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GOVERNMENT OF SINDH

Irrigation Department and Provincial Disaster Management Authority

SINDH RESILIENCE PROJECT (SRP)

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK AND RESETTLEMENT POLICY FRAMEWORK (ESMF/RPF)

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LIST OF ACRONYMS

ACE	Associated Consulting Engineers (Pvt.) Ltd
BISP	Benazir Income Support Program
BP	Bank Policy
BU Bund	Bughar Ucheto Bund
CBO	Community Based Organization
CITES	Convention on International Trade in Endangered Species
CoI	Corridor of Impacts
DACREP	Disaster and Climate Resilience Enhancement Project
DC	Deputy Commissioner
DCRIP	Disaster and Climate Resilience Improvement Project
EA	Environmental Assessment
EC	Electrical Conductivity
ECA	Employment of Child Act
EIA	Environmental Impacts Assessment
ESIA	Environmental and Social Impact Assessment
ESMEC	Environmental/Social Monitoring and Evaluation Consultants
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMU	Environmental and Social Management Unit
ESU	Environmental and Social Unit
GoS	Government of Sindh
GRC	Grievance Redress Committee
GRF	Grievance Redress Focal Point
GRM	Grievance Redress Mechanism
IBIS	Indo Basin Irrigation System
IEE	Initial Environmental Examination
ISDS	Integrated Safeguards Data Sheet
IUCN	International Union for Conservation of Nature
LAA	Land Acquisition Act
MSK	Medvedev Sponheuer Karnik
MS	Mulchand Shah-Bunder
NCS	National Conservation Strategy
MEAs	Multilateral Environmental Agreements
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NGO	Non-Government Organization
OD	Operational Directives

OHS	Occupational Health and Safety
OP	Operational Policy
PAP	Project Affected Person
PAK EPA	Pakistan Environmental Protection Agency
PC-I	Pakistan Planning Commission Form – 1 Appraisal of Development Project
PCC	Public Complaint Centre
PCRWR	Pakistan Council for Research in Water Resources
PD	Project Director
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
pH	Power of Hydrogen
PIC	Project Implementation Consultants
P&DD	Planning and Development Department
PID	Project Information Document
PIEDAR	Pakistan Institute for Environmental Development and Research
PIU	Project Implementation Unit
PKR	Pakistani Rupee
PDMA	Provincial Disaster Management Authority
PSC	Project Steering Committee
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SCOPE	Society for Conservation and Protection of Environment
SDPI	Sustainable Development Policy Institute
SEPA	Sindh Environmental Protection Agency
SEPC	Sindh Environmental Protection Council
SH Bund	Sunda Hilaya Bund
SID	Sindh Irrigation Department
SIDA	Sindh Irrigation and Drainage Authority
SMEDA	Small and Medium Enterprise Development Authority
SRP	Sindh Resilience Project
SSSD	Sindh Strategy for Sustainable Development
SWD	Sindh Wildlife Department
SWMO	Sindh Water Management Ordinance
UN	United Nations
UNCOLS	United Nations Convention Laws on Seas
UNFCCC	United Nation Framework Convention on Climate Changes
WAPDA	Water and Power Development Authority
WB	World Bank
WWF	World Wildlife Fund

DEFINITION OF TERMS

Cut-off date: For non-land related losses it is the date of start of census while for land related losses, it is the date of the notification of section 4 under the LAA (1894).

Encroachers: are those owners or occupiers of land adjacent to public property, that have illegally extended their land holdings or structures into adjacent land owned by another party.

Household (HH): A household is a group of persons who commonly live together and would take their meals from a common kitchen.

Land: The term land refers to land acquired under the Land Acquisition Act or through private transactions.

Affected Persons (AP) includes any person or persons, households, a firm, or private or public institution who, in the context of acquisition of assets and change in land usage, as of the cut-off date, on account of the execution of the project, or any of its subcomponents or part, would have their:

- Standard of living adversely affected;
- Right, title, or interest in any house, land (including residential, commercial, agricultural and grazing land) or any other moveable or fixed assets acquired or possessed, in full or in part, permanently or temporarily adversely affected; or
- Business, occupation, places of work or residence or habitat adversely affected, with or without displacement.

AP means persons or affected household and consists of all members of a household residing under one roof and operating as a single economic unit, who are adversely affected by a project or any of its components. For resettlement purposes, affected persons will be considered as members of affected households.

Replacement Cost: means an amount needed to replace an asset at current overhead expenses of the transaction, including stamp duty and registration charges, as follows:

- Agricultural land based on its productive potential;
- Residential land based on market value;
- Houses and other related structures based on current market prices of building materials and labor, without depreciation and deductions for salvaged building materials, plus transaction costs (such as administrative charges, registration and titling costs),
- Trees, crops and plants on current market value; and;
- Other productive assets like shops and commercial assets based on current market value of similar location attribute i.e. premium;

Squatters: are persons who occupy / possess or use an asset without legal title.

Tenant means a person utilizing/cultivating land owned by someone else in return for payment in cash or kind.

Vulnerable groups: These are distinct groups of people who might suffer disproportionately or face the risk of being marginalized from the effects of resettlement and include: (i) female headed households with dependents, (ii) disabled household heads, (iii) households falling under the generally accepted indicator for poverty, (iv) elderly households with no means of support and landlessness; (v) households without security of tenure; and (vi) ethnic minorities and

indigenous peoples. Other groups may also qualify as "vulnerable" in the light of disadvantages circumstances e.g. children.

Involuntary Resettlement: It refers to two distinct but related processes. Displacement is a process by which development projects cause people to involuntarily lose land or other assets, or access to resources. This may result in physical dislocation, loss of income, or other adverse impacts. Resettlement or rehabilitation is a process by which those adversely affected are assisted in their efforts to improve, or at least to restore, their incomes and living standards.

Compensation: Payment in cash or in kind of the replacement cost of the acquired assets.

Land Acquisition: The process whereby a person is compelled by a government agency to alienate all or part of the land a person owns or possesses to the ownership and possession of the government agency for public purpose in return for compensation.

Improvements: Structures constructed (dwelling unit, fence, waiting sheds, animal pens, utilities, community facilities, stores, warehouses) and crops/plants planted by the person, household, institution or organization.

Entitlement: Range of measures comprising compensation, income restoration, transfer assistance, income substitution, and relocation which are due to affected people, depending on the nature of their losses, to restore their economic and social base.

Host population: Community residing near the area where the Project beneficiaries are resettled as part of the Project.

Affected Family: All members of a household residing under one roof and operating as a single economic unit, who are adversely affected by the Project, or any of its components. It may consist of a single nuclear family or an extended family group.

Detailed Measurement Survey means the detailed inventory of losses that is completed after detailed design and marking of project boundaries on the ground.

Vulnerable groups: include the very poor, marginalized, informal settlers, elderly and female-headed households.

Rehabilitation: Re-establishing incomes, livelihoods, living, and social systems.

Relocation / Rebuilding: Housing, assets, including productive land, and public infrastructure in another location.

Non-titled: means those who have no recognizable rights or claims to the land that they are occupying and includes people using private or state land without permission, permit or grant.

Executive Summary

The Government of Sindh (GoS) through World Bank financing intends to implement the Sindh Resilience Project (SRP)[1] in Sindh province. The project envisages a number of interventions including improving / rehabilitating the degraded reaches of embankments / levees of Indus River, construction of small detention dams in water scarce districts of the province, and construction of office buildings. In compliance with the national/provincial regulatory requirements and World Bank safeguard policies, an environmental and social assessment has been carried out to address the potentially negative impacts of the proposed interventions under SRP. As an outcome of this assessment, an Environmental and Social Impact Assessment (ESIA) has been prepared for the works to be carried out during the first year of SRP implementation. In addition, the present Environmental and Social Management Framework and Resettlement Policy Framework (ESMF/RPF) has been prepared for sub-projects to be undertaken during the later years since their exact locations are not known and designs not available at this stage. The ESIA is presented under separate cover.

Background

The geographic location and climatic conditions of the Province of Sindh render it vulnerable to various natural disaster events. These include floods, cyclones, earthquakes, droughts, wind storms, tsunamis and sea intrusion. The flood in 2010 displaced 7.2 million people and affected 12,000 villages. The drought from 1998 to 2002 affected 1.4 million people, 5.6 million cattle head and 12.5 million acres of cropped area, triggering spread of malnutrition-based diseases in the population and food scarcity in the province.

Project Description

The Sindh Resilience Project (SRP) will focus on improving systems at the provincial government and key agencies for managing disaster risk in Sindh. In addition, the Project will further contribute towards enhancing resilience to hydro-meteorological disasters including floods and drought through physical infrastructure investments. SRP will be implemented in five years and have the following components.

Component 1 - Strengthening Disaster and Climate Risk Management (USD 24 million): The Component will primarily focus on key disaster management institutions in terms of strengthening operational systems and capacities at the provincial and district levels. In addition, the Component will support other departments at the Government of Sindh – through the Provincial Disaster Management Authority (PDMA) Sindh) to develop greater 'fiscal resilience' through strengthening financial capacity and risk financing mechanisms, and mainstream disaster risk reduction in development planning and budgeting processes.

Component 2 - Improving Infrastructure and Systems for Resilience (USD 96 million): This Component will primarily support restoration and improvement of embankments at high risk sites along the Indus for protection against riverine floods as well as construction of small rainwater-fed recharge dams in drought prone regions in Sindh. In addition the Component will assist the Sindh Irrigation Department towards implementing project interventions and increasing operational efficiency.

In terms of infrastructure investments, the Sindh Irrigation Department (SID) has developed a long list of investments, including flood protection works and small dams, which would be considered under the Project. The long list has been developed based on a consultative process involving inputs from relevant stakeholders, including provincial departments (irrigation,

[1] The project was initially named as Disaster and Climate Resilience Enhancement Project.

finance, revenue, and planning and development) and the benefiting communities. Further, the long list of flood protection investments identified by the Irrigation Department has already been approved by the Indus River Commission. Critical investments for the first year of project implementation have been finalized. For subsequent years, a framework approach will be used for picking priority structural investments from the long list. Under this approach, consistent selection and safeguards screening criteria2 have been developed to identify subprojects that may be financed under this component. Additional financing may be considered to support the framework approach in case that the current envelope does not meet the financing needs for critical investments.

Component 3 - Contingent Emergency Response Component (USD 0): Following an adverse natural event that causes a major natural disaster, the government may request the Bank to reallocate project funds to support response and reconstruction. This component would allow the government to request the Bank to reallocate financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available for such an emergency.

Environmental and Social Baseline Conditions

Geography, Seismicity, and Soils. Sindh can be geographically divided into four distinct parts i.e. Kirthar range on the west, a central alluvial plain bisected by the Indus River in the middle, a desert belt in the east, and the Indus delta in the south. Most of the SRP Project area is seismically falling in Zone 2A and Zone 2B[3]. A small portion of Thar District is falling in Zone 4 [4]which is called the High Damage Risk Zone. The soils along the Indus River banks are silt and sandy loam. Outside the active flood plain, the soils are generally calcareous, loamy and silty clay. Most of the soils in the district of Thar and parts of Khairpur and Sanghar districts are sandy.

Water Resources. Indus River is the main surface water source of the province. It has three major barrages in Sindh that divert approximately 48 million acre feet (MAF) (or 59.0 billion cubic meters- BCM) of water annually to the 14 main canal commands in Sindh.

More than 80 percent 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 fresh water is available. Fresh groundwater is found mostly in a strip parallel to the left bank of Indus River and some pockets in other areas. More than 30,000 tube wells in private and public sector are installed for agriculture purpose.

The province of Sindh is having 81 percent of its irrigation area classified as waterlogged. In the last few decades the waterlogged area has increased in the province. While right side of the Indus River in Sindh is facing the problem of drought.

Biological Resource. Currently there are 23 wildlife protected areas in Sindh. There are also a number of wetlands in the province, 10 of which are declared as Ramsar sites. In accordance to IUCN Red List of Threatened Species (2015), two species of mammals in Thar District (Asiatic

[2] These criteria will inter alia include: (i) economic impact; (ii) technical readiness and feasibility criteria; (iii) demand by local communities; (iv) implementation duration; and, (v) scale of safeguards issues and mitigation costs. The selection criteria are described in further detail under Annex II. Additional risk information generated through interventions under Component 1 will also inform the final selection of investments.

[3] Zone 2A and Zone 2B correspond to peak ground acceleration varying from 0.08 to 0.16g and 0.16 to 0.24g, respectively (Pakistan Building Code of Pakistan, 2007).

[4] Zone 4 corresponds to peak ground acceleration of more than 0.32g.

wild ass and Indian pangolin) are endangered, one species (Striped hyena) is Near Threatened, and 30 species have Least Concern status whereas two species have not been evaluated for IUCN Red List (WWF Ecological Assessment of Thar, 2010-11).

The Thatta area has important habitat of mangroves. Mudflat coast provide habitat to species of mammals, birds, reptiles and amphibians. In small mammals, nine species belonging to two orders and four families are reported. *Kharochann* is an important area for a variety of bird species. Many water birds use the area during winter as staging, feeding and wintering ground. As many as 85 species of birds have been reported in the area (WWF Ecological Assessment Report, 2010-11).

Physical Cultural Resources (PCRs). The Sindh province being the center of old culture and civilization has a number of archaeological sites. A total of 43 such sites exist in the districts of project area. However, the initial survey of some of the sub-projects reveals that none of the sites is located in the sub-project area likely to be impacted. Detailed assessment in this respect will be carried out while conducting environmental and social assessment of each subproject. No subproject will be selected under SRP that is likely to have any adverse impact on known PCRs in the area.

Demography. The total area of Sindh Province is 140,914 Km^2 and the total projected population up to 2012 is 44,807,089; a growth rate of 2.80; male and female ratio of 53:47. The average life expectancy is 55.4 years and literacy rate is 45.29%.

Sindh's population is mainly Muslim, while the non-Muslim communities include Hindus, Christians, and Zoroastrians. Sindh is home to nearly all (93%) of Pakistan's Hindus, who form 8.41% of the province's population. The majority of Muslims are Sunni Hanafi followed by Shia. The major languages of the province include Sindhi, Urdu, Punjabi, Pashto, Balochi, and Dhatki.

Gender Issues. Women are active in all the sub-sectors of agriculture namely farming, processing and distribution. The predominant role of women in agriculture has enabled most women farmers to become increasingly responsible for educational and other material needs of their wards, especially for female headed households. The status of women in rural Sindh however, as for the rest of the villages in Pakistan, is acutely disadvantaged. Women bear a disproportionately high share of burden of poverty; have unequal access to economic options and social services, lower endowments of land and other productive assets. Women are severely hindered in their horizontal and vertical social mobility.

Women in Sindh commonly face problems with respect to family law, discrimination at work place, discrimination in education, physical or psychological abuse, and social restrictions. Arranged forced marriages are still common and women commonly have no access to courts for justice due to cultural hindrance. The literacy rate and school enrolment ratio of girls in province is very low, with girls remaining at home to undertake domestic chores.

Poverty. A major part of population lives in rural areas and poverty is pervasive in rural Sindh. About 37% of the rural population lives below the poverty line, compared to 33% in Pakistan on an overall basis. Over 70% of the rural population is landless. The rural households, including the landless, derive 56% of their income from agriculture, directly or indirectly.

Impacts Assessment and Mitigation

Most of the impacts are expected during construction phase of the sub-projects. The anticipated impacts are mostly temporary, localized, and reversible in nature, and with the help of appropriate mitigation measures, these potentially impacts can be adequately addressed.

The major potential adverse impacts associated with the construction of the river embankment sub-projects include disposal of excavated/surplus soil material, development of shallow borrow pits away from the embankments for construction materials, temporary disturbance of surface

water quality due to river embankment stone piling, minor traffic congestion and dust pollution caused by movement of vehicles and construction machinery on roads and earthen tracks along the river dikes, temporary damage to non-critical riparian habitat and vegetation, minor soil erosion along embankments during construction, improper disposal of solid and liquid wastes, opening up of narrow access routes to embankments, and occupational health and safety risks. The positive impacts would be putting in place structurally sound and environment-friendly permanent structures along the Indus River to protect the embankments from breaching and the surrounding communities from severe flood damages as well as generate local employment during the construction phase.

