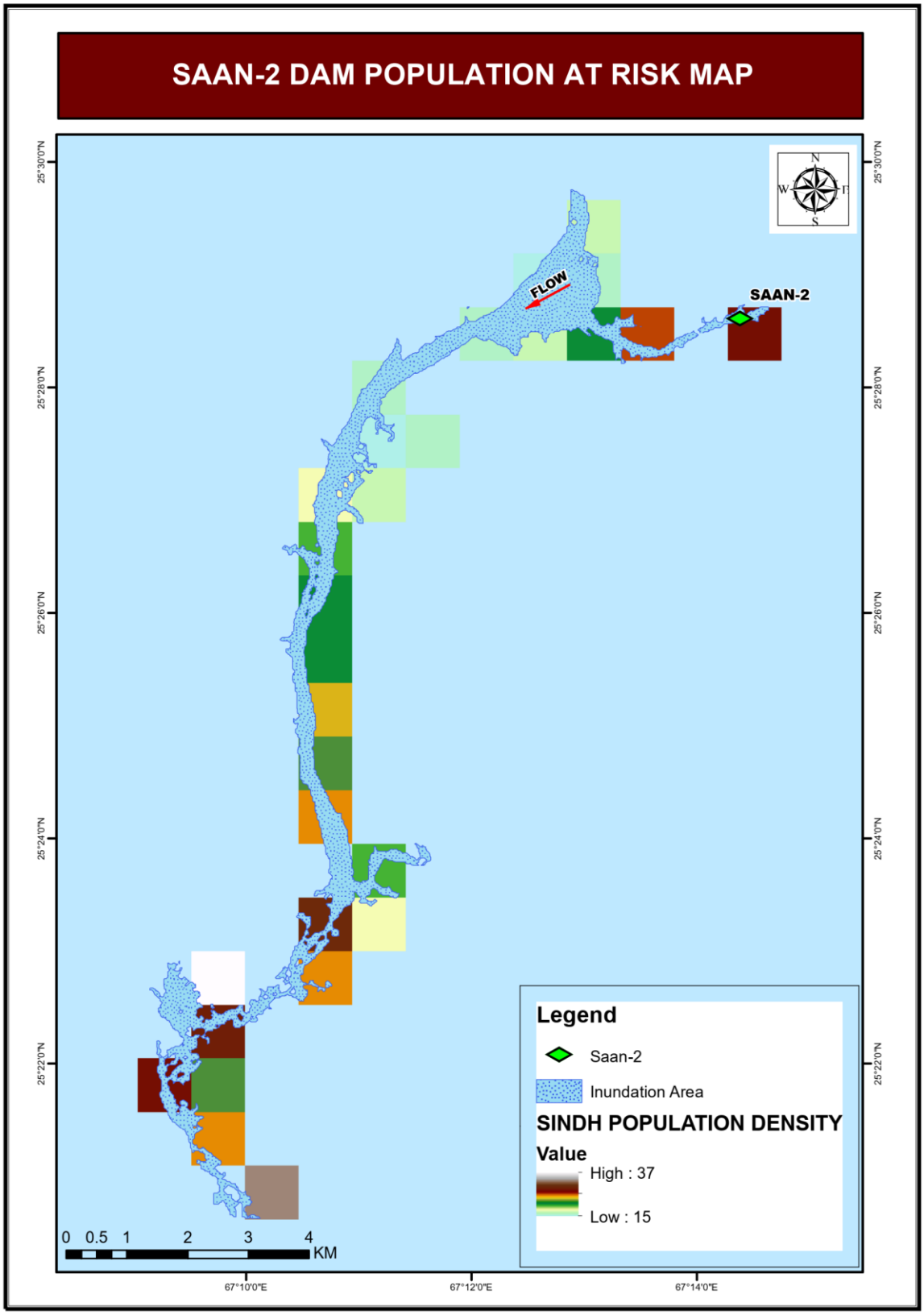

DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
MOIDAN-2
FLOW
N
S
E
W
Legend
Dam
Inundation Area
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E


MOIDAN-2 DAM POPULATION AT RISK MAP
MOIDAN-2
FLOW
N
W
E
S
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
0 0.75 1.5 3 4.5 6
KM
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 169
Low : 0


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
N
W
E
S
FLOW
VAAN KHAND
Legend
Dam
Inundation Area
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E


VAAN KHAND DAM POPULATION AT RISK MAP
N
W
E
S
FLOW
VAAN KHAND
Legend
Dam
Inundation Area
SINDH POPULATION DENSITY
Value
High : 39
Low : 2
0 1.5 3 6 9 12
KM
25°38'0"N
25°36'0"N
25°34'0"N
25°32'0"N
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
25°20'0"N
25°18'0"N
25°16'0"N
25°14'0"N
67°6'0"E
67°8'0"E
67°10'0"E
67°12'0"E
67°14'0"E
67°16'0"E
67°18'0"E
67°20'0"E
67°22'0"E
67°24'0"E


DAM INUNDATION AREA MAP
COINCIDENCE OF DAM BREACH AND 100-YEAR FLOOD
HAB RIVER
FLOW
SAAN-2
Legend
Saan-2
Inundation Area
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
67°10'0"E
67°12'0"E
67°14'0"E


SAAN-2 DAM POPULATION AT RISK MAP
FLOW
SAAN-2
N
W
E
S
25°30'0"N
25°28'0"N
25°26'0"N
25°24'0"N
25°22'0"N
67°10'0"E
67°12'0"E
67°14'0"E
0 0.5 1 2 3 4
KM
Legend
Saan-2
Inundation Area
SINDH POPULATION DENSITY
Value
High : 37
Low : 15

Annexure VII:TOR for C-ESIA

Terms of Reference for

Cumulative Environmental and Social Impact Assessment (C-ESIA)

Please add background

Background

The Government of Sindh (GoS) has undertaken a World Bank-financed Project - the Sindh Resilience Project (SRP) through the Sindh Irrigation Department (SID) and Provincial Disaster Management Authority (PDMA) in various parts of Sindh Province. Physical interventions under SRP Irrigation Component include rehabilitation/ improvement of existing earthen embankments along River Indus and construction of small rainwater recharge dams in the water-scarce areas of the province.
The Government of Sindh through World Bank financing successfully implemented the Sindh Resilience Project (SRP) (Phase-I) with its focus on improving the system at the provincial Government and key agencies for managing disaster risk. Moreover, the World Bank on successful implementation of Phase – I has committed to providing additional financing for the construction of more small dams (Phase - II) to improve resilience against drought. Total 53 dams will be constructed (8 Dams of Phase - I from saving amount and 45 dams of Phase – II from Additional financing).

The overall goal of the C-ESIA is to identify environmental and social impacts and risks associated with the Sindh Resilience Project (SRP) Irrigation component Phase-I & II that, in the context of existing, planned, and reasonably predictable developments, may generate cumulative impacts that could jeopardize the overall long-term environmental, social and economic sustainability of the SRP and the watersheds of proposed small dams.

The C-ESIA has the following objectives:

- Assess the potential impacts and risks of the SRP over the time, in the context of potential effects from other developments and natural environmental and social external drivers;
- Verify that the Projects sustainability or viability of the social and natural environment;
- Suggests Mitigation measures for potential cumulative impacts
- Confirm that the Projects value and feasibility are not limited by cumulative effects;
- Ensure that the concerns of affected communities about the cumulative impacts are identified, documented and addressed, and
- Manage potential reputation risks for stakeholders

The **C-ESIA TOR** is as follows:

Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

- The Consultant shall identify all aspects of the Valued Environmental and Social Components (VECs) potentially affected by the sub-projects of the SRP.
- The Consultant shall identify VEC resources, ecosystems, or human values, which are affected and potentially get affected due to SRP interventions.

Step 2: Scoping Phase II – Other Activities and Environmental Drivers

- The Consultant shall identify all other existing and reasonably anticipated and/or planned and potentially induced developments within the analytical boundaries;
- The Consultant shall assess the potential presence of natural and social external influences and stressors (e.g., droughts, other extreme climatic events);
- The Consultant shall assess the survival rate of Tree plantation done by SRP-Contractors during phase-i at various locations and also suggest further need of plantation in phase-II.

Step 3: Establish Information on Baseline Status of VECs

- The Consultant shall identify natural environmental and external social drivers that could contribute to cumulative impacts in the form of Baseline Information Report (BIR);
- The BIR study must include but not limited, downstream and upstream features, fluvial processes, lower riparian characteristics, natural habitat and vegetation profile, water consumption versus groundwater recharge and availability in the lower riparian, socio-economic conditions, etc.

Step 4: Assess Cumulative Impacts on VECs

- The Consultant shall assess and/or estimate the future condition of selected VECs, as the result of the project cumulative impacts combined with those of other developments and natural environmental and external social stressors;
- The Consultant shall identify potential impacts and risks that could affect the long-term sustainability and/or viability of the VEC;
- The Consultant shall evaluate known or predictable cause-effect relationships; and also assess the impacts and risks interact with each other;

Step 5: Assess Significance of Predicted Cumulative Impacts

- The Consultant shall evaluate the future condition of VECs relative to 'thresholds' or comparable benchmarks;
- The Consultant shall determine impact and risk magnitude and significance in the context of past, present, and future actions.
- The Consultant shall elaborate to manage uncertainties with informed adaptive management

Step 6: Management of Cumulative Impacts

- The Consultant shall identify cumulative impact avoidance and mitigation hierarchy, and
- The Consultant shall define the monitoring and management of cumulative VECs risks.