In case of the small dams for rainwater harvesting, in addition to the construction-related impacts described above, the potentially adverse impacts include reduction of surface water flow during the rainy season for lower riparian areas, and possible proliferation of disease-causing vectors such as mosquitos in the water impoundment areas during the rainy season such as malaria and dengue. The positive impacts include flood control during the rainy season, and the recharge of groundwater and increase in water supply for irrigation, domestic as well as livestock use.

During construction of PDMA office building, the anticipated impacts may include land acquisition, soil and water contamination from improper disposal of wastes, clogging of existing draining, release of hazardous wastes, noise and dust generation, traffic congestion, and safety risks for construction workers as well as nearby residents and communities.

To address the above described potentially adverse impacts, the following mitigation measures have been proposed: proper disposal of excavated earth; water sprinkling at access roads and construction areas to avoid/minimize dust pollution; use of silencers for the machinery and vehicles; use of ear protection gears and other personal protective equipment by construction workers; provision of septic tanks in camps and offices, treatment of wastewater and other pollution control measures in construction camps; location of borrow pits to be at safe distances from structures and to be properly restored; not selecting productive land for borrow area or for establishing camps/construction areas, no damage to cultivated areas; avoiding unnecessary clearing of natural vegetation; avoiding archaeological or culturally important sites; avoiding and controlling toxic materials; implementing erosion control measures, and adhering to safety and occupational health precautions.

Institutional Arrangements

The overall responsibility for SRP project as well as environmental and social management will rest with the Implementing Agencies (IAs), ie, the Sindh Irrigation Department (SID) and Provincial Disaster Management Authority (PDMA). The IAs will designate Project Directors (PDs) to lead the SRP implementation in their respective organizations.. An Environmental and Social Management Unit (ESMU) will be established in SID to support implementation of ESMF/RPF and sub-project-specific Environmental and Social Management Plans (ESMPs). The SID will also engage the Project Implementation Consultants (PIC) that will be responsible for supervision and monitoring of the construction works and also implementation of ESMF/RPF, Abbreviated Resettlement Action Plan/Resettlement Action Plan (ARAP/RAP) and ESMPs. The PDMA will also engage/designate environmental and social safeguard focal points to manage environmental and social safeguards aspects of SRP. Finally, the contractors will be responsible for the implementation of the sub-project specific ESMPs at the field level.

Monitoring and Reporting

Safeguard monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be carried out at three levels. At the IA 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 on a regular basis. At the field level,

more frequent safeguard monitoring will be carried out by the relevant staff of PIC. The PIC and ESMU will produce monthly, quarterly and annual reports for ESMP and RAP implementation. The subproject-specific monitoring requirements will be defined in the respective ESMPs.

Screening Criteria for Sub-projects

Screening checklists will be used to determine the viability and suitability of the sub-project sites and the modifications needed in the design and construction methods in order to achieve the sustainable management of project-related environment and social impacts. Priority will be given to sub-projects that will generate manageable and low impacts. The SRP will support only small to medium-sized sub-projects involving rehabilitation of existing structures or the construction of small-scale infrastructure that are expected to cause low to moderate level of negative but reversible and localized impacts. A full EIA/ESIA including an ESMP and RAP will be carried out for subprojects having significant irreversible and widespread impacts or involving significant degradation of forests or sensitive areas, or requiring land acquisition, or having water impounding structures higher than ten meters. For smaller sub-projects likely to cause low to moderate adverse impacts, an ESMP and ARAP will be prepared.

Stakeholder Consultations

Two rounds of stakeholder consultations have been carried out on selected sub-projects while finalizing the project details and during the preparation of ESMF. The consultations have revealed that the project is considered to have a number of positive social and environmental impacts. Additional consultations will be carried out while conducting subproject specific EIA/ESIA and while preparing ESMPs and RAPs.

ESMF/RPF Disclosure

The ESMF/RPF will be released on the SRP websites, hard copies will be sent to key institutional stakeholders and their regional offices. The ESMF/RPF will also be disclosed on World Bank InfoShop. The entire ESMF/RPF will be translated into local language (Sindhi) and disclosed on the SRP websites, and distributed among institutional stakeholders and affected and beneficiary communities at the early stage of sub-projects. Similar disclosure arrangements will be made for sub-project specific ESIAs, ESMPs and RAPs as well once these documents are prepared.

1. Introduction

The Government of Sindh (GoS) through World Bank financing intends to implement the Sindh Resilience Project (SRP) [5] in Sindh province. The project envisages a number of interventions including improving / rehabilitating the degraded reaches of embankments / levees of Indus River, construction of small detention dams in water scarce districts of the province, and construction of office buildings.

In compliance with the national/provincial regulatory requirements and World Bank safeguard policies, an environmental and social assessment has been carried out to address the potentially adverse impacts of the proposed interventions under SRP. As an outcome of this assessment, an Environmental and Social Impact Assessment (ESIA) has been prepared for the works to be carried out during the first year of SRP implementation. In addition, the present Environmental and Social Management Framework and Resettlement Policy Framework (ESMF/RPF) has been prepared for sub-projects to be undertaken during the later years since their exact locations are not known and designs not available at this stage. The ESIA is presented under separate cover.

1.1. Need of Environmental and Social Assessment

The national/provincial environmental regulations as well as World Bank safeguard policies requires environmental assessment (EA) and management of social impacts to help ensure that they are environmentally and socially sound and sustainable, and thus to improve decision making. In line with this requirement, an ESIA - provided under separate cover - has been conducted of the works to be carried out during the first year of SRP implementation.

Location and design of the sub-projects to be undertaken during later years of SRP implementation are not known yet, therefore a framework approach has been being taken to carry out environmental and social assessment of these subprojects. Under this approach, the present ESMF/RPF has been prepared to identify the potential generic negative environmental and social impacts, propose generic mitigation measures, provide basic screening criteria, list the type of safeguard instruments to be developed and provide institutional, monitoring, reporting and documentation measures for environmental and social safeguards compliance.

1.2. Project Background

Pakistan is exposed to a number of adverse natural events and has experienced a wide range of disasters over the past 40 years, including floods, earthquakes, droughts, cyclones and tsunamis. Exposure and vulnerability to hazards is further exacerbated by a rapid population growth, growing urbanization, environmental degradation and shifting climatic patterns that can result in the occurrence of increasingly severe natural disasters. Over the past decade, damages and losses resulting from natural disasters in Pakistan have exceeded USD 18 billion; as the population and asset base of Pakistan increases, so does its economic exposure to natural disasters.

The geographic location and climatic conditions of the Province of Sindh render it vulnerable to various natural disaster events. These include floods (urban, riverine and flash floods), cyclones, earthquakes, droughts, wind storms, tsunamis and sea intrusion. In addition, the geography, topography, nature of economy, rapid urbanization and high population levels exacerbate Sindh's vulnerability to natural disasters.

Sindh experienced major floods in 1973, 1976, 1992, 1994, 1995, 2003, 2005, 2007, 2010, 2011, 2012 and 2013. Besides riverine floods, primarily involving the River Indus, torrential flash

[5] The project was initially named as Disaster and Climate Resilience Enhancement Project.

floods has also severely impacted parts of Sindh. Floods in 2010 and 2011 were amongst the most devastating in the history of the region. Floods in 2010 displaced 7.2 million people and affected 11,992 villages. The impact on the economy of Sindh was estimated at PKR 372 billion (USD 4.4 billion), with agriculture, livestock and housing contributing to major losses. The flood impacts scenario of SRP Project area is shown in the **Figure 1-1**. The floods in 2011 inundated 38,347 villages, displacing 9.3 million people and human loss stood at 497 lives. The 2011 flood-affected districts constitute 86 percent of geographical area and house 54% of the total population of the province.

Besides floods, Sindh province faces drought in northern and south eastern region on recurring basis. The drought from 1998 - 2002 affected 1.4 million people, 5.6 million cattle head and 12.5 million acres cropped area, triggering spread of malnutrition-based diseases in the population and food scarcity in the province due to poor overall crop output.

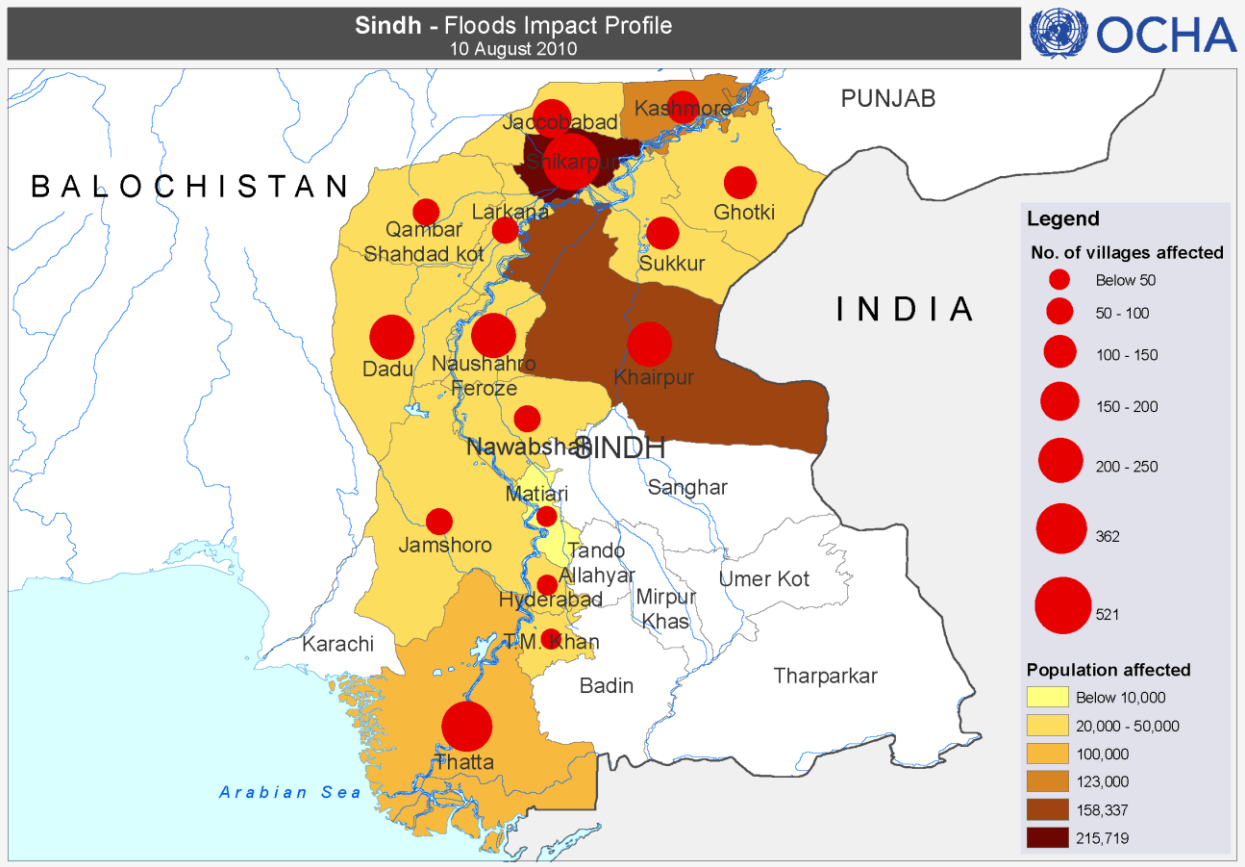

Figure 1.1: Sindh Flood Impacts Profile

(Source: PMDA Situation Report 28/08/2010)

UNOCHA (Situation Overview - Situation Report 30/08/2010)

1.3. Study Methodology

The ESMF/RPF has been prepared employing the standard methodology described below.

1.3.1. Review of Relevant Studies, Policies, Guidelines and Legislations

In order to determine the policy, legal and institutional environment for the project, the consultants have reviewed the applicable policies, guidelines and legislations concerning the

SRP. As the project is to be implemented by the Government of Sindh and funded by the World Bank, two sets of policies and legislations were reviewed:

- Government of Pakistan and Government of Sindh policies and legislations, and
- The World Bank Guidelines, Policies and Directives.
- The ESMF of Disaster and Climate Resilience Improvement Project (DCRIP), being implemented in Punjab Province, was also reviewed and followed where relevant.

The following basic project related documents were provided to the consultants, which formed the basis of the study:

- Terms of Reference issued by Irrigation Department
- Project Information Document and Integrated Safeguard Data Sheet (PID/ISDS) by the World Bank.
- Draft PC-I and Feasibility Reports

Based on the above basic documents, the following relevant policies, guidelines and legislations were reviewed by the consultants:

- National Environmental Guidelines and Legislation
- Sindh Environmental Protection Act 2014.
- Sindh Wildlife Protection Ordinance, 1972 and Amendments 2001.
- The Sindh Water Management Ordinance 2002.
- The Convention on Wetlands of International Importance, Ramsar 1971
- Land Acquisition Act 1894.
- The Sindh Irrigation Act, 1879 (rev. 1996, Ordinance 2000).

The relevant World Bank Operational Policies and Directives like Operational Policy on Environmental Assessment (OP 4.01), Operational Policy on Natural Habitats (OP 4.04), Operational Policy on Forest (OP 4.36), Operational Policy on Cultural Property (OP 4.11), Operational Directives on Indigenous People (OD 4.20, Operational Policy on Involuntary Resettlement (OP 4.12), Operational Policy on Safety of Dams (OP 4.37), Operational Policy on Project in International Waters (OP 7.50 and Operational Policy on Projects in Disputed Areas (OP 7.60).

1.3.2. Scoping

During this phase, key information on the project was collected and reviewed. A long list of the potential environmental as well as social issues likely to arise as a result of the project was developed. The stakeholder analysis was also carried out for the consultation which was undertaken subsequently.

1.3.3. Stakeholder Consultations

Stakeholder consultations were carried out on some sub-projects during the study. Meetings were held with the institutional stakeholders and key environmental and social issues discussed. Extensive consultations with the grass-root and institutional stakeholders will be carried out during ESIA and ESMP preparation in the area of each sub-project through Focus Group Discussions and key Informant Interviews.

1.3.4. Field Data Collection

During this phase, field data was collected and compiled, in order to develop a baseline of the project areas physical, biological and socio-economic human environment. For this purpose, primarily review of secondary sources was carried out. The secondary resources that were consulted included feasibility reports prepared by Consultants. With the help of these resources a generic profile of the entire project area was developed.

1.3.5. Impact Assessment

Once the field data collection was completed, impact assessment was carried out to identify potentially negative but generic impacts of the proposed activities under the project. Generic mitigation measures were also identified to address these potential impacts.

1.3.6. ESMF/RPF Compilation

The last activity of the study was compilation of the present document covering process and outcome of the earlier steps of the study described above.

1.4. ESMF/RPF Structure

Chapter 2 (Project Description) provides an overview of the proposed project. **Chapter-3 (Safeguards Policy Principles and Objectives)** provides an overview of the national and provincial institutional frameworks, national and provincial environmental policies and guidelines, national and provincial applicable laws. The Chapter also discusses the World Bank requirements for environmental and social safeguards. **Chapter-4 (Safeguards Procedures)** details the screening criteria to be used to categorize each subproject based upon the national/provincial regulations as well as WB Operational Policies, preparation of safeguards instruments, consultation and disclosure**. Chapter 5 (Impact Assessment and Mitigation Measures)** covers the existing generic environmental and social conditions of the overall SRP Project area, assess the anticipated potential environmental and social impacts of the sub-projects, and devise generic mitigation measures. **Chapter-6 (Resettlement Policy Framework)** provides procedures to address resettlement impacts of the project and to prepare RAP.

2. Project Description

2.1. Project Area

The SRP Project area is scattered in Tharparkar, Thatta, Dadu, Sujawal and Jamshoro Districts of the Sindh Province of Pakistan. The project area is shown in the **Figure 2.1**.

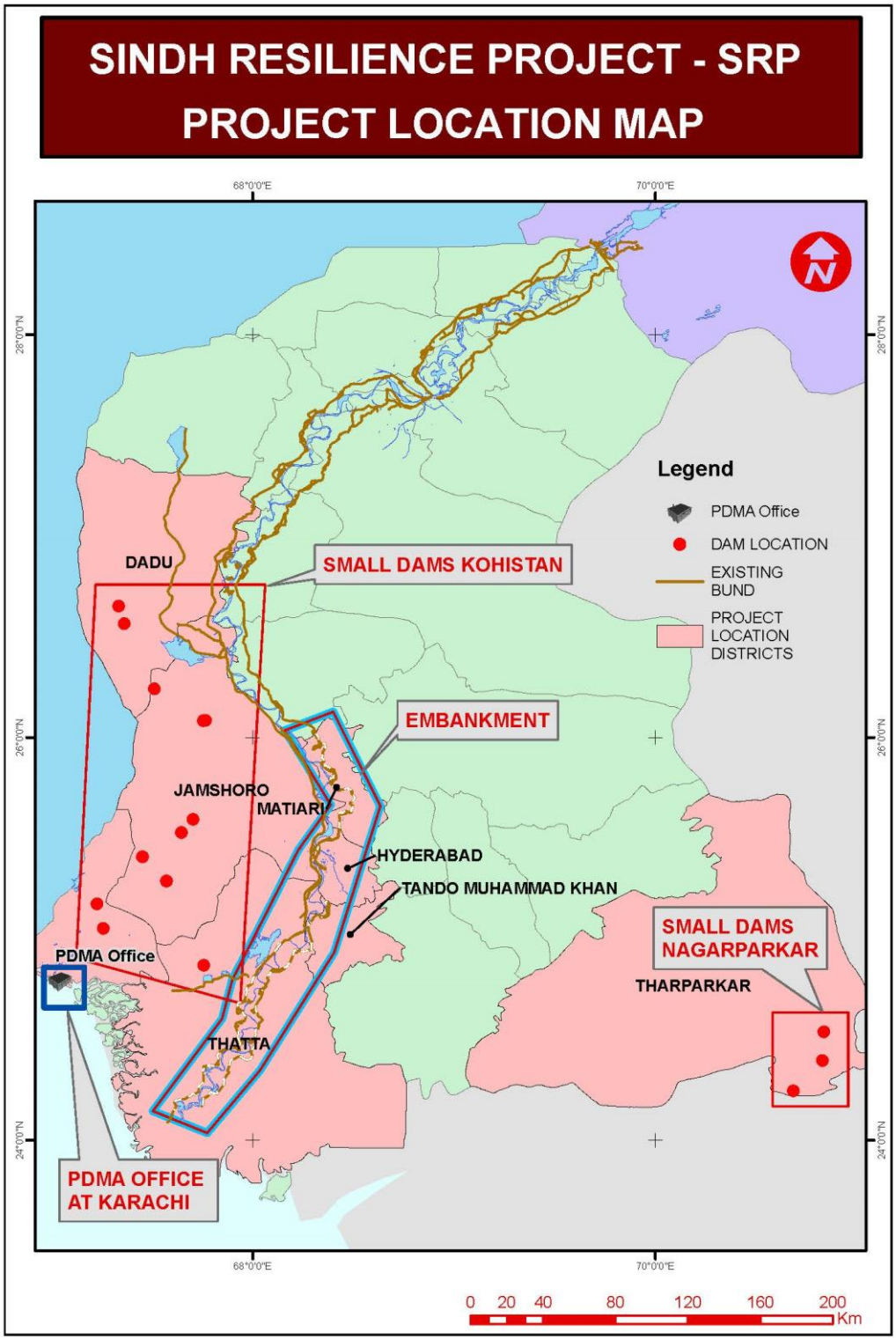

Figure 2.1: Location of the SRP Project Area

2.2. SRP Description

The Sindh Resilience Project (SRP) will focus on improving systems at the provincial government and key agencies for managing disaster risk in Sindh. In addition, the Project will further contribute towards enhancing resilience to hydro-meteorological disasters including floods and drought through physical infrastructure investments. The dialogue with Government of Sindh has established floods and droughts as the highest priority areas owing to high frequency and impact. The dialogue has further identified critical needs in these areas, along with an estimate of resources needed to address these priorities. SRP will be implemented in five years and have the following components.

Component 1 - Strengthening Disaster and Climate Risk Management (USD 24 million): The Component will primarily focus on key disaster management institutions in terms of strengthening operational systems and capacities at the provincial and district levels. In addition, the Component will support other departments at the Government of Sindh – through the Provincial Disaster Management Authority (PDMA) Sindh) to develop greater 'fiscal resilience' through strengthening financial capacity and risk financing mechanisms, and mainstream disaster risk reduction in development planning and budgeting processes.

Subcomponent 1.1. Improving Risk Identification and Using Risk Information for Development Decision-making (USD 2 million): This subcomponent will focus on identifying the disaster and climate risk environment for informed planning and decision-making, development of framework to undertake the assessments, as well as tools to allow the optimal utilization of risk information.

Subcomponent 1.2. Strengthening Disaster Risk Management Agencies (USD 14.5 million): This will entail developing the institutional set up and operational capacities at Provincial Disaster Management Authority (PDMA) Sindh down to the district level. Activities will include enhancement of the operational facilities, training programs, and regular drills, at the provincial and district levels. In addition, PDMA will be supported to enhance outreach through establishing integrated rescue and response systems with other agencies, and improving systems for generating and disseminating early warnings. The subcomponent may also support improvement and customization works for PDMA Sindh's operational facilities. PDMA Sindh will be further supported to enhance its capacity to implement Community Based Disaster Risk Management (CBDRM) interventions.

This component would also support an ex-ante development of post disaster recovery framework in Sindh to enhance its capacity to respond effectively and efficiently to disasters. Recovery framework would focus on four key areas: (i) strategy for recovery planning; (ii) institutional set up for post disaster recovery; (iii) financing mechanisms for recovery; and (iv) strengthening of implementation arrangements for recovery activities.

Subcomponent 1.3. Enhancing Fiscal Resilience (USD 5 million): The fiscal resilience subcomponent would support the government towards strengthening its institutional and financial response capacity in the aftermath of a disaster, and reduce economic and fiscal burdens of such events. This would involve a Fiscal Disaster Risk Assessment (FDRA) for Sindh, leading to the development of a disaster risk financing strategy. The sub-component would also provide advisory services and capital to Sindh Provincial Disaster Management Fund (PDMF) to support development and implementation of Standard Operating Procedures (SOPs), safeguards and controls, drawing on international good practices.

Subcomponent 1.4. Project Implementation Support to PDMA Sindh (USD 2.5 million): This subcomponent will support PDMA Sindh in implementing the Project. This will involve: technical assistance and consultancy services; incremental operating costs, including engagement of additional short-term resources not available within the department; project expenditures in

such areas as procurement and financial management systems, grievance redressal mechanism (GRM), as well as social and environmental safeguards' mechanisms.

Component 2 - Improving Infrastructure and Systems for Resilience (USD 96 million): This Component will primarily support restoration and improvement of embankments at high risk sites along the Indus for protection against riverine floods as well as construction of small rainwater-fed recharge dams in drought prone regions in Sindh. In addition the Component will assist the Sindh Irrigation Department towards implementing project interventions and increasing operational efficiency.

In terms of infrastructure investments, the Sindh Irrigation Department (SID) has developed a long list of investments, including flood protection works and small dams, which would be considered under the Project. The long list has been developed based on a consultative process involving inputs from relevant stakeholders, including provincial departments (irrigation, finance, revenue, and planning and development) and the benefiting communities. Further, the long list of flood protection investments identified by the Irrigation Department has already been approved by the Indus River Commission. Critical investments for the first year of project implementation have been finalized. For subsequent years, a framework approach will be used for picking priority structural investments from the long list. Under this approach, consistent selection and safeguards screening criteria6 have been developed to identify subprojects that may be financed under this component. Additional financing may be considered to support the framework approach in case that the current envelope does not meet the financing needs for critical investments.

Subcomponent 2.1. Flood Protection Works (USD 42 million): The Component will support structural investments including restoration, improvement, and up-gradation of flood embankments to increase resilience of communities and economically productive areas along the Indus River. The preliminary list of high risk sites and corresponding flood mitigation investments communicated by Sindh Irrigation Department will protect communities residing along the left and right banks of the Indus. The aforementioned framework approach will be utilized to finalize flood protection investments included under the Project by applying a consistent selection and screening criteria. Overall, tentative investments proposed by the Sindh Irrigation Department are expected to protect: 5,704 square kilometers of land; more than 2 million acres of cropped area, and associated livelihoods; more than 6,500 kilometers of roads; an estimated population of 5 million and more than 600,000 housing units.

Three priority reconstruction investments that have been identified through the application of selection criteria will be undertaken downstream of Kotri during the first year of Project implementation. These embankments will be located within the Irrigation's Department's Pinyari Circle which is a high risk site. Investments in strengthening these embankments – Mulchand Shah-Bunder (MS) and Sunda Hilaya (SH) Bunds on the Left Bank, and Baghar Ucheto (BU) and Indo Bunds on the Right Bank – will protect around 275,000 houses, and an estimated population of 2 million. These embankments will secure the important urban centers of Sujawal and Thatta, as well as more than 800,000 acres of rural agricultural lands against frequent floods.

Subcomponent 2.2. Construction of Small Recharge Dams to Address Drought and Flash Flooding Risks (USD 40 million): This subcomponent will support the construction of small

[6] These criteria will inter alia include: (i) economic impact; (ii) technical readiness and feasibility criteria; (iii) demand by local communities; (iv) implementation duration; and, (v) scale of safeguards issues and mitigation costs. The selection criteria are described in further detail under Annex II. Additional risk information generated through interventions under Component 1 will also inform the final selection of investments.

rainwater-fed recharge dams, less than 10 meters in height, in the Kohistan and Nangarparkar regions. These small dams will primarily contribute to the recharging of underground aquifers and provision of water to communities during dry periods. Additionally, these would protect communities against seasonal hill torrents and flash floods originating in the Kirthar Range.

The Sindh Irrigation Department is sufficiently advanced with preparatory activities for a large number of proposed small dams, with completed feasibility studies and approved PC-I documents. The Project will utilize the screening criteria under the framework approach, particularly focusing on economic impact, to select priority dams to be financed. The proposed investments will be clustered in two regions: (i) the Nangarparkar area of district Tharparkar.; and (ii) Kirthar range hills in Dadu, Jamshoro and Malir districts. The envisaged investments are expected to add 26,163 acre feet into fresh groundwater aquifers, thereby raising the water table from the current depth of around 200 feet up to 25-50 feet. In addition to recharging of fresh groundwater aquifers, these investments will provide safe drinking water to local communities and livestock as well as irrigating 17,442 acres of arable lands. Further benefits include protection of around 16,681 households having a population of 95,607 persons from hill torrents and flash flooding.

Subcomponent 2.3. Technical Assistance to Sindh Irrigation Department (USD 5 million): The sub-component would support the Sindh Irrigation Department for implementation of non-structural measures to enhance flood management and drought mitigation. The sub-component would also support related equipment upgrades and studies. Salient interventions will include the establishment of a Decision Support System for the Department, improving capacity for safety evaluation of flood embankments, river morphology studies, and floodplain mapping.

Subcomponent 2.4. Project Implementation Support to Sindh Irrigation Department (USD 9 million): This subcomponent will support the Sindh Irrigation Department in implementing the Project, encompassing: (i) incremental operating costs, including recruitment of additional short-term resources not readily available within the Department; (ii) consultancy costs – including engagement of project management consultants; and (iii) costs related to improved operations and maintenance of assets/ infrastructure to ensure sustainability of investments made by the department in general and this project in particular; and (iv) expenditures on fiduciary systems, safeguards requirements, and GRM.

Component 3 - Contingent Emergency Response Component (USD 0): Following an adverse natural event that causes a major natural disaster, the government may request the Bank to reallocate project funds to support response and reconstruction. This component would allow the government to request the Bank to reallocate financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available for such an emergency.

2.3. Institutional Arrangements

The Provincial Disaster Management Authority (PDMA) Sindh and Sindh Irrigation Department (SID) will be responsible for implementation of Component 1 and Component 2, respectively. In case Component 3 is activated, the Recipient will need to designate the responsible agency/s for implementation of activities under Component 3. The Sindh Planning and Development Department (P&DD) will facilitate coordination between provincial departments and agencies.

The specific responsibilities of the institutions involved in the ESMP and RAP implementation are shown in the **Figure 2.2** and described in the following sections.

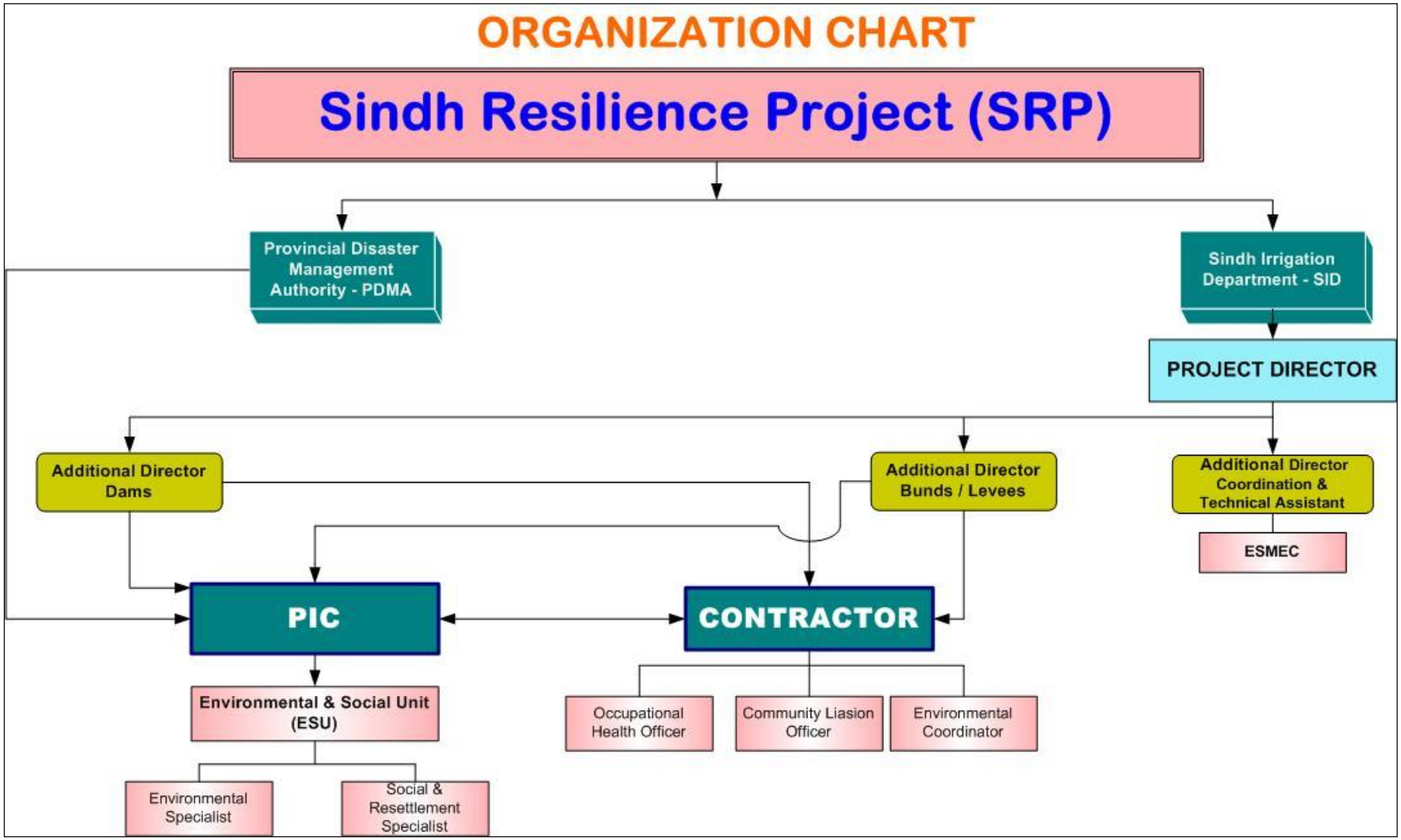

Figure 2.2: Institutional Arrangement for SRP

2.3.1. Implementing Agencies

The overall responsibility for SRP implementation will rest with IAs, ie, SID and PDMA. The IAs will designate Project Directors (PDs) to lead SRP implementation within their respective organizations. The PD -SID will be supported by Additional Director Dams, Additional Director Bunds/Flood Levees, and Additional Director Coordination. Environmental and Social Management Unit (ESMU) will be established within SID to ensure compliance to the safeguards requirements and implementation of ESIA, ESMF as well as Environmental and Social Management Plans (ESMPs) and Resettlement Action Plans (RAPs) of each subproject to be undertaken under SRP. The PDMA will also designate/engage environmental and social safeguard focal points within its organization to manage safeguards aspects of the SRP.