Timeframe

- The Consultant shall submit inception report within one month time.
- The consultant shall submit draft report within three months
- The consultant shall submit final report within two months.

Annexure VIII: Suggested Due Diligence Measures

Stage of Contractual Process	Suggested Due Diligence (to be Included in The Contracts)
Before bidding	• Ensure that the terms of reference clearly define the supervision engineer's responsibilities regarding oversight of, and reporting on, labor influx and workers' camps. • Ensure the team skills in the terms of reference clearly include key staff qualified and experienced in managing similar projects, and demonstrated capacity to manage social and environmental issues, including issues pertaining to community health and safety. • Ensure that the project GRM is established, and its use is widely publicized.
Preparation of bidding documents	• Review contract conditions included in bidding documents to: (i) Ensure that the relevant mitigation measures in the ESMP are reflected and budgeted in the contract, (ii) Ensure the ESMP forms part of, and is explicitly referred to in the bidding documents. (iii) Identify relevant provisions (workers, camps, child and forced labor, occupational health and safety, grievance redress, etc.) regulating the contractor's responsibility and identify any gaps, inconsistencies or areas of concern that could be addressed through additional provisions in the "particular conditions of contract" and/or technical specifications (iv) Include a requirement that all workers sign 'Codes of Conduct' governing behavior, and identifying sanctions (v) Clearly identify that training programs on implementing the Codes of Conduct, etc. will be undertaken by external providers • Ensure the contract conditions and matrix of consequences clearly specify what type of penalty the contractor will face if the provisions of the ESMP and CESMP including OHS MP are not adhered to—including by subcontractors. This may include direct consequences to contractors in the form of penalties for poor performance on social and environmental matters or specific Performance Securities for ESMP and CESMP compliance. • Ensure that bidding documents clearly indicate OHS standards that are going to be applicable to different aspects of the works • Ensure bidding documents make clear the responsibilities of the contractor to prepare and adhere to a CESMP based on the ESMP and that no civil works will commence until the CESMP has been approved by the supervision engineer. Ensure the bidding documents detail how the contractor and supervision engineer will be required to monitor and report on the impacts on the local community, issues related to labor influx and workers' camps. • Propose Key Performance Indicators (KPIs) for Contract Management, reflecting issues and risks specific to the contract and • the monitoring plan

Bidding evaluation	• Review the bid evaluation report and request to review the bids where appropriate, to verify for the recommended bidder that documents related to the ESMP, safeguard implementation capacity, and other obligations of the contractor required to be submitted with the bid are sufficiently detailed and cover the contractual requirements. • Require the contractor's representative or dedicated community liaison staff to have the ability to communicate in the language of the Borrower and/or the local language. • Verify that the contract management framework identifies clearly lines of communication and that these are formalized, and a consistent record is provided. • Ensure that the contractor meets the project's OHS requirements for capability and experience.
After contract signing	• Prior to commencing works, the contractor submits CESMP(s) based on the ESMP, which includes specific management plans for: (i) work activities; (ii) traffic management; (iii) occupational health and safety; (iv) environmental management; (v) social management; and (vi) labor influx. • Supervision engineer reviews and approves the CESMP— with inputs from appropriate Government agencies—before any work starts. For moderate risk sub-projects, the supervision consultants should review and clear the CESMP. The borrower should disclose the approved CESMP. • Supervision Engineers must approve occupational health and safety management plan is approved before contractor is mobilized at site

Annexure IX: Written Particulars of Employment

1. Name of Employer
……
2. Name of Employee
……
3. Date Employment began
……
4. Wage and Method of Calculation
……
5. Interval at which wages are paid
……
6. Normal Hours of work
……
7. Short description of employee's work
……
8. Probation Period
……
9. Annual Holiday Entitlement
……
10. Paid Public Holiday
……
11. Payment during sickness
……
12. Maternity Leave (if employee female)
……
13. Nursing Break Entitlement (for female employee)
……
14. Notice employee entitled to receive
……
15. Notice employer required to give
……
16. Any other matter either party wishes to include
……

Notes:

(a) An employee is free to join a trade union or staff association, which is recognized by the undertaking. The address of the Trade Union or Staff Association is:

(b) The grievance procedure and disciplinary procedure in this undertaking requires to be followed when a grievance arises, or disciplinary action needs to be taken.

(c) When any heading is inapplicable, enter NIL.

……

Employer's signature	Witness
……	……
Employee's signature	Witness
……..	……
Date	Date

Annexure X: Draft CESMP

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DRAFT
CONTRACTOR'S ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (CESMP)
FOR

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ABBREVIATIONS / DEFINITIONS

CESMP	Contractor's Environmental & Social Management Plan
CFP	Chance Finding Procedure
CLO	Community Liaison Officer
E&P	Equipment & Plant
EIA	Environment Impact Assessment
EO	Environmental officer
EPA	Environmental Protection Agency
ESIA	Environment Social Impact Assessment
GRC	Grievance Redress Community
GRM	Grievance Redress Mechanism
HSE	Health, Safety & Environment
I/C	In-charge
IEE	Initial Environment Examination
MOU	Memorandum of Understanding
OHSO	Occupational Health Safety officer
PCIS	Physical and Cultural Infrastructure
PIC	Project Implementation Consultants
PM	Project Manager
PPE	Personal Protective Equipment
SDS	Safety Data Sheet
SM	Site Manager
WMP	Waste Management Plan

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1. INTRODUCTION

Seasonal heavy monsoon rains and floods have caused disaster in large areas in various districts of the Sindh province. Additionally, it has damaged public, private and community physical infrastructure and has brought destruction to private housing and agricultural lands. Besides floods, Sindh Province is facing prolonged droughts on a recurring basis.

However, in order to address the drought, there is still a dire need for small dams and lining of taraies in the water-scarce regions of the Kirthar and Nagarparkar Regions. For this purpose, a Study for the construction of 50 Nos of Small Dams and the lining of 110 Nos of Taraies/ ponds was conducted and based on the findings of the feasibility study, 20 potentials small dam sites (refer Figure-1) and 130 taraies (Refer Figure -2) have been identified.

2. PROJECT DESCRIPTION

•

Figure 2-1: Location of Sub- Project

2.1 Applicable legislations & World Bank Standards

As per ESMP following cross sectorial legislation in Sindh are applicable to contractor's activities, which are shown in **Table 2-1**.

Table 2-1: Key Applicable Cross-Sectoral Legislation in Sindh

Legal Instrument	Scope and Applicability	Relevance
Sindh Environmental Protection Act, 2014	Sindh EPA is responsible for ensuring the implementation of provisions of the Act in Sindh territorial jurisdiction. Sindh EPA is also required to ensure compliance with the SEQS and establish monitoring and evaluation systems.	
Sindh Climate Change Policy, 2022	The policy aims to identify the effects of climate change, provide solutions and implement framework/ plans to mitigate its effects, among other objectives - all of which are in line with the National Climate Change Policy.	
Sindh Irrigation Act with Amendments in 2011	This act was unanimously amended in 2011 to remove encroachments from the natural or artificial depression courses on government lands. With a view to removing the encroachments from the natural or artificial depression courses on government lands for smooth flow of rainwater, it is expedient to make some suitable amendments to the Sind Irrigation Act, 1879 by providing severe punishment therein so that the encroachment is removed in the public interest.	
The Sindh Solid Waste Management Board Act, 2014	The Sindh Solid Waste Management Board Act, 2014 passed unanimously in March 2014, for the collection and disposal of all solid waste, to arrange for effective delivery of sanitation services, to provide a pollution-free environment and to deal with other relevant matters.	

Land Acquisition Act 1894	Empowers the government to acquire private land for projects of national importance and lays down the acquisition procedure.	
The Sindh Forest (Amendment) Act, 2012	Regulates forest resources. Empowers the government to declare any forest area reserved or protected.	
The Sindh Wildlife Protection Ordinance 1972 (Amendment 2001, 2010) Act, 2007, 2020	The law specifies three broad classifications of the protected areas: - a). **National Parks**. b). **Wildlife Sanctuaries** - c). **Game Reserves** -.	
Employment of Child Act, 1991	In accordance with this Article, the Employment of Child Act (ECA) 1991 disallows child labour in the country. The ECA states that no child shall be employed or permitted to work in any of the occupations set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out.	
The Sindh Occupational Safety and Health Act, 2017	The clauses relevant to the project are those that concern health, safety and welfare of workers, disposal of solid wastes and effluents, and damage to private and public property. The Act also provides regulations for Compulsory vaccination, inoculation, and Precautions against contagious or infectious diseases at workplaces.	
The Antiquities Act 1975	Preservation and protection of antiquities (any object more than 75 years old). Empowers the government to declare any antiquity as protected.	
Sindh Cultural Heritage (Preservation) Act - 1994	The Act 1994 provides rules and regulations to preserve and protect ancient places and objects of agricultural, historical, archaeological, artistic, ethnological, anthropological and national interest in the province of Sindh.	

2.2 World Bank Environmental, Health & Safety Guidelines

World Bank Group's Environmental, Health, and Safety (EHS) Guidelines apply to the proposed project. In particular, contractors will be required to implement the General EHS Guidelines (April 2007).

Table 2-2: World Bank Env. & Social Standards Relevant to the Project

Environmental and Social Standards	Relevance to the Project
ESS1 – Assessment and Management of Environmental and Social Risks and Impacts	**Relevant.**
ESS2 – Labor and Working Conditions	**Relevant.**
ESS3 – Resource Efficiency and Pollution Prevention and Management	**Relevant.**
ESS4 – Community Health and Safety	**Relevant.**
ESS5 – Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	**Relevant.**
ESS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources	**Relevant.**
ESS7 – Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	**Not relevant.**
ESS8 – Cultural Heritage	**Rrelevant.**
ESS9 – Financial Intermediaries	**Not relevant.**
ESS10 – Stakeholder Engagement and Disclosure	**Relevant.**

3. PURPOSE OF CESMP

The purpose of this CESMP is to minimize or offset to the extent possible, the adverse environmental, social, health & safety related impacts likely to arise during the construction phase. The Plan will be applicable to all activities being constructed by the Contractor. Moreover, this plan will also demonstrate:

- a clear statement of environmental and social policy to be adopted for the works
- Details of specific actions and mitigations to be implemented on site to prevent or
- reduce the environmental and social impact of the works
- Details of proposed internal monitoring actions to ensure implementation of mitigations
- Details of the administrative framework under which the plan shall be implemented.
- The CESMP is based on bidding documents studies, contract conditions, Environmental & Social Management Plan.

This CESMP will ensure that construction activities are carried out in a way that meets the goals of the environmental and social safeguard standards of World Bank, performance standards and national (Pakistan) environmental laws and regulations applicable to the construction works. CESMP also intends to ensure Good International Industrial Practices (GIIPs) for environmental, health & safety management program.

4. CESMP Objectives

- Draw responsibilities for Contractors and other members of the Project team for the Environmental and social management of the project.
- Assess Environmental, Social, health and safety training requirements to implement a training program that supports the achievement of personnel competency in relation to environmental, social, health and safety compliance during implementation of sub project activities.
- Facilitate the implementation of the mitigation measures and implementation of monitoring plan
- Define a monitoring mechanism and identify monitoring parameters to ensure effective implementation of the mitigation measures and reporting thereon.
- Provide a procedure for timely action in the face of unanticipated Environmental and Social situations.
- Maximize potential project benefits and control negative impacts.
- To deal with Environmental and Social issues generated during implementation of Sub Project
- To ensure that Environmental and Social actions are in phase with engineering and other activities.
- To redress Community Grievances through establishing effective GRM at site

5. ORGANIZATIONAL FRAME WORK

For effective Implementation of CESMP, Contractor shall deploy Health, Safety and Environment staff with appropriate skills for ensuring effective compliance of HSE standards, Code of Conduct for staff as described in HSE Plan part, achieving level of performance, site supervision, implementation of Contract guidelines and CESMP requirements.

5.1 Key Project EHS Staff

Following staff is responsible and will be deployed at site for adequate management of CESMP.

- Project Manager (Contractor's Representative)
- Occupational Health and Safety Officer (OHSO)/ Labour Officer
- Environmental Officer (EO)/Ecologist
- Social Expert/Community Liaison Officer (CLO)
- Doctor/Dispenser

Note: CV's of above-mentioned staffs needs to be attached as **Annexure 1**.

6. CONSTRUCTION CAMP MANAGEMENT PLAN

The project Manager will ensure that all construction camps and welfare facilities shall be designed, constructed and maintained in accordance with the company set procedures. The following shall be ensured:

- General Arrangements for Camp Construction
- Construction camp hygiene
- Kitchen Areas/Food Storage & Quality
- Personal Hygiene
- Toilet Sanitary Facility and Laundry
- Temporary Electrical Facility, Internet accessibility and Installations
- Firefighting/Emergency Response System
- Insecticides/Mosquito Control
- Sewage Handling
- Evacuation Routes and Emergency Exits
- Medical Facilities
- Bunded Oil Storage impermeable area.
- Assembly points.
- Site office.
- Labor Camp
- Staff residence
- Parking area

6.1 Facilities for Labor and Construction Camps

Staff quarters and labor camps shall be provided with all necessary services for drainage, and lighting which will be provided through generators, internet, gas, roads, paths, parking places, fencing, sanitation, and firefighting equipment, etc. All labor camps, workshops, and storage areas shall be built on hard compacted ground with sufficient binding so as to prevent the loss or infiltration of leaked or spilled fluids into surrounding soils, groundwater, or water courses. Traffic signage shall be displayed in the camps.

6.2 Camp Location

- Living facilities shall be located in areas not at risk of flooding or other natural hazards and within a reasonable distance from the worksite, to which safe, free transport is provided where required. The living facilities shall be built with adequate

materials, kept in a good state of repair, clean and at least 500 meters away from local communities if any.

- The living accommodation, and immediate surrounding area, shall be provided with adequate drainage to avoid the accumulation of stagnant water.
- Adequate ventilation, natural light and emergency lighting shall be provided.

6.3 Drinking Water Supply

Access to a free, safe, readily available potable water source shall be provided at all times. Drinking water quality shall meet WHO standards & Sindh Environmental Quality Standards. Prior to use, the contractor shall arrange for tests on samples of each drinking water source from a laboratory approved by the Supervision consultant on a monthly basis. The results of these tests shall be submitted to the Supervision Consultant. Each supply of drinking water shall be conspicuously marked by an appropriate sign. All water storage tanks shall be covered to avoid the risk of contamination.

6.4 Room / Dormitory Facilities

Floors to rooms/dormitories shall be constructed, float finished concrete, or other similar solid, washable material. Rooms/dormitories shall be maintained to a liveable standard and cleaned daily.

A minimum spacing of 1m (3.3ft) shall be provided between beds /cots and one bed/ cots should be provided per resident. The use of bunk beds shall be avoided. Each worker shall be provided with an appropriate mattress, pillow, cover, clean bedding and mosquito net. Bed linen shall be washed regularly and treated with repellents as necessary. Cupboards for residents shall be provided for personal storage, with separate storage being provided for any clothing or Personal Protective Equipment required for staff to carry out the work assigned to them.

6.5 Sanitary Facilities

The contractor shall provide and maintain hygienic, well-lit and ventilated sanitary facilities. Sanitary facilities shall be provided within separate buildings in the vicinity of rooms/dormitories. Separate latrines and washing facilities shall be provided for males and females (if females working on site) with total isolation by wall or by location. A minimum of one hand wash facility, one latrine and one shower shall be provided for every ten persons.1/10 Rule will be followed properly.

- Latrines (Toilets) shall be clearly distinguished in a language understood by those using them to avoid miscommunication.
- Washing facilities, including showers, shall be provided at readily available places within the immediate vicinity of every latrine. Washing facilities shall include a supply of clean running water, soap and clean towel.

- All sanitary facilities shall be built from easily cleanable material and shall be cleaned daily. Sanitary facilities shall be built so as to provide adequate privacy. All doors shall be lockable.

6.6 Canteen, Cooking and Laundry Facilities

- Canteen, cooking and laundry facilities shall be built from easily cleanable materials and kept in a clean and sanitary condition. All such facilities shall be cleaned daily.
- Adequate facilities for washing and drying clothes shall be provided.
- Kitchens and other areas used for food preparation shall promote good food hygiene and protect against contamination. Kitchens shall include raised, smooth, easily cleanable, non-toxic and non-corrosive surfaces for food preparation. Wood burning will not be taken during cooking. Cooking and other activities will be done by gas provision through gas cylinder
- Adequate facilities for cleaning, disinfecting and storage of kitchen utensils shall be provided throughout the Contract period. Kitchens shall provide facilities to promote good personal hygiene, such as adequate hand wash and hand drying facilities. Food waste and other refuse shall be adequately deposited in sealed containers and regularly removed from the kitchen.
- Kitchens shall be sheltered and separated from living quarters.
- The contractor shall provide sufficient fuel for cooking inside camps, to prevent the collection of firewood.

6.7 Standards for Nutrition and Food Safety

The WHO safer food process shall be implemented. Food shall be made available to workers and shall contain an appropriate level of nutritional value and consider religious/cultural backgrounds.

6.8 Leisure, Social and Telecommunications Facilities

Basic collective social/rest/recreational spaces shall be provided. Workers shall be provided with dedicated spaces for religious observance if so warranted.

6.9 Parking Area

Sufficient parking area for material/equipment vehicles, and light vehicles shall be ensured.

7. TRAFFIC MANAGEMENT PLAN

7.1 Purpose

This plan has been prepared to fulfill a contractual obligation, provide guidelines and set criteria for the safety of the personnel, assets, general public and environment being affected by the movement of vehicles and equipment for the construction of the Project.