2.3.2. Project Implementation Consultant (PIC)

The SID will engage the Project Implementation Consultant (PIC) that will be responsible for monitoring of the ESMP and RAP implementation during execution of the works under the SRP and shall submit periodic reports to the SID in this regard. The PIC will have environmental and social specialists to supervise and monitor ESMP and RAP implementation in the field. In general the PIC will have the following responsibilities pertaining to the environmental aspects of the project:

- Prepare the required documents, review and update the available documents relevant to the Project (including ESIAs, ESMPs and RAPs) and those to be prepared by the Contractor.
- Monitor the implementation of ESMPs and RAPs on a regular basis during execution of civil works by the Contractor.

2.3.3. Environmental/Social Monitoring and Evaluation (ESMEC) Consultant

The ESMEC shall be an independent body responsible for external environmental monitoring for the SRP on behalf of the IAs. The ESMEC will have environmental and social experts and shall carryout intermittent third party monitoring of the project.

2.3.4. Construction Contractors

The contractor will be responsible for implementing the ESMP and RAP at the construction sites and appropriate clauses will be included in the contracts for this purpose. The contractor will have environmental and social specialists available in the field to carry out implementation of ESMP and RAP.

2.4. Project Area of Influence

2.4.1. Corridor of Impact

The Corridor of Impact (CoI) for the sub-projects to be considered under SRP shall be defined carefully keeping in view the proposed interventions and associated impacts during construction, operation and maintenance phases. The CoI would cover the footprint of the temporary and permanent works or the working area required to complete the works, the anticipated impacts during construction and operation phases. The spatial extent of the sub-project area when preparing the ESMPs shall be focused keeping in view the proposed interventions and broad impacts of the sub-project after completion. The CoI shall be classified as described below.

2.4.2. Primary Impact Zone

Primary impact zone will be considered as the footprint of the subproject's permanent and temporary components and area where there is likely to be direct impacts of construction activities, for example, the reaches of rehabilitation of the embankments, borrow areas, disposal areas, and contractor's temporary facilities at the site. The impact receptors such as human

habitations and natural resources existing in this area will be directly affected by project actions e.g. construction of access roads, movement of vehicles, pollution, and presence of workers.

In the case of dams sub-projects, the command and downstream areas shall be considered as the area that will be impacted negatively in the form of dam failure, development of access routes, borrow areas, contractor's camps, disposal areas.

2.4.3. Secondary Impact Zone

The secondary impacts zone will be considered the areas prone to or frequently damaged in the past due to breach in the embankments, or area that is affected by droughts.

3. Safeguard Policy Principles and Objectives

This chapter provides an overview of the federal and provincial institutional frameworks, federal and provincial environmental policies and guidelines, applicable laws and the World Bank operational policies.

3.1. Pakistan Institutional Framework

The institutional framework for decision making and policy formulation in environmental and conservation aspects is briefly described below.

3.1.1. National Disaster Management Authority- Climate Change Division

After the 18th Amendment, the Environment Ministry was devolved to the provinces and a new Ministry of National Disaster Management was created. The Government of Pakistan renamed the Ministry of National Disaster Management in 2012 as the Ministry of Climate Change to deal with the threats posed by global warming and to protect environment in the country. National Policy of Climate Change was also approved in the same year. The policy describes the following measures regarding environmental assessment:

- Take necessary measures to redesign administrative structures and procedures of Federal and Provincial EPAs and Planning and Development Division to integrate climate change concerns into Initial Environmental Examination (IEE) processes;
- Ensure that IEE/EIA and other mechanisms are strictly observed in all development projects, particularly infrastructure projects, by the concerned agencies.
- The ministry has now been dissolved and transformed into a division under National Disaster Management Authority that would implement the National Policy on Climate Change with coordination of provincial governments.

3.1.2. Sindh Environmental Protection Council (SEPC)

The Sindh Environmental Protection Council (SEPC) has been established under section 3 of the Sindh Environmental Protection Act, 2014. The SEPC is headed by the Chief Minister or such other person as the Chief Minister may nominate in this behalf in the province. The functions of the SEPC are;

- to frame its own Rules of Procedure, co-ordinate and supervise the enforcement of the provisions of the SEAP Act, 2014 and other laws relating to the environment in the Province;
- Approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;
- provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- Coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programs at the provincial, district and local levels;
- Deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-

provincial impact, provide guidelines for biosafety and for the use of genetically modified organisms; and,

- Assist the Federal Government or Federal Agency in implementation and or administration of various provision of United Nation Convention on Laws on Seas, 1980 (UNCLOS) in coastal waters of the province.

3.1.3. Pakistan Environmental Protection Agency

The Pakistan Environmental Protection Agency (Pak-EPA) headed by a Director General has wide ranging functions given under the Pakistan Environmental Protection Act (PEPA) including preparation and co-ordination of national environmental policy for approval by the Pakistan Environmental Protection Council (PEPC), administering and implementing the PEPA and preparation, establishment or revision of the National Environment Quality Standards (NEQS)[7]**.** The Pak-EPA also has the responsibility for reviewing and approving IEE and EIA reports for the following projects:

- Projects on federal land
- Military projects
- Projects involving trans-country or trans-province impacts

The responsibility for the review and approval of all other IEE and EIAs was delegated to the relevant Provincial Environmental Protection Agencies. Vide notification dated 29thJune, 2011 "Pakistan Environmental Protection Agency" was assigned to the Capital Administration and Development Division under National Disaster Management Division.

3.1.4. Non-Government Organizations

International environmental and conservation organizations, such as the International Union for the Conservation of Nature (IUCN) and the World Wide Fund for Nature (WWF) are active in Pakistan. Both these Organizations have worked closely with the Government and have played an advisory role with regard to the formulation of environmental and conservation policies. Since the Rio Summit (1992), a number of national environmental Non-Governmental Organizations (NGOs) have also been formed, and have been engaged in advocacy and, in some cases, research. The other prominent environmental NGOs include Sustainable Development Policy Institute (SDPI), Leadership for Environment and Development (LEAD), Society for Conservation and Protection of Environment (SCOPE), Pakistan Institute for Environmental Development and Research (PIEDAR), and Shirkatgah.

As mentioned earlier, environmental NGOs have been particularly active in advocacy and promoting sustainable development approaches. Much of the government's environmental and conservation policy has been formulated in consultation with leading NGOs, who have also been involved in drafting new legislation on conservation.

3.1.5. Sindh Environment Protection Agency (SEPA)

The Sindh Environmental Protection Agency (SEPA) was established under Pakistan Environmental Protection Act 1997. It is headed by a Director General who exercises powers delegated previously to him by the Pakistan Environmental Protection Agency and now the Environmental and Alternate Energy Department, Government of Sindh. In this particular case of SRP, Sindh EPA (SEPA) is the relevant agency for the approval of IEE and EIA reports.

[7] These NEQS are available on http://www.environment.gov.pk/eia_pdf/g_Legislation-NEQS.pdf.

3.1.6. Sindh Irrigation Department (SID) and Sindh Irrigation and Drainage Authority

Major tasks performed by the SID are the operation and maintenance of the irrigation and flood protection system and regulation of flows in rivers and canal systems. Execution of development schemes and mega projects is also one of the major responsibilities. SRP Project is under the Jurisdiction of the Chief Engineer Irrigation Kotri Barrage Region Hyderabad, Chief Engineer Irrigation Development Region in Sindh, Chief Engineer Irrigation, Development Region-II, Hyderabad and Project Director/Chief Engineer, Small Dams Organization in Sindh. The provinces have established independent Irrigation and Drainage Authorities to take over the irrigation and drainage systems from the Irrigation Departments. The Sindh Irrigation and Drainage Authority (SIDA) was established under Sindh Irrigation and Drainage Authority Act 1997.This Act empowers SIDA to have control over all the rivers, canals, drains, streams, hill torrents, public springs, natural lakes, reservoirs (except such reservoirs as are under the control of WAPDA) and underground water resources within the Sindh Province to give effect to schemes to be prepared under this Act in relation to public purposes.

The Sindh Irrigation Department is the project proponent of SRP and in particular for the implementation of the component-2.

An Environment Management Unit (EMU) was established in SIDA under National Drainage Program in 2004 and further strengthened under the Water Sector Improvement Project (WSIP) Projector support implementation of Social and EMF/EMPs under the project and also to improve SIDA's capacity in planning, development and operation of water resources management systems with proper consideration to environmental and social issues and participation of stakeholders in order to make water systems sustainable in the long run and generate higher benefits. During implementation of the ESMP and RAP, the SRP may be assisted by the EMU-SIDA.

3.1.7. Sindh Wildlife Department

After the dismemberment of One Unit, Sindh pioneered in establishing Wildlife Management Board in 1972, and the Sindh Wildlife Protection Ordinance was also promulgated in the same year. A Chairman, who is normally the Chief Executive of the province heads Sindh Wildlife Management Board constituted in 1972, and members as determined by the Government. During the time of "Board", the services of the wildlife staff were non-pensionable within the autonomous body where no bylaws, recruitment and other rules regarding service structure were ever framed. The provincial government in 1994 decided to regularize the services of the employees and Sindh Wildlife Management Board was converted into a regular Sindh Wildlife Department of the Government of Sindh. Sindh Wildlife Department is the main organization responsible for the protection of wild life in Sindh.

3.1.8. Provincial Disaster Management Authority

Provincial Disaster Management Authority is responsible for implementing policies and plans for disaster management in the Province. The PMDA is also responsible:

- To formulate the provincial disaster management
- Coordinate and monitor the implementation of the National Policy, National and Provincial Plans
- Examine the vulnerability of different parts of the Province to different disasters and specify prevention or mitigation measures
- Lay down guidelines to be followed for preparation of disaster management plans by the Provincial Departments and District Authorities

- Evaluate preparedness at all governmental or non-governmental levels to respond to disaster and to enhance preparedness
- Coordinate response in the event of disaster;
- Give directions to any Provincial department or authority regarding actions to be taken in response to disaster
- Promote general education, awareness and community training in this regard;
- Provide necessary technical assistance or give advice to district authorities and local authorities for carrying out their functions effectively
- Advise the Provincial Government regarding all financial matters in relation to disaster management
- Examine the construction in the area and if it is of the opinion that the standards laid down have not been followed and it may direct the following same to secure compliance of such standards
- Ensure that communication systems are in order and disaster management drills are being carried out regularly; and
- Perform such other functions as may be assigned to it by the National or Provincial Authority.

The PDMA is one of the implementation agencies of the SRP along with the Sindh Irrigation Department.

3.2. National Environmental Policies and Guidelines

3.2.1. National Conservation Strategy (1992)

The Pakistan National Conservation Strategy (NCS) is the principal policy document for environmental issues in the country which was developed and approved by the Government of Pakistan on 1st March 1992. The NCS works on a ten-year planning and implementation cycle. It deals with fourteen core areas as follows:

- Maintaining soils in cropland;
- Increasing irrigation efficiency;
- Protecting watersheds;
- Supporting forestry and plantations;
- Restoring rangelands and improving livestock;
- Protecting water bodies and sustaining fisheries;
- Conserving biodiversity;
- Increasing energy efficiency;
- Developing and deploying material and energy renewable;
- Preventing and abating pollution;
- Managing urban wastes;
- Supporting institutions for common resources;
- Integrating population and environmental programs;

- Preserving the cultural heritage

3.2.2. The National Environmental Policy (2005)

The National Environmental Policy (NEP) describes integration of the environment into development planning through the implementation of the EIA process at the scheme level. The NEP is the overarching framework which aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development.

The policy includes guidelines to Federal, Provincial and Local Governments under the following relevant headings:

- Water supply and management
- Air quality and noise
- Waste management
- Forestry
- Biodiversity and protected areas
- Climate change and ozone depletion
- Energy efficiency and renewable
- Multilateral environmental agreements

Cross-sectorial guidelines are also included which link the environment to poverty, population, gender, health, trade, local governance and natural disaster management.

3.2.3. Guidelines for Sensitive and Critical Areas (1997)

The guidelines identify officially notified protected areas in Pakistan, including critical Ecosystems, archaeological sites and present checklists for environmental assessment procedures to be carried out within or near to such sites. Environmentally sensitive areas include, among others, archaeological sites, biosphere reserves and natural parks, and wildlife sanctuaries and preserves, none of which are relevant to the Project area.

3.2.4. The Solid Waste Management Policy (2000)

This policy was promulgated by PEPA, which aims to facilitate control on waste by providing principles of good waste management and reducing waste at source.

3.3. Applicable Laws

The federal and provincial laws applicable to the SRP are listed below.

- Sindh Environmental Protection Act, 2014.
- Factories Act 1934
- Antiquity Act 1975
- National Environmental Quality Standards 2010
- Sindh Irrigation Act with Amendments in 2011
- Sindh Local Government Act,2013
- Provincial Motor Vehicles (Amendment) Act,2014
- Highway Safety Ordinance

- The Land Acquisition Act (LAA) 1894
- Employment of Child Act,1991
- Sindh Wildlife protection Ordinance,2001
- Sindh Forest Act,2012
- Sindh Fisheries Ordinance 1980
- Protection of Women (Criminal Laws Amendment) Act,2006
- Industrial Relations Act, 2008.
- Constitution of Pakistan, Articles, 11, 17, 18, 25 and 37(e) on labourThe Employment of Children Act 1991
- The Bonded Labor System (Abolition) Act, 1992.

3.4. The World Bank Safeguards Policies

The World Bank is the donor of the project. Therefore it is obligatory for the project to abide by the World Bank safeguard polices. In the light of the World Bank OP: 4.01, the SRP has been assessed as Category-A. The triggering statuses of the World Bank Operational Policies are described below in **Table 3.1** and further discussed in the subsequent sections.

Table 3.1: World Bank Safeguard Policies Triggered

	Subject	Policy Reference	Triggered	Not Triggered	Remarks
1	Environmental Assessment	OP/BP/GP 4.01	✔		As per PID/ISDS of the SRP, the overall project is categorized as Category-A due to the structural investments under the Component- 2 which will include construction of new and rehabilitation of existing flood protection and river training structures. These activities are likely to cause negative environmental and social impacts of varying degree of intensity, significance, spatial as well as temporal extent, reversibility, and importance. Therefore; in accordance to the WB OP 4.01, the environmental assessment of each sub-project to be covered under the ambit of SRP is required.
2	Natural Habitats	OP/BP 4.04	✔		Some interventions are likely to be carried out within or near important habitats. Therefore; this OP is triggered.
3	Involuntary resettlement	OP/BP 4.12	✔		Some of the proposed interventions may cause involuntary resettlement resulting in relocation or adverse impact on livelihood and/or sources of a livelihood. Therefore; this OP 4.12 is triggered. This Policy covers involuntary land acquisition and related impacts.
4	Project in International water ways	OP/BP 7.50	✔		Some of the proposed interventions will be carried out in/along Indus River which is an international waterway as defined in the OP. However; an exception notification would be sought by the task team.
5	Safety of Dams	OP/BP 4.37	✔		The selected sub-projects are falling under the definition of Small Dams as specified in the OP 4.37. As part of due diligence and considering that Bank's OP 4.37 is triggered and Dam Safety Expert would be engaged by the World

	Subject	Policy Reference	Triggered	Not Triggered	Remarks
					Bank to undertake a technical review of sites.

3.4.1. Environmental Assessment (OP 4.01)

The World Bank requires environmental assessment (EA) of projects proposed for Bank funding and thus to improve decision-making. The OP 4.01 defines the EA process and various types of EA instruments. The present environmental assessment has been carried out in accordance with this OP-4.01, to identify the extent and consequences of these impacts and to develop an ESMP for their mitigation. OP 4.01 defines the requirements for environmental assessments for World Bank funded projects. It describes environmental screening processes in order to define projects as category A, B, or C, where category A projects are likely to have significant impacts, and category C projects have minimal impacts. The OP includes a range of environmental assessment and management tools relevant to different impact category projects and defines the requirements for public consultation and disclosure.

The overall project is categorized as Category-A due to the structural investments under the Component- 2 which will include construction of new and rehabilitation of existing flood protection and river training structures. These activities are likely to cause negative environmental and social impacts of varying degree of intensity, significance, spatial as well as temporal extent, reversibility, and importance. Therefore; in accordance to the WB OP 4.01, the environmental assessment of each sub-project to be covered under the ambit of SRP is required.