The following details based on the Environmental Code of Practice shall be considered

- Access routes for material deliveries to storage areas shall be ensured that it will not impact local traffic.
- Material-carrying vehicles will not disturb local traffic. Delivery vehicles should not be allowed to queuing on the local road.
- Loading / unloading points for deliveries are in the storage areas and shall not impact local routes and traffic.
- Appropriate warning signs should be displayed at different locations near the main barrage e.g. crossing points, pedestrian walkways, diversions, etc.
- Several flagmen shall be assigned to control and guide delivery vehicles to ensure smooth traffic flow.
- The contractor shall minimize traffic disruption by selecting non-peak hours for its vehicle's operation if possible
- The contractor shall ensure that high traffic flow is prohibited during working hours
- The contractor shall closely monitor the Traffic control management plan and ensure its implementation.
- Local authorities/District Management and traffic police shall be involved in handling traffic flow while the flow is at peak if required.
- They shall ensure regular sprinkling of water on hall routes to minimize dust/erosion.
- Speed limit signs shall be placed, and speed limits shall be followed and monitored regularly.
- Safe & defensive driving training sessions shall be conducted regularly.

7.2 Speed Limit

The speed limit shall be 10 - 20 km/hr on the project site and camp roads. This limit shall apply to all kinds of vehicles. On main roads, traffic-assigned speed limits shall be strictly followed by all drivers.

7.3 Road Safety Signs

- It shall ensure that depending upon the hazard identified, all required road safety signs are affixed at required locations and kept well visible and in good condition.

- Road safety signs shall be shifted according to progress in the construction phases.
- Barricading shall be used where required.

7.4 Transportation of Workers

- Camps of workers should preferably be located near the site so they can walk to the site on foot.
- However, if the camp is far from the site workers shall be provided with adequate means of transportation from camp to work sites and back to camps.
- It shall be ensured that the safest route is selected for the transportation of workers from camp to the work site and back.
- Vehicles transporting workers shall be well maintained and kept in excellent working condition, regular servicing shall be performed to keep the vehicle clean and tidy.
- Vehicles shall be parked in the designated parking slots to load and unload workers, workers shall not be allowed to board or get down from a moving vehicle.
- Drivers of the vehicles shall be instructed to only move the vehicles once all the workers have boarded, doors shall be closed and all workers have taken their seats.
- Vehicles shall leave the camps at a predetermined time which shall be informed to all workers, at the end of the work shift, vehicles shall leave the work site based on the planned time. Workers who are required to perform extended hours with the approval of the Engineer i/c if needed shall have vehicles available for transportation back to camps when they complete their work.

7.5 Transportation of Construction Materials & Equipment

- Transportation of construction material, plant and equipment shall be well-planned and executed safely
- In case of closure of roads while heavy movement, safety boards shall be displayed well before the start of activity and must be approved in advance by the relevant authority.
- Experienced drivers shall be assigned for transportation of heavy equipment/material to and from the work site
- All loads shall be properly tied down to the transporting vehicles and shall be checked prior to starting and during the journey
- Road martial/Flag man shall be assigned for the controlled crossing of transport.

7.6 Site Transport

- Only vehicles necessary for the construction operation shall be permitted on site
- Use of horn is not allowed near settlements
- It shall be ensured that only authorized and competent personnel are allowed to drive vehicles

- Loads shall be within the safe weight limit for the vehicle and shall not project beyond the vehicle body in such a manner as to present a hazard to other vehicles, pedestrians or adjacent structures
- Flagman shall be appointed where required, to minimize the incidents, especially to control the tipper truck movement
- Passengers shall not be carried unless a proper seat is provided
- Personnel shall not get on or off any vehicle whilst it is in motion
- All vehicles shall be parked on level ground with the hand brake applied
- Vehicles shall not block access or emergency points
- All drivers of vehicles shall be in possession of a valid national license for the class of vehicle.
- All drivers shall go through an orientation before entering the site.

7.7 Selection of Drivers

- All drivers shall have valid driving licenses and shall only drive vehicles they are authorized by the competent Authority. they will also have fitness from third-party validation
- It shall be ensured that drivers are fit and healthy
- The transport Supervisor shall assess the competency of the drivers before assigning the duty.

7.8 Selection of Vehicles

- It shall be ensured that vehicles are in perfect working condition.
- Vehicles shall be selected based on the requirement
- Selected vehicles shall have valid registration and insurance documents available
- HTV shall be fitted with reverse alarms.
- HTV shall have safety equipment installed and in working condition.

7.9 Traffic Violation

- Disciplinary action shall be taken against violators of project/road traffic rules and regulations.

Some examples of violations that shall be liable for disciplinary actions include the following key points and are not limited to:

- Driving without authority
- Using mobile while driving
- Over Speeding

- Not using safety equipment
- Letting personnel climb on or off while the vehicle is moving
- Misbehavior with passengers or other drivers.
- Use of liquor or sedative drugs
- All the vehicles will be got inspected/ monitored through a third party following the reverent contract clause.

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8. RESOURCE EFFICIENCY & POLLUTION PREVENTION AND CONTROL PLAN

The Contractor shall ensure that its construction activities do not result in the contamination of any surface water, groundwater or agricultural soil by adopting methods that will prevent entrance or accidental spillage, solid matter, contaminants, debris, and other objectionable pollutants and wasters into Indus river flowing streams, flowing or dry watercourses, and underground sources.

8.1 Air Pollution Control

- The Contractor shall ensure that mitigation measures as defined in the ESIA are in place to minimize the impact on health and the environment. The Contractor shall arrange Emission tests of vehicles, and generators through a third party approved by Environment Protection Agency in order to ensure compliance with national guidelines on ambient air quality.
- Water is to be sprinkled during the construction phase in all mixing areas where dry materials are handled and/or crushed. Temporary access roads to aggregate sites must be included in the dust suppression program.
- The Contractor shall routinely inspect generators by using a checklist and emission tests through a third party shall be done annually in order to ensure that emissions do not exceed SEQs / NEQs.
- Materials are to be transported safely in vehicles going to and from the construction sites to reduce spills. Dust suppression measures with the spraying of water should be taken for all roads used for transport.
- Comply with the national guidelines on ambient air quality standards and shall Implement ECP (Environmental Code of Practices) on Air quality management as defined in the ESA
- Vehicular traffic through communities will be avoided as far as possible. Vehicle speeds will be kept low if they should pass through communities.
- Dust Control Systems are an important factor in meeting environmental, health and safety requirements. Water Bowser shall be used to suppress the dust within the construction area.

8.2 Noise Pollution and Control

- Administration control will be applied to control noise pollution shall be:
- Warning Signs shall be affixed in noisy areas.
- Training shall be conducted to create awareness in workers about noise protection.
- PPE shall be provided for noise protection.
- Noise survey shall be conducted on regular basis to monitor the level of noise.

- Moreover, engineering controls will also be taken to control noise and separate rooms shall be constructed for generators and other noisy equipment.
- Ear plug/ear muff shall be used if the noise level exceeds from SEQs for day and night times.
- Safety signs and other mandatory hearing protection signs shall be placed in high-noise areas.
- The Contractor shall maintain construction machinery for the purpose of minimizing construction noise on the work site.
- The Contractor shall monitor noise and vibration results and adjust construction practices if required.
- In areas where noise may interfere with communication, suitable alternative arrangements shall be in place.
- All equipment in orders to keep it in good working order shall be maintained following manufacturers' maintenance procedures.
- Unnecessary use of alarms, horns and sirens shall be avoided
- Best available work practices shall be employed on-site to minimize occupational noise levels

8.3 Water Pollution

- The environmental Officer shall comply with applicable regulations concerning the control and abatement of water pollution as follows
- Construction activities shall be performed by methods that shall prevent entrance or accidental spillage of solid matter, contaminants, debris and other objectionable pollutants and wastes into flowing streams, flowing or dry watercourses and underground water sources.
- Pumps shall be provided to transfer fuel from fuel drums/tanks, and manual fuel pouring shall be prohibited.
- The Contractor shall ensure that caps on drums and tanks are completely sealed after filling.
- The Contractor shall ensure that drums and tanks are in good condition.
- Regular maintenance of vehicles and water browsers/ Water Pumps shall be carried out.
- Minimal generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes), It shall be ensured that these substances must not enter into waterways All waterborne plants shall be inspected daily prior to operation.
- All fuel tanks/drums shall be shifted and not stored on barges / waterborne vessels.
- The Contractor shall provide bonding around refueling points on any waterborne vessels to contain any spilled fuel.

- The Contractor shall ensure spill kits and absorbent material is provided at refueling points on all waterborne plant and ensures that staff involved in refueling operations is trained.
- Proper storage and disposal of waste shall be ensured.
- Handling of chemical waste through proper channels/third parties.

8.4 Spill Prevention and Contingency Plan

Spill Prevention and contingency plan describes planning, prevention and control measures to minimize impacts resulting from spills of fuels, petroleum products, or other regulated substances as a result of construction.

8.5 Plant and Vehicle Maintenance

- Vehicles shall be inspected by Equipment and Plant (E&P) department on a daily basis to check for leakages
- Vehicles found with the leakage shall not be allowed to move on site

8.6 Treatment of Spills

- Spill kit including absorbents, neutralizers, PPE's and tools for cleanup, oil spill boom, shovels; plastic bags shall be available to deal with spills.
- Shovels, plastic bags, and absorbent material shall be present near fuel and oil storage or handling areas to attend the spills and leaks
- All oil spills major or minor on the ground or in water shall be managed by the HSE team.
- Contaminated material resulting from spills shall be collected and declared hazardous waste.
- Contaminated material (hazard waste) shall be disposed of through proper procedure.

8.7 Run-off from Camps and Worksites

- The campsite shall be provided with all necessary drainage of storm water from the camp, construction area and community settlement.

8.8 Ground Pollution

- Hazardous substances shall not be discharged onto the ground
- All possible efforts will be taken to maintain the ground in a better condition & to avoid ground pollution
- Most Importantly the contractor will import monthly effects monitoring from a third party as suggested by PIC/ Client.
- The following parameters will be taken into account;

- Gaseous Emissions;
- Physical, Chemical and Biological Parameters of water being used at site;
- Noise Levels;
- Ambient air;
- Disease/Health monitoring;

8.9 Water, Raw Material usage & Monitoring

- Contractor will maintain record of water consumption and take measures to conserve resources.
- Use the water efficient equipment and machinery
- Reuse wastewater generated from camp in gardening and watering of tree plantation purpose.
- Raw material like stone, crush and other material shall be transported from authorized vendors.
- Consumption record of fuel and other materials will be managed in order to reduce or optimize the use.
- Solar Power will also be utilized for camp energy needs.

9. WASTE DISPOSAL AND EFFLUENT MANAGEMENT PLAN

9.1 General

- The contractor shall minimize the production of waste materials by the 3R (Reduce, Recycle and Reuse) approach and organize disposal of all wastes generated during construction activities by ensuring proper collection and disposal of waste.
- Prior Disposal certificate of local Municipal/Union Council (UC) will be collected
- Provide training to personnel in waste management practices and procedures.
- provide waste drums and waste bins in camp and at each work site
- Collect waste in color-coded drums as waste types
- Ensure good housekeeping practices during all operations in the camp or at work sites
- Maintain all construction sites in a cleaner, tidy and safe condition.

9.2 Prevention & Reduction

- On the project site this method will take first place as the first principle of waste management, a clear emphasis will be placed on determining how a waste stream can be reduced.

9.3 Waste Segregation

- Waste shall be collected in color-coded waste bins. These bins shall be labeled in local languages. Hazardous waste e.g. batteries, oil filters, paint containers, oily rags, etc shall be collected in red color-coded drums & should be stored in 'Hazardous waste' containers placed in the waste storage area and finally shall be disposed of as per the category of waste.

9.4 Secure Disposal

- Site-specific landfill site shall be established as per contract specification

9.5 Kitchen & Food Waste

- Kitchen waste / Food waste will be prevented by using reusable crockery and conducting training as per the training plan of the canteen staff on prevention, reuse and recycling of food waste. Moreover, waste bins with closing lids will also be provided in the kitchen and messes. Waste from these waste bins will be collected on a regular basis and transported through a vehicle to the final disposal point.
- The kitchen and food waste will be dumped to convert it into compost for plants

9.6 Camp Waste

- All the domestic waste from camps will be kept in waste bins provided in camps. Further waste from waste bins will be collected regularly and disposed of at designated disposal points.

9.7 Sanitary Waste

- The construction activities inherently have the potential to impact on water environment specifically groundwater and surface water. These management and mitigation plans ensure that construction activities are managed in a manner to not cause any negative impact or prevented them. However, the objectives of this plan are to proper disposal of wastewater after septic tank treatment.
- Provide and maintain hygienic, well-lit and ventilated sanitary facilities.
- Ensure sanitary facilities shall be provided within separate buildings in the vicinity of rooms/dormitories.
- All sanitary facilities shall be built from easily cleanable material and shall be cleaned daily.
- Sanitary facilities shall be built to provide adequate privacy. All doors shall be lockable.
- Sanitary waste shall be collected and treated in three chambered masonry-built septic tanks
- The septic tank shall be consisting of 3 chambers/portions for wastewater treatment and it shall be ensured, that the loading rate of the septic tank shall not exceed its treatment capacity
- The ultimate disposal of sewage would be into a soak pit
- Further soakage pits shall be constructed with all septic tanks.
- Arrange annual testing in order to ensure, that the release is within the prescribed limits of SEQS.

9.8 Hazard waste

- Any hazardous material will not be accepted without a material safety data sheet (MSDS) and shall be provided to the user by the store in charge at the time of issuing material
- The diesel fueling area shall be kept under controlled access.

9.9 Waste Disposal Method

9.9.1 Construction waste

Dirt, concrete, Plaster, plumbing, heating and electrical parts will be collected and segregated. Mechanical Scrap & wooden scrap will be sent to the scrap yard.

9.9.2 Packing waste

Request the supplier to minimize packing where practicable & Incinerate in the burn pit.

9.9.3 Excavated Waste

All excavated waste shall be disposed of at the designated Site.

9.9.4 Medical Waste

Syringes, soiled bandages, expired drugs & dressings will be collected in orange-colored waste bins and will be handed over to authorize medical waste handling authority i-e will be sent to the incinerator of the District hospital or any third party. Needle cutter shall be available with Doctor / First Aider.

9.9.5 Hazardous Waste

The concept of a **"cradle to grave"** tracking system is considered for proper management of disposal of hazardous waste generated viz cartridges/toners, used oil, grease, used batteries, batteries acid waste, etc shall be collected at source in color-coded waste bins/drums labeled as "**Hazardous Waste**" stored in tightly closed leak-proof containers, placed waste storage area and finally sent to The Contractor main workshop Hyderabad by complying the rules of Transportation and disposal.

9.9.5.1 Remedial Measures

- Limit the occurrence of hazardous materials, which increases the risk of Environment, Health & safety impacts
- Provide sufficient information to all site personnel regarding risks associated with Hazard material through Material Safety Data Sheet
- Control & manage access to the general waste storage area to ensure Environmental, Health & Safety illustrating the area of storage of Hazardous Waste Material
- Maintaining the Risk Register
- Products labeled as "nontoxic" prior to purchase are confirmed and shall be given the highest priority
- Construction of an impervious pad for storage of Hazard Material
- Ensure that all the drums/containers & tanks used for storage of Hazardous material viz used oil etc. have no leakage have proper seal arrangement and are in good condition for storage & transportation
- Ensure regular inspection of the fuel storage area
- Ensure eyewash facilities
- Ensure all precautionary measures while handling & storage POL circumvent the environmental pollution
- Ensure that all the personnel understand and can implement the action required for safe handling of Hazardous Material.

10. BORROW AREA MANAGEMENT AND RESTORATION PLAN

- Borrow areas shall be established as per the relevant contract clause or as approved by the Engineer. The Contractor shall be responsible for determining the ownership of land required for borrowing areas other than specified areas in the Contract and shall submit such records to the Engineer.
- Agree (MOU) with the landowner. However, in the case of Government land, written approval shall be required from the concerned department
- Slopes of borrow areas shall be maintained.
- Access routes shall be maintained through regular sprinkling of water.
- A comprehensive detail e.g. location, area etc of borrow area shall be maintained.
- Borrow areas shall be reinstated if required.
- A topography survey of the borrow area shall be conducted before its use all the private or public utilities inside the borrow area such as electric poles, underground water lines, and gas pipelines shall be marked accordingly.
- A photographic record shall be maintained prior to the start of activities in the borrow area and pictorial evidence shall also be kept after restoration.
- Adequate access and egress shall be maintained for the movement of the machinery in the borrows area.
- Dust shall be controlled through regular water sprinkling at least thrice a day.
- Prepare a list of fauna and flora present in the borrow area

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11. DRINKING WATER AND SANITATION PLAN

The Contractor shall ensure access to a free, safe, readily available potable water source at all times. Drinking water quality shall meet WHO standards & SEQS and Sindh factories act guidelines. Prior to use, the Contractor shall arrange tests on samples of each drinking water source from a laboratory approved by the EPA / SEPA annually. The results of these tests shall be submitted to the Engineer. The Contractor shall use water for construction activities after approval from the Engineer.

12. EMERGENCY PREPAREDNESS & RESPONSE PLAN

12.1 Purpose

A good Emergency Preparedness & Response Plan (EPRP) will help people take quick and effective action in the event of an emergency. It will help in easing the severity of the situation and limit the consequences.

EPRP provides procedures and structures for response to emergencies. EPRP provides strategies to combat specific situations and assign responsibilities for implementation.

The emergencies include but are not limited to;

- Fires
- Rains/Floods
- Explosions
- Civil disturbance
- Poisoning
- Structural Failures
- Workplace violence resulting in bodily
- Harm and Tolerance
- Chemical spill

12.2 Emergency Drills

All site personnel/members of the public (if applicable) will follow this plan that shall be tested through exercises/drills quarterly. These drills shall be conducted on the following scenarios;

- Fire Fighting
- Medical Evacuation
- Flooding
- Thunderstorm
- Spills of hazardous material
- Work at height

12.2.1 Fire Fighting

- The operation on Fire Extinguishers and fire buckets shall be taken according to the **"Firefighting Procedure"** laid for which training shall be given at regular intervals.