3.4.2. Natural Habitat (OP 4.04)

This document outlines the World Bank Policy on biodiversity conservation taking into account ecosystem services and natural resource management and use by project affected people. The policy requires the assessment of potential project impacts on biodiversity. The aim of the policy is to limit circumstances under which conversion or degradation of natural habitats can occur. The policy can prohibit projects which are likely to result in significant loss of critical natural habitats.

Some interventions are likely to be carried out within or near important habitats. Therefore; this OP is triggered.

3.4.3. Indigenous People (OP 4.10)

For the purpose of this policy, the term “Indigenous People” is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees.

- Self-identification as members of distinct indigenous group and recognition of the identity by others.
- Collective attached to geographically ancestral territories in the project area and to the natural resources in these habitats and territories.
- Customary cultural, economic social or political institutions that are separate from those of the dominant society and culture, and
- An indigenous language often different from the official language of the country or region.
- The OP defines the process to be followed if the project affects the indigenous people.

Although there are no known indigenous people as defined by OP 4.10 in Sindh, however; the ESMP for each sub-project would confirm the presence or absence of IPs in the project area.

3.4.4. Cultural Property (OP 4.11)

The World Bank safeguards require full protection to physical cultural heritage on the World Bank financed project sites. By reviewing the secondary reports, there are five sites having physical and cultural value. As per initial assessment, the sites are not located within the potential working area; therefore; this OP 4.11 will not trigger. However the specific aspects of this policy are given below:

- The Bank normally declines to finance projects that will significantly damage non-replicable cultural property and will assist only those projects that are sited or designed so as to prevent such damage.
- The Bank will assist in the protection and enhancement of cultural properties encountered in the Bank financed projects, rather than leaving that protection to chance. In some cases the project is relocated so that sites and structures can be preserved, studied and restored in situ. In other cases, the structures can be relocated, preserved, studied and restored on alternate sites. Often, scientific study, selective salvage and museum preservation before destruction is all that is necessary. Most such projects should include training and strengthening of institutions entrusted with safeguarding a nations' cultural heritage. Such activities should be directly included in the scope of the project rather than being postponed for some possible future action and costs are to be internalized in overall project costs.
- Deviations from this policy may be justified only where expected project benefits are very high and any loss of cultural heritage is unavoidable, minor or otherwise acceptable. Specific details of the justification should be discussed in project documents.

This OP is not triggered as yet, however; during detailed environmental and social studies of each sub-project, the status of this policy will be confirmed. In case of any unidentified discovery of any such sites or artifacts during construction phase, a chance find mechanism is provided later in the document.

3.4.5. Involuntary Resettlement (OP 4.12)

This policy pertains to any World Bank financed project, which directly or indirectly involves partly or as a whole Resettlement. This Policy covers involuntary land acquisition and its related impacts.

The World Bank experience indicates that such involuntary resettlement under development or unmanaged, may give rise to severe economic, social and environmental risks. Production systems are dismantled; people face impoverishment when their productive assets or income sources are lost. This policy covers involuntary land acquisition and related impacts of the development projects. This policy includes safeguards to address and mitigate these risks.

The overall objectives of the policy are as follows:

- Involuntary resettlement should be avoided where feasible, or minimized, exploiting all viable alternative project options.
- Where it is not feasible to avoid resettlement, the resettlement activities are sustainable development programs, providing sufficient investment resources to affectees by the project and share with them the benefits of the project. The anticipated affectees are meaningfully consulted and are given due chances to participate in planning and implementing the resettlement process.
- The affectees should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore their direct financial losses. It should be ensured that their condition is better than prior to the start of the project.

This policy is triggered as there maybe loss of partial cropping area of encroached land, damages to adobe/muddy rooms built for storage of agriculture inputs and animal sheds due to some project activities. A Resettlement Policy Framework (RPF) is being prepared (Chpater-5) to define principles for mitigation measures and need for the preparation of RAPs to develop mechanism to mitigate negative social impacts, their implementation, costing, scheduling and monitoring.

3.4.6. Safety of Dams (OP 4.37)

This Policy relates to dam safety, but is equally applicable to reservoirs and ponds. The selected sub-projects are falling under the definition of Small Dams as specified in the OP 4.37. As part of due diligence and considering that Bank's OP 4.37 is triggered and Dam Safety Expert has been engaged by the World Bank to undertake a technical review of sites.

3.4.7. Projects on International Waterways (OP 7.50)

This OP is related to the types of projects falling within the ambit of international waterways like (a) any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states. This policy applies to the following types of international waterways:

- any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states, whether Bank members or not;
- any tributary or other body of surface water that is a component of any waterway described in (a) above; and
- any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states--and any river flowing into such waters.

This policy applies to the following types of projects:

- hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial, and similar projects that involve the use or potential pollution of international waterways as described in para. 1 above; and
- detailed design and engineering studies of projects under para. 2(a) above, including those to be carried out by the Bank as executing agency or in any other capacity.

Some of the proposed interventions will be carried out in/along Indus River which is an international waterway as defined in the OP. However; an exception notification would be sought by the task team.

3.5. Multilateral Environmental Agreements

Pakistan is signatory of several Multilateral Environmental Agreements (MEAs), including:

- Basel Convention,
- Convention on Biological Diversity, Convention on Wetlands (Ramsar),
- Convention on International Trade in Endangered Species (CITES),
- UN Framework Convention on Climate Change (UNFCCC),
- Kyoto Protocol,
- Montreal Protocol,

- UN Convention to Combat Desertification,
- Convention for the Prevention of Pollution from Ships (MARPOL),
- UN Convention on the Law of Seas (LOS),
- Stockholm Convention on Persistent Organic Pollutants (POPs),
- Cartina Protocol.
- Ramsar Convention (the Convention on Wetlands of International Importance).

These MEAs impose requirements and restrictions of varying degrees upon the member countries, in order to meet the objectives of these agreements. However, the implementation mechanism for most of these MEAs is weak in Pakistan and institutional setup mostly nonexistent. The MEA most applicable for the Project is the Stockholm Convention on Persistent Organic Pollutants (POPs), under which certain pesticides such as dichloro diphenyl trichloroethane (commonly known as DDT) cannot be used.

4. Safeguard Procedures

4.1. Site Selection Criteria

The proposed subprojects will not be located adjacent to or within the environmentally and or socially sensitive areas and will not carry out activities that have potential to cause damage to such areas - as described in **Table 4-1**.

Table 4.1: Sub-Project Location in the Environmental Sensitive Areas

	Environmental Sensitive Areas/Activities
1	Cultural heritage e.g. archaeological, historical sites or existing cultural sites
2	Conversion and potential adverse effects on sensitive and valuable ecosystems e.g. protected areas, wetlands, habitat of endangered species, special area for protecting biodiversity and buffer zones of protected area
3	Densely populated areas where resettlement may be required or pollution impacts and other disturbance may be significant and encroachment on lands or rights of indigenous people or other vulnerable minorities shall be avoided;
4	Watercourses, aquifer recharge areas, or reservoir catchment used for potable water supply shall be voided;
5	Impact on the international water ways, other trans-boundary issues and toxic wastes disposal;
6	Permanent conversion of potentially productive or valuable resources e.g. fisheries, natural forests and wild lands/rangelands;
7	Activities causing social conflicts;
8	Substantial cutting of trees.

4.2. Subproject Screening

The Sindh Environmental Protection Agency (SEPA) in its review of Initial Environmental Examinations (IEE) and EIA regulations, 2014 describes those projects that require an IEE or EIA in accordance with Schedule I and Schedule II, respectively. Projects have been categorized in the regulations on the basis of expected degree of adverse environmental impacts. Project types listed in Schedule II are designated as potentially seriously damaging to the environment and require EIAs. Those listed in Schedule I are seen to have potentially less serious effects and only require IEEs, unless the projects are located in environmentally sensitive areas. The WB policies also classify projects in a similar manner primarily based upon the nature and quantum of potential adverse impacts.

Screening checklists will be used to determine the viability and suitability of the sub-project sites and the modifications needed in the design and construction methods in order to achieve the sustainable management of project-related environment and social impacts. Priority will be given to sub-projects in sites that which will generate manageable and low impacts. . Given the needs of the communities, this project will support only medium-sized sub-projects involving rehabilitation of existing structures or the construction of small-scale infrastructure that are expected to cause low to moderate level of negative but reversible and localized impacts. An ESMP (and a RAP if needed) will be prepared for to fulfill the project's safeguards requirements for smaller subprojects having low to moderate adverse impacts. A full EIA/ESIA including an

ESMP and RAP will be carried out for subprojects having significant irreversible and widespread impacts or involving significant degradation of forests or sensitive areas, or requiring land acquisition, or involving water impounding structures higher than ten meters.

The criteria for subproject categorization under SRP, developed in light of the SEPA Regulations and World Bank OPs are given in **Table 4.2** below.

Table 4.2 Criteria for of the Categorization of Sub-Projects

Large Subprojects Full EIA/ESIA Required (Category A Subprojects)	Medium-sized Subprojects ESMP Required (Category B subprojects)	Smaller Subprojects Environmental Social Checklist Required
Subprojects requiring/involving: • large-scale construction • requiring land acquisition that may affect more than 20 households • dam height more than 10 m, • Category A according to WB OP 4.01, • Requiring EIA according to SEPA regulations • involving significant degradation of forest or sensitive habitat	Subprojects involving: • rehabilitation of existing structures; potentially causing low to moderate level of impacts, temporary, reversible and localized impacts such as minor traffic, disposal of excavated soil, shallow borrow pits, minor soil erosion, generation of solid and liquid wastes from temporary camp sites • construction of small-scale civil works • significant but manageable impacts on non-critical habitats such as forests.	All other small subprojects

4.3. Preparation of Safeguard Instruments

Once the number and location of the sub-projects are confirmed, safeguards instruments (EIA/ESIA including ESMP and if required a RAP) would be prepared for each category A sub-project as defined in Table 4.2 above, in compliance with the World Bank Operational Policies, IFC EHS guidelines as well as SEPA Act, 2014 and regulations. In case of category B sub-project as defined in Table 4.2 above, an ESMP (and also a RAP/ARAP if applicable) covering only the aspects of the relevant sub-project will be prepared. For smaller subprojects, mitigation checklists will be filled. The safeguard instruments will need to be reviewed and cleared by the WB before commencing the procurement process on the associated subprojects.

The approach is to prepare sub-project specific RAP (if required), ESMP and ESIA for each contract in the framework of overall SRP that would be implemented under the project. Depending upon nature, scale and complexity of works, subproject/contract specific ESIA would assess general as well as site specific environment issues and preparation of sub-project specific ESMP. Implementation of ESMP would be included in the contract and addressed under the Project. The design reports would also include ESIA and ESMP in addition to the technical designs and form the basis of bidding documents. The contract specific ESIA/ESMP would be reviewed and cleared by the ESMU and also by the WB. The ESMEC will be reporting to the ESMU/IA.

4.4. Stakeholder Consultations

Public consultation is one of the key regulatory tools employed to improve transparency, efficiency and effectiveness of regulations for a development project. It involves actively seeking the opinions of those interested or affected by a project. It is a two-way flow of information, which may occur at any stage of development from project identification through planning, design, construction and operation. It may be a process or a continuing dialogue between project implementation authority and the affectees. Consultations are increasingly concerned with the objective of gathering information and find the acceptable solution.

As the SRP is a Category-A Project therefore intensive consultations for the overall project were carried out by the project proponents and consultants with the key stakeholders. As per World Bank OP 4.01 requirements for Category-A projects, two rounds of public consultations were carried out; one at the time of initial surveys and the other when the draft ESMF/RPF was prepared.

On some of the sub-projects, open consultation sessions were held with different stakeholder groups that may be affected by the project. Further consultations will be carried out during preparation of sub-project specific ESIAs and ESMPs.

4.4.1. Objectives

Participation mechanisms facilitate the consultative process and include: information sharing and dissemination; disclosure; and participation of all stakeholders in the project related activities so that their views and concerns shall be addressed properly and ensure them that they are actual beneficiaries of the project. It is of basic importance to involve representatives of local communities right from the start. The institutional arrangements should also be in place for continuous consultation throughout the process of planning to implementation of the project.

The consultation with various stakeholders was carried out in accordance with the World Bank Operational Policy (OP4.01) on public consultation:

4.4.2. Identification of Stakeholders

Stakeholder analysis/identification is a way of determining who among stakeholders can have the most positive or negative influence on an effort, who is likely to be most affected by the effort, and how you should work with stakeholders with different levels of interest and influence. The Stakeholders are people/farmers, groups, Non-Governmental Organizations (NGOs), Community Based Organization (CBOs), or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. Generally, stakeholders can be classified into three groups:

4.4.3. Primary Stakeholders

The primary stakeholders are the people or groups that stand to be directly affected, either positively or negatively, by an effort or the actions of an agency, institution, or organization. In case of SRP, the primary stakeholders may include;

- Communities located within CoI
- All Project Affected Persons (including men, women, titled and non-titled holders, disabled, and vulnerable, minorities) within Corridor of Influence (Col).
- The general population / residents, as well as any institutions, Government departments, NGOs or CBOs within primary impact zone who may be subject to direct or indirect impact on their residences, livelihood or access to their workplaces during the construction period, or by any kind of project action, or who may have other interests in the project.

- The Project Proponent i.e. Irrigation Department, Government of Sindh

4.4.4. Secondary Stakeholders

Secondary stakeholders are people or groups that are indirectly affected, either positively or negatively, by an effort or the actions of an agency, institution, or organization. Secondary Stakeholders identified for SRP are:

- Farmers of Secondary Impact Zone (in the command area of each dam sub-project) who will be potentially impacted by this project, positively in the long term through availability of water for irrigation, domestic and livestock use.
- The local political leaders, influential community members and other local representatives including Imams and may be teachers of local schools.

4.4.5. Outcome of Stakeholder Consultations

In order to get spontaneous and candid responses, scoping sessions were conducted in all the villages located on both sides of the existing Indus River embankments and upstream as well as downstream of some of the small dams.

The community consultations involved a program of structured discussion in communities in the vicinity of primary impact zone of the sub-projects of SRP. The **Table 4.3** lists the public consultations carried out in the project area. The details are given in **Annex-B**.

Table 4.3: Summary of Stakeholder Consultations

	Name of Sub-Project	Name of Village	Date	Number of Participants
1.	Bhansar Dam	Bhansar Village	15-10-2015	16
2.	Bhansar Dam	Bandhi Village	15-10-2015	8
3.	Sankar Dam	Sankar Village	15-10-2015	14
4.	Sabusan Dam	Sabusan Village	18-10-2015	8
5.	SH Bund	Wadera Ghulam Thenga	24-11-2015	7
6.		Soondha	24-11-2015	14
7.		Ghulam Muhammad Shah	24-11-2015	4
8.	BU Bund	Qasim Goth	26-11-2015	4
9.		Muhammad Hassan Khushk	26-11-2015	9
10.		Mir Hassan Khushk	26-11-2015	5
11.		Abdullah Khan Hamro	26-11-2015	14
12.		Noor Muhammad Gaho	26-11-2015	6
13.		Chibarh Khaskeli	26-11-2015	6
14.		Hayat Gaho	26-11-2015	4
15.		Yar Muhammad Girano	26-11-2015	6
16.		Haji Ibrahim	28-11-2015	5
17.		Kaamu	28-11-2015	5
18.		Ghora Bari town	28-11-2015	25
19.		Mayo Wasayo	28-11-2015	5
20.		Qasim Hamti	28-11-2015	5
21.		Wadero Lal	28-11-2015	6
22.		Ismail Shoro	28-11-2015	8
23.		Ghulam Qadir	28-11-2015	8

	Name of Sub-Project	Name of Village	Date	Number of Participants
24.		Shams Shoro	28-11-2015	6
25.		Muhammad Soomar	28-11-2015	9
26.		Essa Meher	28-11-2015	6
27.	Indo Bund	Noor Muhammad Junejo	28-11-2015	10
28.		Dandari	28-11-2015	23
29.		Mera Dino	28-11-2015	6
30.		Gujrio	28-11-2015	6
31.		Muhammad Soomar Junejo	28-11-2015	15
32.	MS Bund	Allah Bux	25-11-2015	5
33.		Pasand Maheshwari	25-11-2015	8
34.		Malik Shareef	25-11-2015	3
35.		Syedpur	27-11-2015	23
36.		Manaro	27-11-2015	5
37.		Muhammad Yaqub	27-11-2015	10
38.		Muhammad Ishaq	27-11-2015	5
39.		Haji Ramzan	27-11-2015	4
40.		Muhammad Ali Khosa	27-11-2015	3
41.		Gul Muhammad Mallah	27-11-2015	5
42.		Haji Saleh Muhammad Khoso	27-11-2015	20
43.		Syed Burhan Shah	27-11-2015	7
44.		Muhammad Arab Saharo	27-11-2015	5
45.	MS Bund	Haji Ahmed Khosa	27-11-2015	6
46.		Ahmed	27-11-2015	9
47.		Juma Khan Khosa	27-11-2015	5
48.		Ramu Wato	27-11-2015	7
49.		Muhammad Hassan Konjai	27-11-2015	6
50.		Road Mori	27-11-2015	7
51.		Chohar Jamali	27-11-2015	10
52.		Mumtaz Samo	27-11-2015	7
				433

4.4.6. Findings of Public Consultation with Male Community Members

Some of the key findings of consultation with male community members on sub-projects are summarized below while details are given in **Annex-B**.