- Maintenance and inspections of firefighting appliances will be ensured through the checklist and regular monitoring.

12.2.2 Emergency Drills

- Emergency response drills shall be conducted in the camp and the work site, and the observations and debrief notes shall be recorded. OHSO shall analyze the findings and identify any remedial actions required.
- The emergency procedure shall be updated from time to time to reflect observations made. Training shall be conducted on a regular basis for emergency response teams.
- The location of emergency facilities e.g. firefighting appliances shall be identified on plans displayed at conspicuous locations.

12.2.3 Emergency Evacuation

- Activate the emergency disaster siren to evacuate the area safely and ensure that unnecessary personnel leave the site by a safe route. The PM shall assign responsible personnel to advise security to open the facility's main gate for emergency vehicles.
- For emergency response activities managed by The Contractor, key roles and responsibilities are detailed below:

12.3 Roles and Responsibilities

Key roles and responsibilities are detailed below:

12.3.1 Project Manager (Contractor's Representative)

The Contractor's Project Manager shall be responsible for the implementation of all the details of Environment and Social Management activities given in this CESMP.

- Providing leadership and direction in the event of an emergency.
- Ensuring that emergency response planning, preparedness and execution are consistent with the site requirements
- Ensuring that appropriate field response teams are defined and prepared for the various emergency response scenarios identified in this plan.
- Notification to the Client of any emergency incident.
- Providing leadership and direction in the event of an emergency.
- Ensuring that emergency response planning, preparedness and execution are consistent with the site requirements
- Ensuring that appropriate field response teams are defined and prepared for the various emergency response scenarios identified in this plan.
- Notification to the Client of any emergency incident.

- Following initial notification, the liaison will be made with the Client during the execution of any emergency response.

12.3.2 Environmental Officer (EO)

- The environmental officer shall be responsible to aid with the practical implementation of CESMP. Specific responsibilities of the Environmental Coordinator officer include;
- Ensure compliance with national legislation related to the environment and with the World Bank's environmental safeguard policies
- Oversees and ensures the implementation of the environmental components of CESMP and parallel management plans
- Reports on non-compliances and promotes corrective actions.
- Conduct regular inspections to check that impact mitigation measures are being implemented properly
- When required, arrange environmental training for the relevant.
- Personnel, The Contractor staff, contractors and service provider
- Reviews environment performance and reports to the in-charge HSE.
- To ensure that workers' accommodation meets the basic environmental requirements
- Maintain Trees Inventory
- Participate in Monthly Effects Monitoring by the third party

12.3.3 Occupational Health and Safety Officer (OHSO)

- OHSO will be responsible for site management for the on-site implementation of the CESMP plan. OHSO will specifically aid with the following;
- To ensure that worker camps & latrines shall comply with The Sindh Occupational Safety and Health Act, 2017, Labor Camp Rules, 1960 & Sindh Factories Act 2015.
- Prevention of injury to personnel and damage to equipment
- Provision and ensure the use of protective clothing and equipment
- Assessments of potential hazards on jobs before work start
- To ensure that workers' accommodation meets applicable requirements
- Carrying out hazard identification and risk assessment, in association with the Construction Manager, Civil Supervisor to decide on the best safe methods of work in operation.
- Determining the cause of any accident or dangerous occurrence and recommending means of preventing recurrence. Arrange necessary OHS training for the workers and other relevant staff
- The OHSO is responsible for ensuring at the site that provisions are in place for emergency response, including:

- Muster points.
- Arrangements for conducting head counts.
- Identification and Mobilization of the Fire Team.
- Setting up drills and exercises.
- First Aiders with Ambulance.
- Conduct TBT (Tools Box Talks)
- Conduct WSTS (Weekly Safety Talks)
- In the event of any emergency the OHSO shall take the following actions:
- Shall attend the site of the incident, assess the situation and issue directions to the concerned parties and the Fire Team.
- Ensure that messages have been communicated to The Field Response Team Leader.
- Ensure all escape routes and assembly areas are marked by respective safety signs in the field as indicated on the site plan.
- Evaluate the scale of the incident and decide whether additional resources are required to adequately deal with it.
- Ensure effective use of PPE.
- Liaise with site supervision for the mobilization of any plant and equipment necessary for dealing with the emergency
- Limit access to the area with barriers or other means to prevent unauthorized access
- Coordinate the reinstatement measures following the stabilization of the incident.
- Prepare a full report.

12.3.4 Community Liaison Officer (CLO)

- Ensure access to information by communities and use of localized means to disseminate information.
- CLO will provide information to communities on employment opportunities, Risks, Impacts and Mitigations prior to the start and end of construction and when other changes in project activities take place
- CLO will conduct consultation meetings with community leaders
- Coordinate activities concerning social mobilization and civil society involvement in the project
- The Community Liaison Officer (CLO) will maintain the Social Complaint Register (SCR) and complain box at the site to document all complaints received from the local communities and the actions taken against each complaint
- CLO will be inconsistent liaison with management and the community
- CLO will also document oral complaints (if any) by the community

- Community Liaison Officer (CLO) shall be hired having a background in sociology Subject
- Proper communication & implementation of Communication and Local Recruitment Plan
- CLO will also handle the issue of resettlement due to dam work. Employment opportunities will be addressed through CLO and Village Focal Points nominated and their frequency depends upon manpower requirements at the site. Community complaints will be maintained on a register and in the complaint Box. Community issues will be communicated as part of the routine HSE meetings held with the management. Actions taken against the complaints will also be maintained to show as issue close-out evidence. the progress will be part of the monthly monitoring and implementation report of the contractor to be submitted at PIC.

12.3.5 Dispenser

- Holding a Certificate/Degree recognized by Pakistan Medical Commission
- Able to conduct the bred examination of each patient and also to document clinical findings
- Able to screen out Blood samples
- Able to operate BP apparatus and glucometer
- Able for Main medical record and could give a complete first add before
- reaching hospital
- Able to prescribe proper medication
- Able to keep a record of all medical proceedings
- Able to communicate and report the progress as and when necessary.

12.4 Emergency Response Team

In the event of an emergency, the chain of command will be as follows;

Name	Designation	Contact No.
	Site Manager	
	Environmental Engineer	
	Occupational Health & Safety Officer	
	Community Liaison Officer	
	Dispenser	

13. TRAINING PLAN

- As part of the Contractor's Environmental and Social Management Plan (CESMP) the training plan including the details such as subject, attendees, duration and frequency of the training has been prepared to provide all personnel with adequate information, instruction and training on environmental and social awareness, cultural sensitivity & occupational health and safety (Please see **Annexure 2**). The Contractor shall be responsible for conducting all the specified training through its highly trained Health, Social, and Environmental Management Team with the consultation of PIC. The Contractor shall also hire the services of experts with the prior approval/consultation of PIC for more training necessary and momentous for health, safety, social & environmental particular perspective under the provision of the contract. Training activities shall be recorded and reported on a regular basis.

The Contractor shall:

- Update the training plan on a need basis.
- Organize induction training for all staff.
- Ensure employees are trained in the proper use of equipment in their care to minimize the risk of accidents.
- Training Plan shall include below subject training as a minimum:
- Handling, use & disposal of hazardous material
- Waste Management
- Efficient & safe driving practices, including road & vehicle restrictions
- Actions to be taken in the event of major or minor pollution events on land
- Pollution Prevention
- Refueling of waterborne plant and Vehicles
- Use of spill kits and flexible booms
- Safe way to work & hazard awareness
- Safe Use of Plant and Equipment
- Work at Height
- Use of PPE
- Emergency Procedures and Evacuation
- Fire Fighting
- Importance of Tree Plantation
- Awareness of site-sensitive areas.
- HIV/AIDS/Covid19
- COVID-19

- Cultural Sensitivities of the local population
- Grievance Redressal Mechanism / GBV /SEA/SH
- Social Mobilization/Consultation
- Awareness of Social and Cultural Dynamics
- Gender Issues

14. ENVIRONMENTAL MONITORING PLAN

- The Contractor Environmental Officer shall be responsible for day-to-day monitoring of compliance with the environmental and social requirements of this specification as well as the requirements of the CESMP.
- The Environmental Officer shall prepare a monthly report to the Engineer. The format of the monthly report shall mutually be finalized however; it shall be ensured that the requirement of CESMP has been incorporated in the monthly report. The report shall also provide detailed actions taken or proposed by the Contractor in response to any non-compliance identified the report shall be submitted not later than the third of each month.
- The Environmental Officer shall be available to attend monthly meetings (when and where arranged by the Employer) to discuss environmental and social performance on Site. When instructed by the Employer or Engineer, any other member of the Contractor staff shall be available to attend such meetings.

14.1 HSE Inspections

- The Contractor shall utilize a number of inspections not only to ensure compliance with the requirements of the CESMP but also to get feedback for the improvement of the CESMP
- The Environmental Officer shall conduct inspections on day to day basis
- The Environmental Officer shall be responsible to identify noncompliance and report it to the Site Manager/Project Manager
- Construction Managers and the area in charge shall be responsible for rectification of highlighted non-compliance
- The Environmental Officer will also maintain a record of tree inventory.