- The communities expressed satisfaction that the project work would protect their villages from the hazard of floods and they will find work through laborers during construction phase.
- After rehabilitation of the embankments, their agricultural land and crops will be protected.
- After construction of the small dam, the collective perception of the communities was that the dam will provide water for domestic, livestock and irrigation use. The dams will

also protect their houses, agriculture land and other livelihoods from the damages of flash flood.

4.4.7. Findings of Public Consultation with Female Community Members

Key findings of consultation with female community members on sub-projects are summarized below.

- Most of the women were in favor of the sub-project and also had expectations to get benefits.
- The female community members requested for the installation of hand pumps in the area as they are facing shortage of drinking water.
- The female community members also requested for the provision of buffalo passage routes/tracks over the embankment.

4.4.8. Second Round of Public Consultation

Second round of public consultation was carried out when the draft ESMF/RPF was prepared. A Disclosure/Consultative Workshop on ESMF/RPF SRP and ESMP (of prioritized sub-projects) was organized in the Irrigation office in Thatta on 30 December, 2015. The executive summaries of the draft ESMF/RPF and ESMP (MS.SH, BU and Indo Bunds) were translated into Sindhi Language, uploaded on the Sindh Irrigation Website and printed copies were distributed among the participants. Invitations were given by individual invitation cards and on Irrigation Department's SRP website.

The irrigation department also sent invitation letters to Sindh Wildlife and Forest Departments, WWF, IUCN and Sindh EPA. A presentation about the ESMF/RPF and ESMP was prepared by the SRP Consultants. In describing the engineering aspects of the sub-project or overall project, the SRP consultant team was assisted by concerned Additional Directors/Executive Engineers (XENs).

Table 4.4 provides list of participants of consultative/disclosure workshop organized for disclosure of ESMF/RPF while the details are given in **Annex-B**.

Table 4.4: List of Participants in the Consultative/Disclosure Workshop

	Name of the Participant	Organization	Designation
1	Zahoor Ahmed Sehito	Small Dams	Assistant Executive Engineer
2	Nadeem Jokhio	Small Dams	Assistant Executive Engineer
3	Ali Muhammad	Small Dams	Assistant Executive Engineer
4	Muneer	Irrigation Department	Assistant Executive Engineer
5	Mujeeb Rehman	Irrigation Department	Assistant Executive Engineer
6	M. Usman Malik	Irrigation Department, Sonda Sub-division	Assistant Executive Engineer
7	Balram Dodani	Irrigation Department	Assistant Executive Engineer
8	Dr. Ali Asghar Mahesar	PMO	Deputy Director (Env)
9	Shoaib Ahmed Sughrio	Irrigation Department,	Executive Engineer

	Name of the Participant	Organization	Designation
		Kalri Baghar Division	
10	Shafqat Hussain	Irrigation Department, Pinyari Circle	Superintendent Engineer
11	Ibrahim Samoon	Associated Consulting Engineers (ACE)	Regional Head
12	Ghulam Mohiuddin Mughal	Irrigation Department	Executive Engineer
13	Sardar Muhammad Kakar	Associated Consulting Engineers (ACE)	Team Leader
14	Rubina Aziz	Associated Consulting Engineers (ACE)	Sociologist
15	Attaullah	Associated Consulting Engineers (ACE)	Ecologist
16	Muhammad Ramzan	-	Landlord
17	Ghulam Rasool	-	Landlord
18	Ali Muhammad Hingoro	-	Social Worker
19	Nisar Ahmed Junejo	Irrigation Department	Assistant Executive Engineer
20	Wasi Ahmed	Irrigation Department	Assistant Executive Engineer
21	Fareed Ahmed Memon	Irrigation Department, Baghar Sub-divison	Assistant Executive Engineer
22	Azimullah	Irrigation Department	Assistant Executive Engineer
23	Ali Hassan Behrani	Irrigation Department	Assistant
24	Eijaz	SRP	Assistant
25	Shafi Muhammad	Irrigation Department	Pesh Imam
26	Ghulam Abbas	Irrigation Department	Sub-Engineer
27	Ghulam Rasool	-	Landlord
28	Abdul Rasool	-	Landlord
29	Muharram Solangi	-	Landlord
30	Khamiso Khan Shar	Education Department	Teacher
31	Ghulam Muhammad Shar	Education Department	Teacher
32	Angario Samo	-	Landlord
33	Manzoor Ali Soomro	-	Landlord
34	Mir Ali Solangi	Irrigation Department	Darogo
35	Ziarat Hussain	-	Landlord
36	Nasir Ahmed	Irrigation Department	Darogo
37	Asif Ali Siddiqui	Irrigation Department	Darogo
	Sagheer Ahmed Walhari	Irrigation Department	Sub-Engineer
38	Tanveer Ahmed Walhari	Irrigation Department	Sub-Engineer
39	Shanker	Irrigation Department	Clerk
40	A. Sattar Bahrani	Irrigation Department	Sub-Engineer

	Name of the Participant	Organization	Designation
41	A.Khalique Soomro	-	Landlord
42	Nazir Ahmed Walhari	-	Landlord ,BU Bund
43	Hyder Ali	Irrigation Department	-
44	Asif Ali Solangi	Irrigation Department	-
45	M. Yakoob Jalbani	-	-
46	Khan Muhammad	Irrigation Department	Clerk
47	Muhammad Essa	Irrigation Department	Naib Qasid
48	Haji Mallah	Irrigation Department	-
49	Muhammad Suleman	Irrigation Department	Darogo
50	Akram Khan	Irrigation Department	Darogo
51	M. Ilyas	-	Landlord
52	M. Hussain Katyar	APCA, Thatta	Jr. Clerk
53	Abdul Hameed Shaikh	APCA, Thatta	Jr. Clerk
54	Farooq Memon	Associated Consulting Engineers (ACE)	Environmental Engineer
55	Sajid Abbas	Irrigation Department	Assistant Executive Engineer
56	Kashif Channa	Livestock and Fisheries Department	Assistant Warden (Fisheries)
57	Adnan Khalid Soomro	Livestock and Fisheries Department	Assistant Warden (Fisheries)
58	Fareed A. Memon	Irrigation Department	Executive Engineer
59	Abdul Qadir Palijo	Irrigation Department	Superintendent Engineer
60	Ghukam Mohiuddin Soomro	-	Landlord
61	Ghulam Mustafa Memon	Irrigation Department	Sub-Engineer
62	Muneer Ahmed	Associated Consulting Engineers (ACE)	Environmental Engineer
63	Javed Ali	Associated Consulting Engineers (ACE)	Computer Systems Incharge
64	Naeem Samoon	Associated Consulting Engineers (ACE)	Senior Environmentalist

4.4.9. Findings of Second Round Public Consultation

The key issues raised and discussed with the participants during workshop in Thatta are summarized below while details are given in the **Annex-B.**

The participants requested for consultation with the concerned communities and making ensure their participation in the planning and implementation phases of the project. The participants requested to include the PB Bund for rehabilitation under the SRP and expressed concerns about the contamination of Keenjhar Lake. The participants also requested for including the Monarchi Bund in the project. The participants requested the Irrigation Department to not disturb the existing access routes during construction period and also requested for plantation along the embankment under the project.

In response, the SRP Consultant and Irrigation Department representatives ensured the participants the participation of the concerned communities in the project planning and implementation, the inclusion of PB Bund for rehabilitation under the project but the Monarchi Bunds is in good condition and no rehabilitation is required. The contamination of Kheenjar Lake (not due to the proposed project) was noted by the irrigation department. The Project will take care of the existing access routes and in case protection was not possible will rehabilitate after completion of the rehabilitation works. The compensatory plantation is prosed in the ESIA of the sub-projects.

4.5. Public Hearing

In accordance to the Sindh EPA IEE and EIA Regulations, 2014, the public hearing in the case of category A sub-projects where ESIAs are to be prepared shall be advertised/announced in English, Urdu or Sindhi newspapers and in a local newspaper of general circulation in the area affected by the project. A public notice will be published mentioning the type of project, its exact location, the name and address of the proponent and the places at which the ESIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed. The date to be fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice. All the comments received from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the ESIA.

4.6. Public Disclosure

As discussed earlier, this ESMF/RPF was disclosed to the stakeholders on 30 December 2015 and feedbacks from the participants were obtained and will be addressed in the ESMPs.

The IAs will disclose the ESMF/RPF (and subsequent ESIAs and ESMPs) on their respective websites. The summary of the reports will be made available to the stakeholders at sites designated by Sindh-EPA in accordance with SEPA Act, 2014. In addition, executive summaries of ESMF/RPF, ESIAs and ESMPs will be translated into Urdu and Sindhi languages by the project proponents and made available to local communities in the Project area and also made available on the official websites of the proponents (SID and PDMA). This will ensure that local communities are aware of the project's key impacts, mitigation measures and project implementation mechanism. ESMF/RPF and ESIAs will also be disclosed on the World Bank InfoShop.

4.7. Grievance Redress Mechanism

The IAs will make all efforts to address grievances at the project and sub-project levels. A grievance redress mechanism (GRM), consistent with the requirements of the World Bank safeguard policies, will be established to prevent and address stakeholders' concerns, reduce risks, and assist the project to maximize environmental and social benefits. The GRM will be designed for the overall project and sub-projects to help in achieving the following objectives:

- Addressing the grievances communicated by the stakeholders as soon as possible at the local level
- Open channels for effective communication, including the identification of new environmental and social issues of concern arising from the project;
- Demonstrate concerns about community members and their environmental well-being; and
- Prevent and mitigate any adverse environmental or social impacts on communities caused by project implementation and operations.

The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Confidentiality and privacy for complainants will be honored where this is seen as requested by the complainant.

4.8. Safeguard Monitoring

Safeguard monitoring will be carried out to ensure that the environmental and social mitigation plans are regularly and effectively implemented. It will be carried out at three levels. At the IA 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 on a regular basis. At the field level, more frequent safeguard monitoring will be carried out by the relevant staff of PIC. Monitoring checklists will be prepared and the subproject-specific mitigation plans included in the ESMPs will be monitored. Finally, the project will engage ESMEC as specialists/firms to conduct external monitoring as third party validation on an annual basis. The subproject-specific monitoring requirements may be further defined in the respective ESMPs.

4.9. Capacity Building

The capacity building of the project staff as well as contractor's crew is the key requirement for the SRP. For safeguarding the environmental and social aspects of the SRP, environmental and social trainings will be designed to provide basic knowledge and information on the key environmental and social issues associated with the proposed interventions to the key project personnel of IAs, PIC and contractors. The training plan is presented in **Table 4.5**. The environmental and social specialists of PIC will be responsible for the implementation of this plan. At the subproject sites, the contractor will be responsible to provide such trainings to its construction staff and workers. Additional capacity building requirements may be included in the ESIAs and ESMPs of the subprojects.

Table 4.5: Environmental and Social Training Plan

Area of Training	Key Aspects to be Covered	Participants	Responsibility	Frequency
Environment, Social and Resettlement	a. Environmental and social awareness; b. Key environmental and social issues associated with the project and subprojects ESIAs and ESMPs findings; c. Subproject-specific ESMPs and their components; ESMP implementation. d. Subproject screening; e. Subproject monitoring and reporting; f. Involuntary resettlement; g. Grievance Redress	IAs, PIC and Contractor staff as well as relevant communities.	Environment, Gender, Social and Resettlement Specialists of PIC and IAs.	Before project/physical works commencement, during construction and after construction.

	Mechanism implementation and Community consultations			
	ESMP implementation, occupational health and safety (OHS) aspects	Contractor staff and workers	Contractors	On-going; at least once in a month.

5. Baseline Conditions, Impact Assessment and Mitigation Measures

This Chapter describes the existing environmental and socioeconomic conditions of the SRP project area. The aim of the environmental and social baseline is to provide a generic baseline against which the project impacts can be measured. This chapter also identifies archaeological sites, protected areas, sensitive flora and fauna receptors in the project area. Also discussed in the Chapter are the potential impacts of the project and associated mitigation measures to address these impacts.

5.1. Physical Environment

5.1.1. 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 features of these parts are briefed below.

Kirthar Range: The Kirthar range consists of three parallel tiers of ridges, which run from north to south with varying width between 20 and 50 kilometers. The range consists of ascending series of ridges from east to west, which are about 4,000 to 5,000 meters high. The hills decrease in altitude from north to south. Towards the south, they spread out in width and form a Sindh Kohistan. The Kirthar range has little soil corner and is mostly dry and barren. The small dam sub-projects of Dadu District are located in this zone.

Central Alluvial Plain: The fertile central plain constitutes the valley of the Indus River. This plain is about 580 kilometers long and about 51,800 square kilometers in area and gradually slopes downward from north to south. It is a vast plain, around 100 meters high above sea level. The lower part of this plain, which starts from Hyderabad is predominantly covered with flood silt. There are a few limestone ridges in this plain. Some of them are near Rohri in Sukkur district commonly known as Rohri cuesta, which extends about 50 kilometers South of Rohri and has an average height of about 75 meters above sea level. Another such ridge is the Ganjo Takkar, a cuesta of limestone, which stretches southward from Hyderabad up to a distance of 25 kilometers. There are also a few depressions and lakes in this plain. According to the past tradition, the Central Alluvial Plain has been divided into three distinct zones:

- Lar or Southern Sindh comprising the areas south of Hyderabad.
- Wichalo or Central Sindh, the area lying immediately around Hyderabad.
- Siro, or Northern Sindh, comprising the area beyond Naushahero Feroze and Sehwan.

Some of the small dams may be located in this zone in the area of Sehwan.

Eastern Desert Belt: The eastern desert region includes low dunes and flats in the north, the Achhrro Thar (white sand desert) to the south and the Thar Desert in the southeast. Its major portion lies in India. In the north it extends up to Bahawalpur division of Punjab, where it is called Cholistan. With little rainfall and low water table, most of the area is a barren land with scattered stunted thorny bushes. In the extreme southeast corner of the desert is Nagar Parkar taluka of Tharparkar district. There is small hilly tract known as Karunjhar hills. These hills are about 20 kilometers in length from north to south and have height of about 300 meters. It consist of granite rocks, probably an outlying mass of the crystalline rocks of the Aravalli rang. The Aravalli series belongs to Archaen system, which constitutes the oldest rocks of the earth crust. The small dam sub-projects of Tharparkar District would be located in this zone.

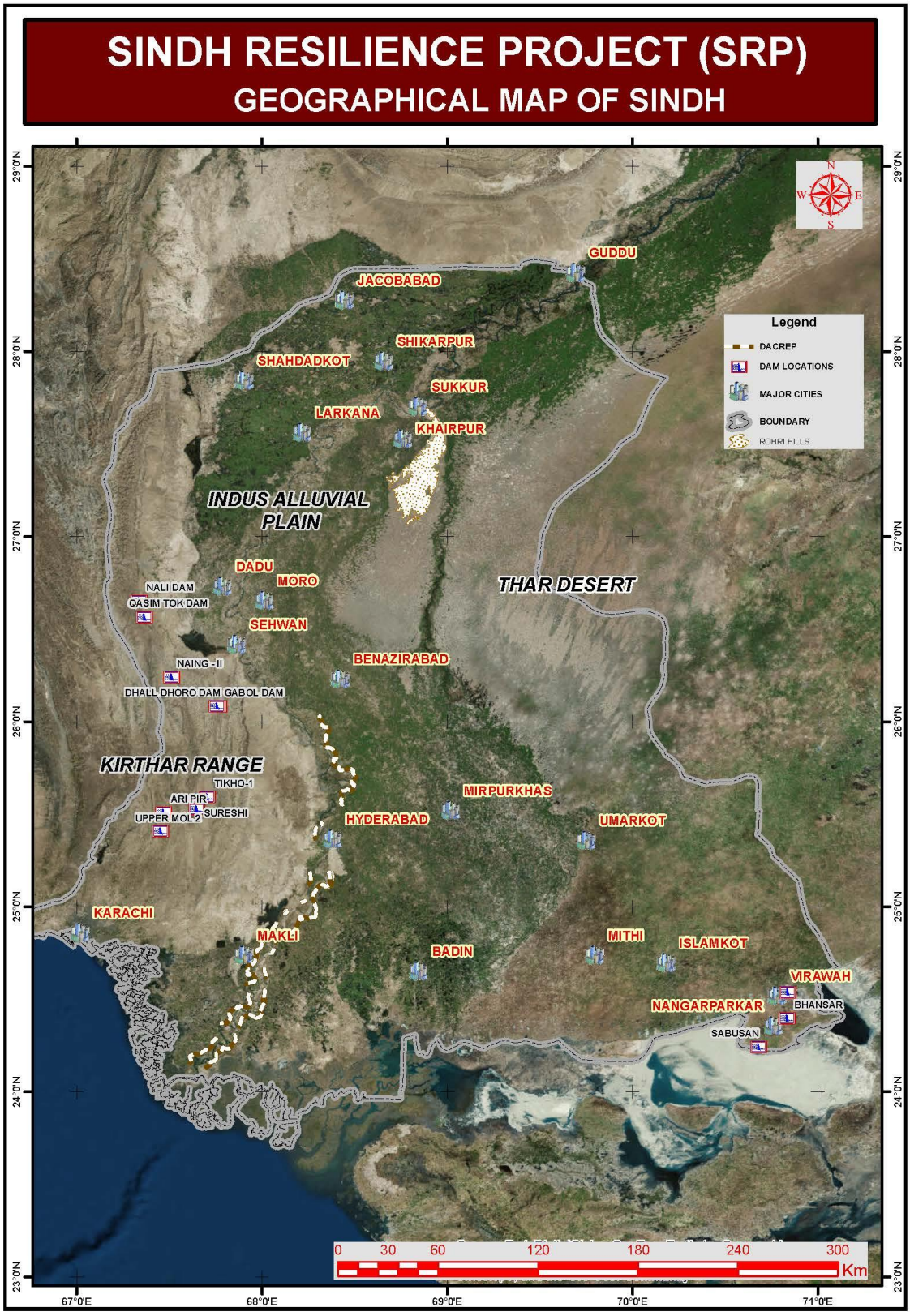

Figure 5.1: Geographical Map of Sindh

Indus Delta: The distributaries of the Indus start spreading out near Thatta across the deltaic flood plain in the sea. The even surface is marked by a network of active and abandoned channels. At a high tide, a coastal strip of 10 to 40 kilometers wide is flooded. The embankment sub-projects along the Indus River are falling in this zone.

5.1.2. Geology

The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karunjhar Mountains, which is famous for Nagar Parkar Granite. In the north Sindh is enquired by rocks of Laki range extending to Suleiman range and its southern most part is encircled by the Arabian Sea. The rocks exposed in this area belong to upper Cretaceous which are recent in age. The sub-surface rocks are about 20,000 feet thick and belong to Cretaceous and Pre-Cretaceous periods. Mostly the rocks are of sedimentary origin of clastic and non-clastic nature and belong to marine, partly marine and fluviatile depositional environments (**Figure 5-2**).

Basin wise Sindh lies in the lower Indus Basin and its main tectonic features are the platform and fore deep areas. Thick sequences of Pab sandstone of Upper Cretaceous, Ranikot Group (Khadro, Bara, Lakhra) of Paleocene, Laki, Tiyon, and Khirthar of Eocene age, Nari Formation of Oligocene, Gaj Formation of Lower to Middle Miocene, Manchar of Upper Miocene to Pliocene, Dada Conglomerate of Pleistocene are present in various areas of Sindh. Limestone and sandstones are the most dominant sedimentary rocks in the area. Structurally Sindh generally contains gently folded anticlinal features trending in north-south direction.

The Thatta District geologically belongs to early Eocene Laki formation. The Laki formation is dominantly composed of cream colored white fossiliferous limestone of massive and nodular character with subordinate calcareous sandstone, shale and marl. Structurally the region belongs to Karachi Arc zone that comprises a series of about 200km long and 50km wide parallel to sub parallel, small, rounded dome shaped, anticline hills with corresponding wide synclinal valleys and Piedmont plains.

The elevation of the area varies from 350m in the north to 75m in south. The main rivers of the area are Naing, Barran and Malirs. In addition to these rivers, the semi-arid region is characterized by a number of dry streams that dissects the eastern slope of Kirthar Range. The Rod Nadi is one of such consequent stream has carved its channel through folded series of rocks.

In Tharparkar District, the area has a remarkable feature as it exhibits a variety of rocks from Pre-Cambrian basement rock to Tertiary sandstone and clays depicting a long tectonic history of the region. The desert to the south of Nagarparkar is believed to have grown over last 3,000 to 4,000 years, before that the region had more humid and tropical climate which favored growth of thick vegetation and habitation of wild animals such as and peacocks and deers. The presence of lignite coal in Thar coal field showed that a humid climate existed at the time. The eastward extension of desert condition was prevented by Aravalli Mountain range about 250km from Nagarparkar where moisture bearing clouds of southwest monsoon precipitates. Since there are no hills across the direction of winds the south west monsoon just passes over Thar Desert. The Nagarparkar is surrounded on three sides by Rann of Kutch shelf which was a shallow arm of sea during Pleistocene which extended and locally submerged the sloping land. The Indus once flowed into it and is now silted up and forms an extensive and desolate salt marsh during dry period and tidal flat covered with little seawater during monsoon period.

The River Indus and its banks are alluvial deposits of fine sands and non-plastic silts.

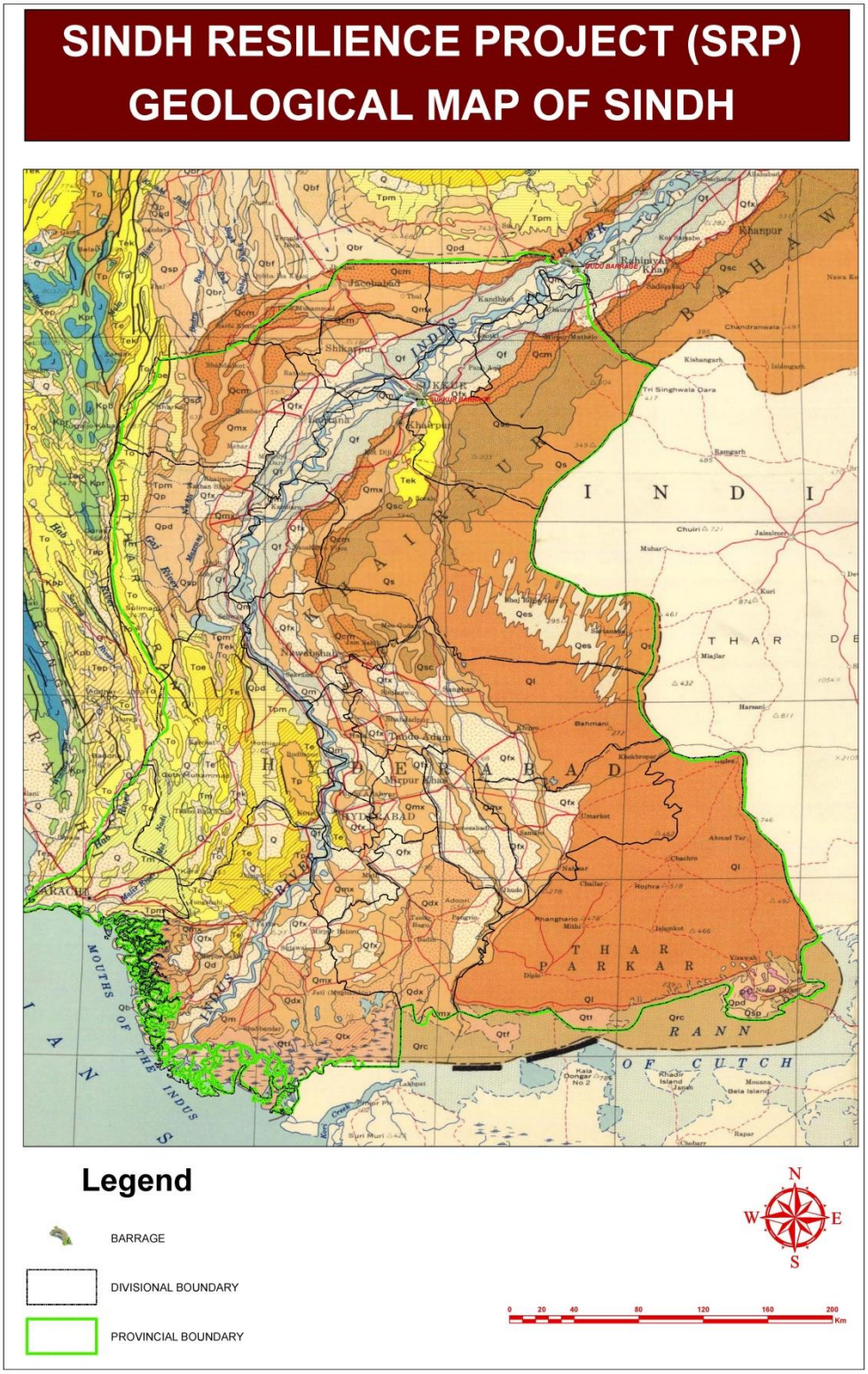

Figure 5.2: Geological Map of Sindh (*Source:Geological Survey of Pakistan – GSP)*

5.1.3. Seismicity

The map shown as **Figure 5-3** indicates that most of the SRP area is falling in Zone 2A and Zone 2B, with peak ground acceleration (PGA) varying from 0.08 to 0.16g and 0.16 to 0.24g, respectively (Pakistan Building Code of Pakistan, 2007). A small portion of Thar District is falling in Zone 4 which is called the High Damage Risk Zone and covers areas liable to MSK VIII. The PGA will be more than 0.32g in this zone.

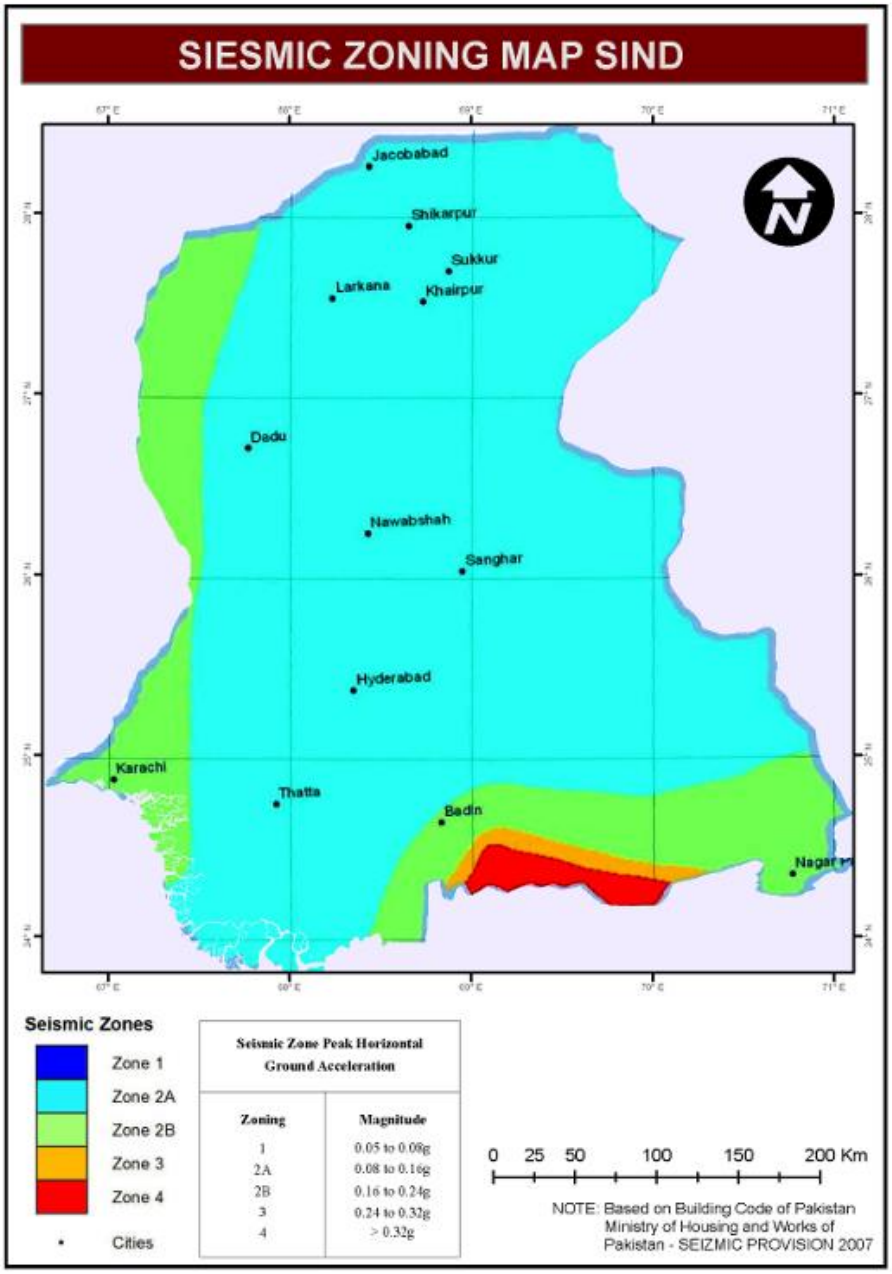

Figure 5.3: Seismic Zones of the Project Area (*Source: Retrieved from* http://db.world-housing.net/building/176 on 11th Nov-2015)

5.1.4. Soil Morphology

Large quantitative of sediments is brought by Indus River and is deposited along the Indus River banks and especially in the deltaic zone. Further hill torrents also bring silt and clay deposits in the lower reaches. These silts provide a highly fertile layer of soil to the region. The soils along the Indus River banks are silt and sandy loam. Outside the active flood plain, the soils are generally calcareous, loamy and silty clay. Most of the soils in the district of Thar are sandy. Moving sand dunes are also found in these districts. In Tharparkar area, the undulating flat plain is covered with variable soils mainly derived by erosion and residual weathering of the granites, granite gneisses and amphibolite's. While in the case of Dadu and Jamshoro, the soils in the plain near to subproject sites have 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.

In addition, the soil samples are collected from some of the sub-projects and are under analysis by Pakistan Council for Research in Water Resources (PCRWR) Karachi. The soil samples will be analyzed by considering the following sub-parameters and will be incorporated in the ESMP reports of sub-projects: Soil texture; pH; EC; Phosphorous; Potassium; Soluble and Exch Na; Soluble Ca+Mg; and Sodium Adsorption Ratio.

5.1.5. Climate and Rainfall

The climate of Sindh is arid and hot. According to 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, coastal region receives a maximum rainfall of 175-200mm. The rainfall pattern in the SRP area is illustrated in the following **Figures 5.4** to **5.16**.