15. COMMUNICATION AND LOCAL RECRUITMENT PLAN

The following records will be maintained

15.1 Employment

- Total number of unskilled, semi-skilled, and skilled jobs offered during construction
- Name and domicile of the employed staff
- CNIC of Staff will be prioritized
- Driving license of all drivers will be mandatory.

15.2 Project and Community Interface

- Record of community complaints and the measures taken to address them.
- Number of meetings held in various communities and persons who attended

15.3 Local Recruitment Plan

- The potential employment-related issue includes dissatisfaction among local communities over the number of jobs offered to them, disagreement on the definition of 'local' and also on the distribution of jobs within the local community.
- The following measures will be implemented:
- There will be no discrimination and equal opportunities will be provided to the local community through effective methods.
- A maximum number of unskilled and semi-skilled jobs will be reserved for the local communities
- Job opportunities will be communicated to local Notable persons of villages through CLO
- The following may be the salient features of the criteria:
- For any construction work, an agreed percentage of the labor will be attempted to be hired from the nearest villages
- If possible, keeping in view the required and available craft category, the jobs within the nearer villages would be distributed in proportion to the unemployed persons available from each village.
- Village Focal Points (Both Male and Female) from villages will be nominated by the villagers to liaise/interact with the Contractor through CLO.

15.4 Communication for Traffic Management

- The following measures will be adopted:

- A strong liaison will be maintained with the community. The community will be knowledgeable in advance of any slow-moving heavy/wide loads that will disrupt local traffic patterns.
- Vehicles will remain confined to defined designated access roads
- Project specific speed that is 10-20 Km/hr Limit of vehicle & will be obligatory for all related with the contract
- To the extent possible, peak traffic times will be avoided for project site traffic.

15.5 Community Relations Management

- During the currency of the project, active consultation will be maintained with the community through informal and formal meetings.
- The record of the meeting describing the objective will be maintained by CLO
- A complaint registering, tracking and Redressal mechanism will be implemented.
- The non-local project staff will be sensitized to local culture and norms
- Unnecessary interaction of the local population with the non-local project staff will be avoided.
- Construction workers not belonging to the local area will be prohibited from entering the residential area

15.6 Grievance Mechanism

- A grievance can be submitting

a. Receiving complaints from **Fixed Complaint Box**

b. Complaints from the complaint register

c. Directly to Contractor

d. Directly to Employer/ PIC

e. Through Union Council

- Forwarded through CLO to Grievance Redressal Committee (GRC)

15.7 Grievance Redressal Mechanism

- It should be ensured that
- The grievance recorded register is available at the site.
- The complaint box is fixed at the site.
- Immediate action to satisfy the complaint and corrective action information to the complainant
- Implement corrective action. Record the date, and action taken and present it to GRC.

16. SECURITY PLAN

16.1 Purpose

- The purpose of this part is to describe the primary functions in security necessary for the prevention of personal injury, loss of equipment materials, etc. due to carelessness, negligence and vandalism and pilfering.

16.2 Scope

- This specification defines the rules, regulations and responsibilities which must be implemented in order to effectively control security operations on the work scope of the site. The main objective of security is to protect the property from fire & theft and to stop unauthorized entry into the specified area. The Contractor's security rules and regulations will be incorporated to the maximum possible extent into the job site security rules as per the requirement of the site.

16.3 Method and Responsibilities

16.3.1 Responsibilities

- PM is responsible for arranging meetings with the security representatives to outline the Contractor requirements for security and to incorporate any requirements into the security plan of the project.
- OHSO will be responsible for implementing the Security Plan, monitoring and supervising its implementation and administering the subsequent operations.
- To provide security either through a Security Company or Local Watchman to prevent unauthorized access to the site and camp area.
- To ensure that Local language speaking staff shall be available to communicate with the local community.
- OHSO shall ensure that emergency contact numbers have been displayed clearly and prominently at different locations in the camp and working area.
- The Community Liaison Officer with the consultation of the PM shall coordinate with concerned local Law Enforcement Agencies.
- A record shall be maintained to keep track of the headcount of persons Identification of Employees
- The Contractor employees working on site will be issued site identity cards on completion of the HSE induction course as per The Contractor's procedures.
- All employees on site must carry their site identity card at all times, non-compliance with this rule can exclude the person from the site until the site identity card is produced.

- Employees must not use any site camp area for the purpose of domestic habitation. Any employees in breach of this rule will have their site identity card confiscated followed by their expulsion.
- When a person leaves the site on termination or transfer he must return the site identity card.
- Personnel must have the appropriate Personnel Protective Equipment (PPE) prior to entry to the site; no compliance with this rule can result in immediate expulsion from the site.

16.3.2 Visitors

- The temporary visitors will be provided with the visitor's card after registration of their name, the reason for the visit and the address with respect to the company. The visitor card/batch will be signed off and returned to the gate at the end of the visit. Visitors will be accompanied at all times on-site by a responsible person until or unless they are properly inducted and issued a full identity card.
- Ensure that all visitors are made aware of any HSE regulations which are in force on site and of fire and emergency evacuation procedures.
- The visitor's book will be placed in order to note their remarks and comments.

17. PHYSICAL CULTURAL INFRASTRUCTURES (PCIS)

- No archaeological site was observed near (within 500 meters) the project area and no physical cultural resources at or near the proposed sub-project; sites are observed that may likely be affected by construction activities.
- In case of discovery of an unidentified graveyard or sensitive area, The Contractor shall notify the Engineer and the following Chance Find Procedure will be adopted:
- On discovery of archeology resources, all work in the area shall be stopped
- The engineer shall be informed about the discovery
- A brief report with photo, plan and location shall be submitted to the client and Engineer
- Work shall commence again according to the recommendations and comments provided by the Engineer.

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ANNEXURES

Annexure 1: Curriculum Vitae Of EHS Personnel

Annexure 2: Environment, Social, Health and Safety Training Matrix

ENVIRONMENT, SOCIAL, HEALTH, AND SAFETY TRAINING MATRIX									
S. No.	Topics/Courses Required	To be Attended By			Duration	Schedule	Status		Remarks
		Employees in Management	Skilled Crafts	Labors			Completed	Outstanding	
1.	Initial Orientation	✓	✓	✓	2 hrs	Once upon joining			
2.	Specific Orientation (on job)	✓			2 hrs	On job assignment			
3.	Training to Staff Working within Active Process Area	✓	✓	✓	2 hrs	As & when required			
4.	Daily Tool Box Talk		✓	✓		Daily			
5.	Safety Talks				15 min	Weekly			
6.	Covid-19 SOP	✓	✓	✓	10 min	Daily			
7.	Task-Specific Training Course	✓	✓	✓					
8.	Environmental Issues	2 hours As & when required							
9.	PPEs on Site				2 hour	Weekly			
10.	Driving Rules and Driver's Training	FOR ANY CATEGORY			2 hour	- Do -			
11.	Risk Assessment				1/2 day	- Do -			
12.	Accident/Incident Reporting				1/2 day	- Do -			
13.	Emergency and Evacuation Drills & Exercises				1/2 day	- Do -			
14.	Scaffolding and Ladders				1/2 day	- Do -			
15.	Fire Fighting				1/2 day	- Do -			
16.	Hazardous Material Handling				1/2 day	- Do -			

ENVIRONMENT, SOCIAL, HEALTH, AND SAFETY TRAINING MATRIX									
S. No.	Topics/Courses Required	To be Attended By			Duration	Schedule	Status		Remarks
		Employees in Management	Skilled Crafts	Labors			Completed	Outstanding	
17.	First Aid				1/2 day	- Do -			
18.	Working at Heights				1/2 day	- Do -			
19.	Wastes and Spills				3 hours	- Do -			
20.	Air/Water Emissions				3 hours	- Do -			
21.	Grievance Redressal Mechanism		✓		½ hour	As & when required			
22.	Community Mobilization/Consultation		✓	✓	½ hour	Once in month			
23.	Social and Cultural Dynamic		✓	✓	½ hour	Once in month			
24.	Gender Issues		✓	✓	½ hour	Once in month			

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Annexure 3: Daily Check list of Diesel Generator

(Rated _____ KVA)

Dated:

Radiator With Cower and Water level	Battery water level and Terminal Covers	Panel With all Meters
Engine condition	Earthing	Secondary containment
Oil \ Diesel Leakage	Electrical Connection in Proper condition	D B Condition
Fire Extinguisher	Emergency Stop Switch	
Remarks:-		
Generator operator Name with Signature:-		

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Annexure 4: Induction Record

HSE Induction Record						
S.No	Date	Name	Designation	CNIC No	Signature	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Annexure 5: Employee Arrival Departure Formats

EMPLOYEE ARRIVAL-DEPARTURE FORM

Project: Reference#:

Name : _____ CNIC# _____ _____

Designation: _____ Arrival Date: _____ Arrival Time: _____

Cell#: Departure Date: Departure Time:

S. No#	Items	Issue Date	Employee Signature	Return Date	Store Incharge Signature
1-	Coverall				
2-	Goggles				
3-	Helmet				
4-	Shoes				
6-	Jacket				
7-	Blanket				
8-	First Aid Box				
9-	Fire Extinguisher				
10-	Water Cooler				
11-	Tracker/Logger				
12-	V.H.F				
13-	Reverse Horn				
14-	Seat Belt				
	Others If Any				
15-					

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Annexure 6: Employee Arrival Departure Formats

FIRE EXTINGUISHER CHECKLIST

Inspected By _____ Inspection Date _____

S.No	ID	Type	Weight	location	Body Condition	Use Instructions	Hose/ Horn	Height	shade	Mono Meter	Safety Pin	Safety Seal	Tag	expiry	Remarks

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Annexure 7: Fire Extinguisher Tag

Fire Extinguisher Type:_____
Fire Extinguisher Weight:_____

Month	Inspection Date	Inspected By	Signature	Remarks
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				

Fire Extinguisher Type:_____
Fire Extinguisher Weight:_____

Month	Inspection Date	Inspected By	Signature	Remarks
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				

Fire Extinguisher Type:_____
Fire Extinguisher Weight:_____

Month	Inspection Date	Inspected By	Signature	Remarks
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				

Fire Extinguisher Type:_____
Fire Extinguisher Weight:_____

Month	Inspection Date	Inspected By	Signature	Remarks
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				

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Annexure 8: Vehicle Inspection Checklist

Vehicle:	Driver/Opt:	Date:	
Weekly Inspection Check List			
All Lights/ Indicators Are Properly Working	Horn Working Properly	Radiator Water Checked	Hand Brake Working Properly
Fire Extinguisher Is Available	No Oil Leakage	Foot Brake Working Properly	**Logger is Available**
Wheel / Studs & Nuts Are Checked	All Side View/ Rear View Mirrors Are Fixed	Seat Belts Are Properly Fitted	Chock Blocks Are Available
Battery Is In Good Condition & Terminals Are Covered.	Tool Kit Is Available	First Aid Box Is Available	Wind Screen / Wipers Checked
Remarks:			
Checked By Name:			
Driver's Signature:			

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Annexure 9: OPD Daily Report

DAILY OPD Report						
Project:				Date:		
S. No	Patient Name	Designation	Diagnoses	Medicines Recommended	Dosage	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
	Doctor/Medic signature:			HSE Officer Signature:		

Annexure 10: HSE Toolbox Topic

HSE TOOL BOX TOPICS

1. Hearing Protection.
2. Heat Stress .
3. Accident Prevention.
4. Excavation &Trenching Safety.
5. Hand Tool Safety.
6. Hazard Awareness.
7. Heavy Equipment Safety.
8. House Keeping.
9. Manual Handling.
10. Importance of Personal Protective Equipments.
11. Ladder Safety.
12. Work at height Safety.
13. Scaffolding Safety.
14. Bullying Hazards.
15. Smoking Safety.
16. Role & Responsibilities of Individual towards Hazard.
17. Electrical hazards and its safety.
18. Power tool safety.
19. Concrete Hazards.
20. Steel Fixing Hazards.
21. Slips/Trips/Falls
22. Behavior- Based Safety
23. Lightning Safety
24. First Aid & Medical
25. Fall Protection
26. Carbon Monoxide CO Safety
27. Noise Hazards and its preventive measures.
28. Stress Hazards
29. Heat Stroke
30. Fire Safety
31. Construction Safety

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Annexure 11: Tool Box Talk

Tool Box Talk

Topic		**Location**	
Conducted by		**Signature**	
Time started		**Time ended**	
Date			
S.No.	**Name**	**Designation**	**Signature**
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

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Annexure 12: Incident / Accident Report Form

Project Title : _____ Project # : _____

Near Miss / Incident:- Title _____ Report No.: _____

Report of Incident – Section I							
Responsible Contractor / Dept. :							
Short Description of Incident:							
Report Prepared By:	*Name:*	*Job Title:*	*Contact Details:*				
Responsible Supervisor:	*Name:*	*Job Title:*	*Contact Details:*				
Incident Owner:	*Name:*	*Job Title:*	*Contact Details:*				
Where did the incident occur?							
Location:							
Specific Location:							
What were the conditions like?							
Weather:							
Lighting:							
Road Surface:							
When did the incident occur?							
Date Occurred:	*(day/month/year)*		**Time:**	*24 hour*			
Date Reported:	*(day/month/year)*		**Time:**	*24 hour*			
Who or What was involved?							
Employee:	*Name:*	*Job Title:*	*Contact Details:*				
Contractor:	*Name:*	*Job Title:*	*Contact: Details:*				
Witnesses:	*Name:*	*Job Title:*	*Contact Details:*				
Vehicle / Equipment Involved:	*Description and Number:*						

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Event Type:					
Incident resulting in personnel injury	☐		Non-conformance	☐	
Incident resulting environmental damage	☐		Public complaint	☐	
Incident resulting in asset damage	☐		Potential incident	☐	
Near miss	☐		Unsafe act	☐	

Type of Hazard: * Encircle any of the following hazard types.		
A. Health hazards	B. Safety hazards	C. Environment hazards
1. Hazardous Material	1. Fire and Explosion	1. Airborne Emission
2. Asphyxiation	2. Flammable Properties	2. Underground Equipment Failure
3. Radiological	3. Ignition Sources	3. Surface water Run-off
4. Lightning	4. Opening Equipment for Maintenance	4. Process Water Effluents
5. Burns	5. Process Hazards	5. Separators
6. Noise	6. Entry into Confined Spaces	6. Waste Generation Disposal
7. Microbiological	7. Hot Work	7. Sludges
8. Hygiene/Cleanliness	8. Machinery	8. Refrigerants
9. Health	9. Electricity	
10. Physical Damage	11. Excavations	
	12. Working at Height	
	13. Road Operations	
	14. Falling Objects	

Associated Risk:

Enter any illness or injury information:

Enter any spill information:

Enter full description of this incident:

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Enter any immediate corrective actions taken:								
Actual Incident Risk Assessment: See IRAM (Annexure A) *(Please circle)*								
Likelihood:	**People**		**Asset**		**Environment**		**Reputation**	
A, B, C, D, E	0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5	
Risk Classification:	**Red**	☐	**Yellow**	☐	**Green**	☐		
Potential Incident Risk Assessment: See IRAM (Annexure A) *(Please circle)*								
Likelihood:	**People**		**Asset**		**Environment**		**Reputation**	
A, B, C, D, E	0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5		0, 1, 2, 3, 4, 5	
Risk Classification:	**Red**	☐	**Yellow**	☐	**Green**	☐		
Section II - Root Cause Analysis								
1. Substandard Action			2. Substandard Condition					
3. Personnel Factor			4. Job Factor					
CAUSES CHECKLIST								
IMMEDIATE CAUSES								
SUBSTANDARD ACTIONS			**SUBSTANDARD CONDITIONS**					
[] 1.Operating equipment without authority			[] 1. Inadequate guard or barriers					
[] 2. Failure to secure			[] 2. Improper protective equipment					
[] 3.Failure to warn			[] 3. Defective tools, equipment					
[] 4.Operating at improper speed			[] 4. Conjunction or restricted action					
[] 5.Making safety device inoperable			[] 5. inadequate Warning System					
[] 6.Using Defective equipment			[] 6. Fire & Explosion Hazards					
[] 7.Using Equipment improperly			[] 7. Poor Housekeeping					
[] 8.Failure to properly use PPE			[] 8. Environmental conditions					
[] 9.Improper loading/placement/lifting			[] 9. Noise/Radiation Exposures					
[] 10.Improper position for task			[] 10. Inadequate Ventilation					
[] 11.Servicing equipment in operation			[] 11. High or low temperatures					
[] 12. Horse play			[] 12. Inadequate illumination					
UNDERLYING CAUSE / BASIC CAUSE								
PERSONAL FACTORS			JOB FACTORS					
[] Inadequate capability			[] Inadequate Leadership supervision					

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[] Lack of knowledge [] Lack of skill [] Stress [] Improper motivation	[] Inadequate Engineering [] Inadequate Purchasing [] Inadequate Tools/Equipment [] Inadequate Maintenance [] Inadequate Work standards [] Wear & Tear [] Abuse or misuse

Conclusion

Preventive Actions

Recommendations by Investigator	**Responsibility**	**Closing Date**
	Date	Area lead Incharge

Report Distribution: *Note: * select amongst the following. PM, SM, Head QHSE, Head BA, CEO, construction mgr., Comm. mgr., HSE incharge, subcontractor.*		

Report Entered By:	*Name:*	**Date:**
Incident Report No.:		

SM / Incident Owner
Date:

Site I/C HSE
Date:

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Annexure XI: WHO Permissible Limits for Heavy Metals in Soil

S. No	*Elements	*Target Value of Soil (mg/kg)
1.	Cd	0.8
2.	Zn	50
3.	Cu	36
4.	Cr	100
5.	Pb	85
6.	Ni	35

*Target values are specified to indicate desirable maximum levels of elements in unpolluted soils.