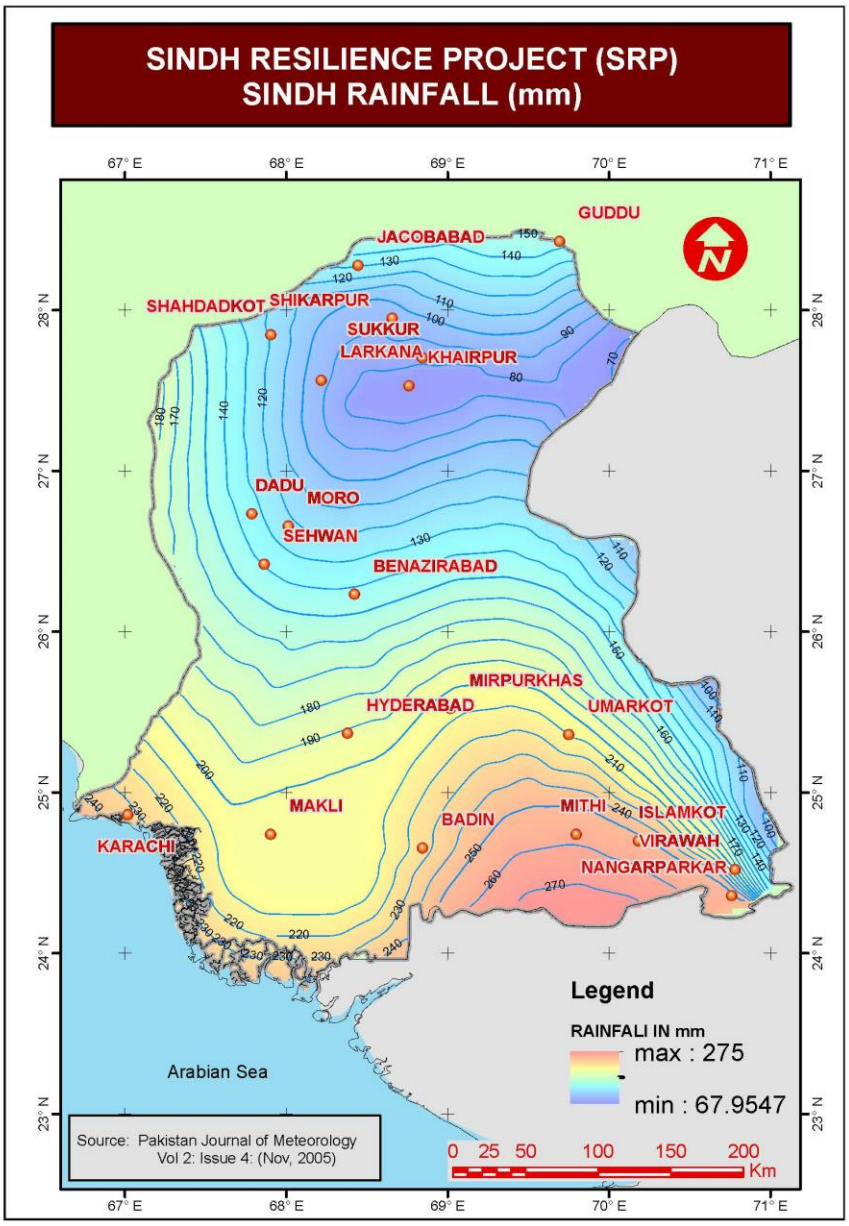

Figure 5.4: Annual Rainfall in Project Area

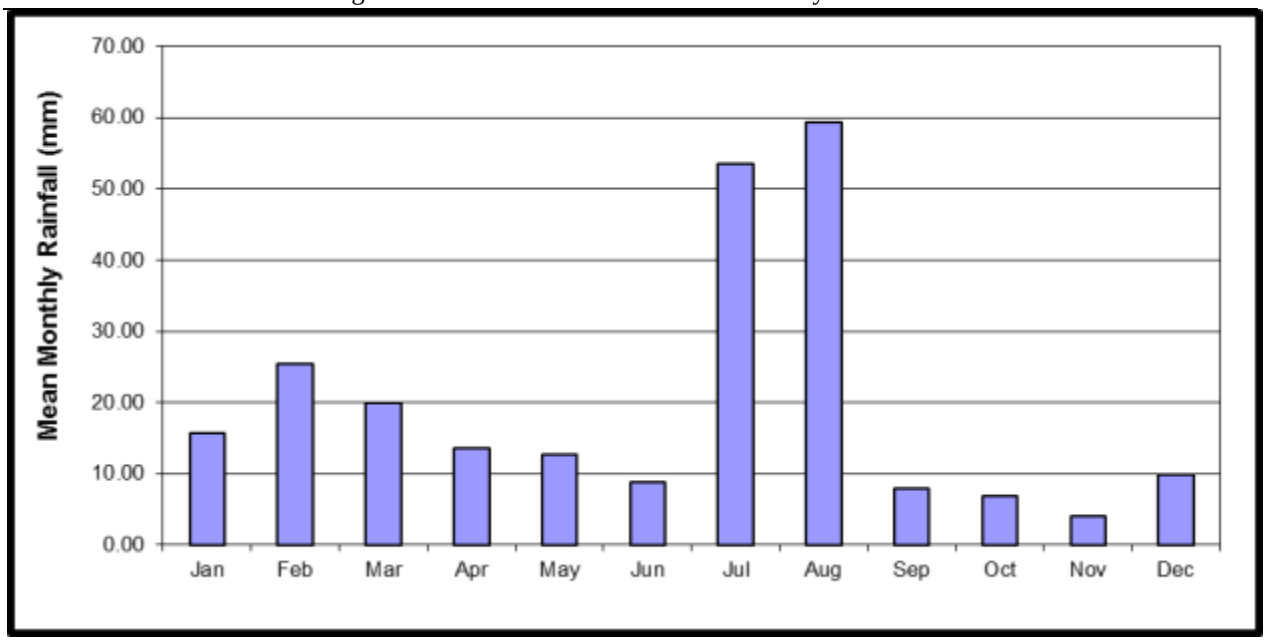

Figure 5.5: Mean Monthly Rainfall at Nai Gaj

Source: (WAPDA: Detail Design Report 2007)

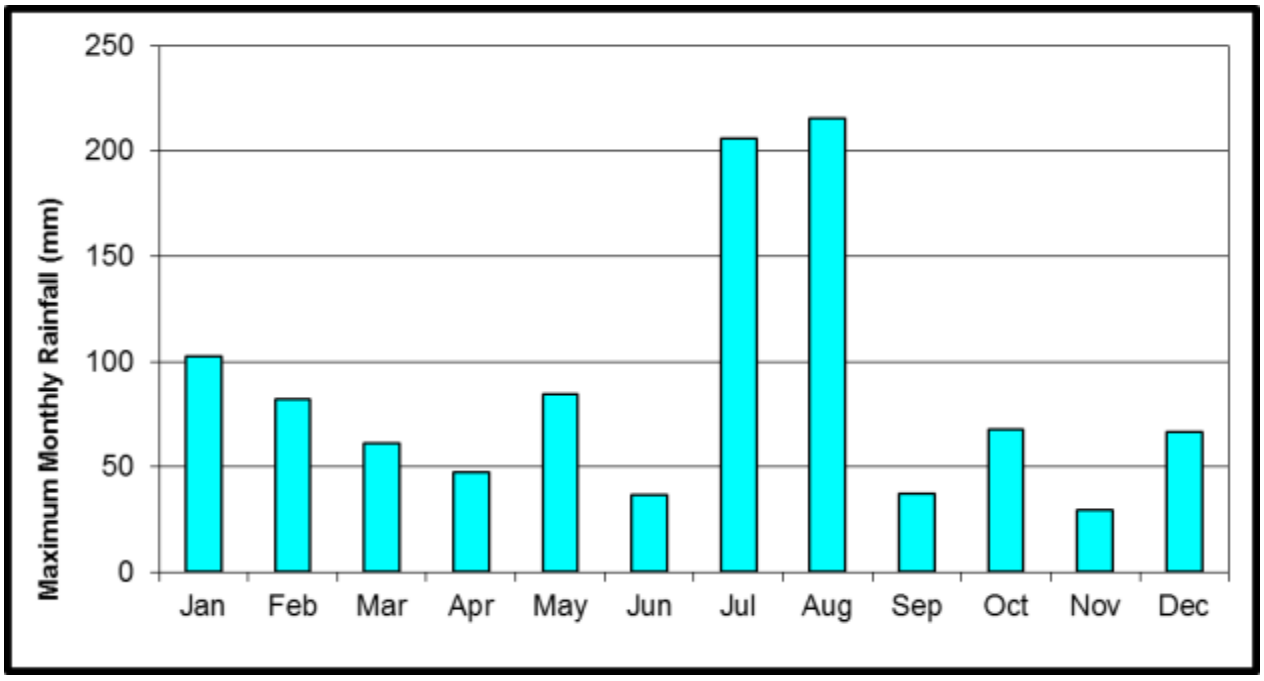

Figure 5.6: Mean Maximum Monthly Rainfall at Nai Gaj

Source: (WAPDA: Detail Design Report 2007)

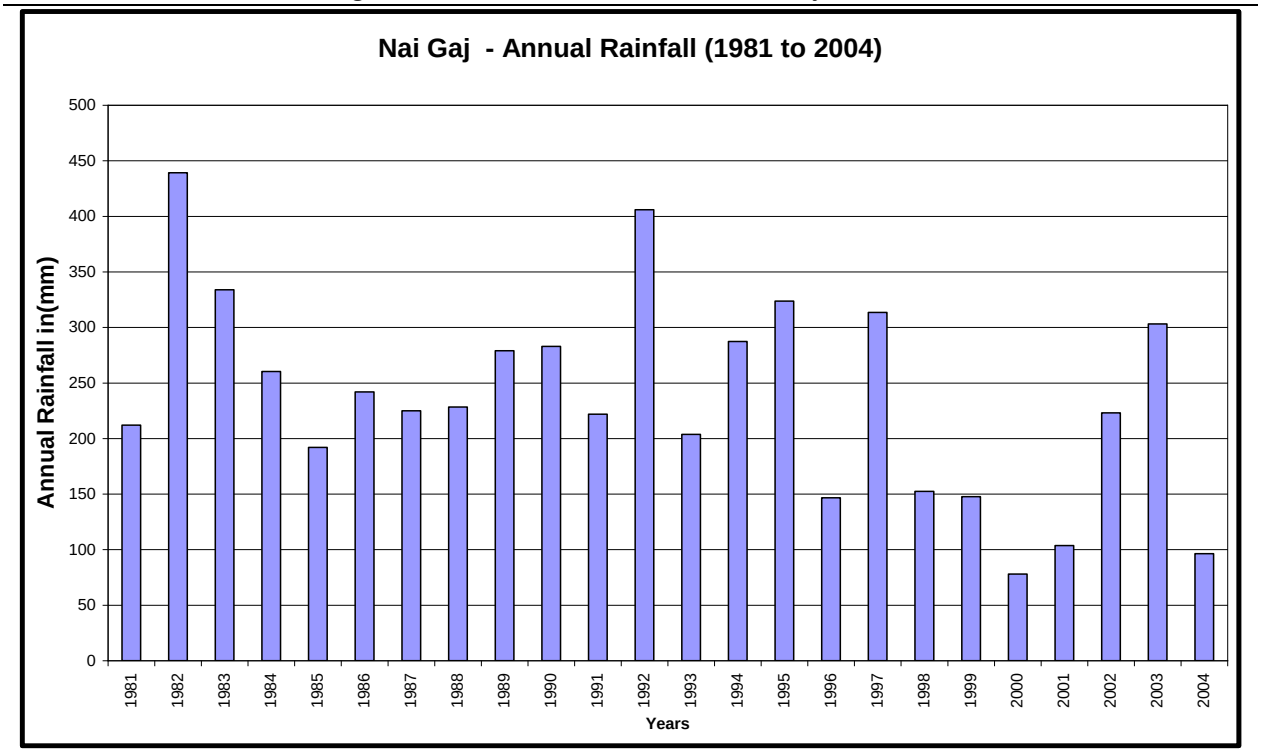

Figure 5.7: Mean Annual Rainfall at Nai Gaj

Source: (WAPDA: Detail Design Report 2007)

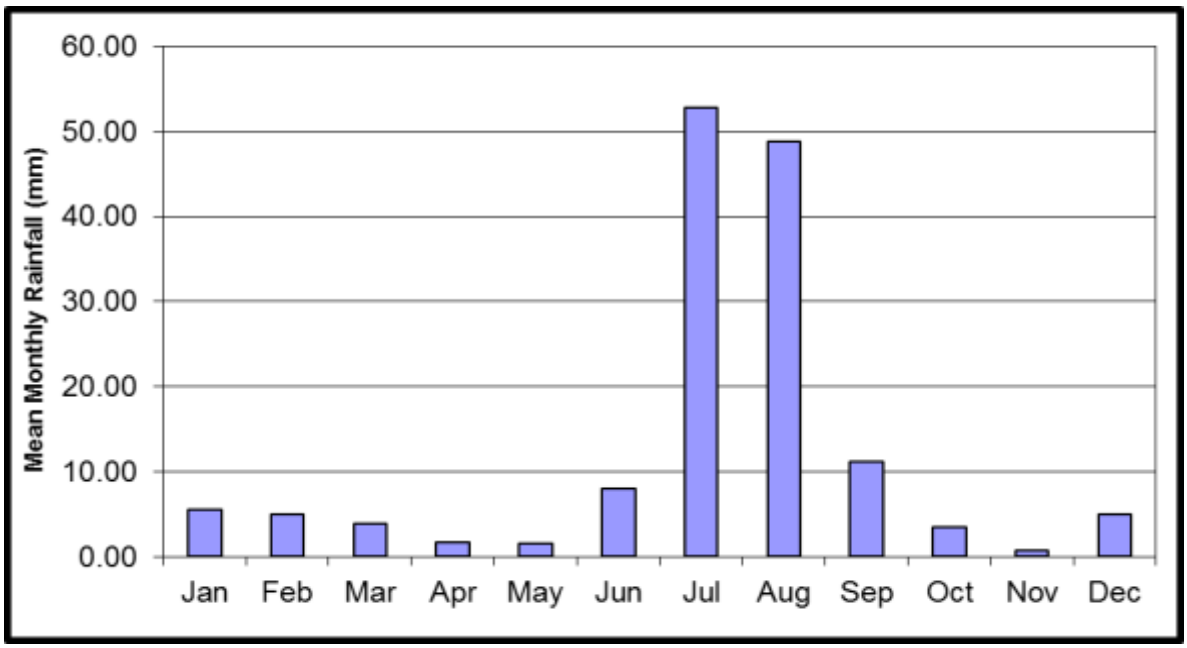

Figure 5.8: Mean Monthly Rainfall at Dadu

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

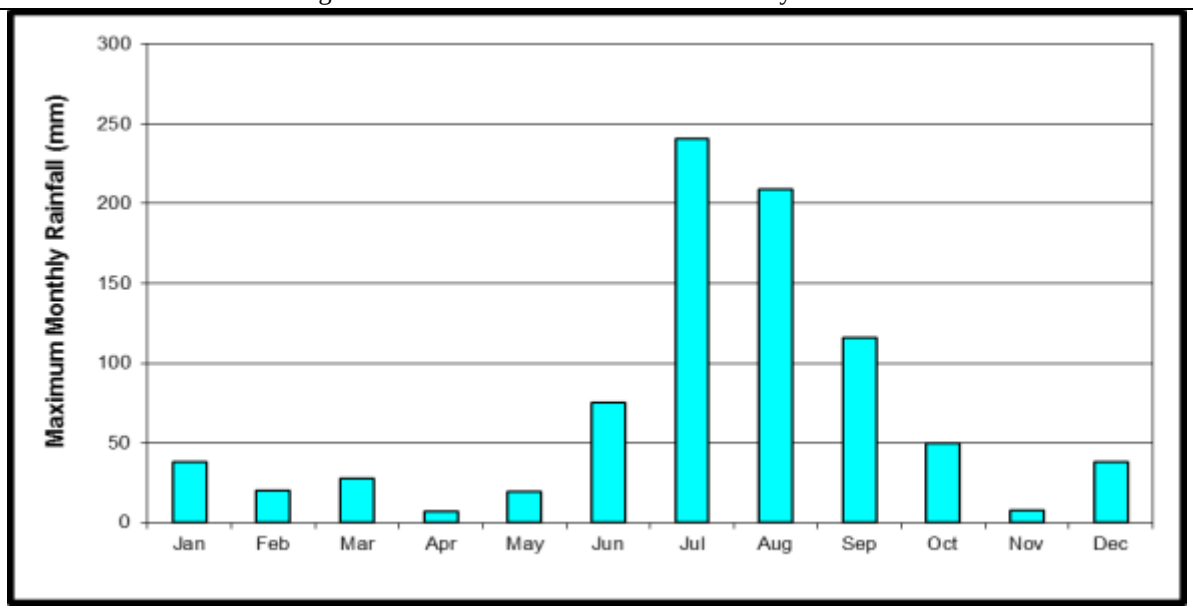

Figure 5.9: Maximum Monthly Rainfall at Dadu

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

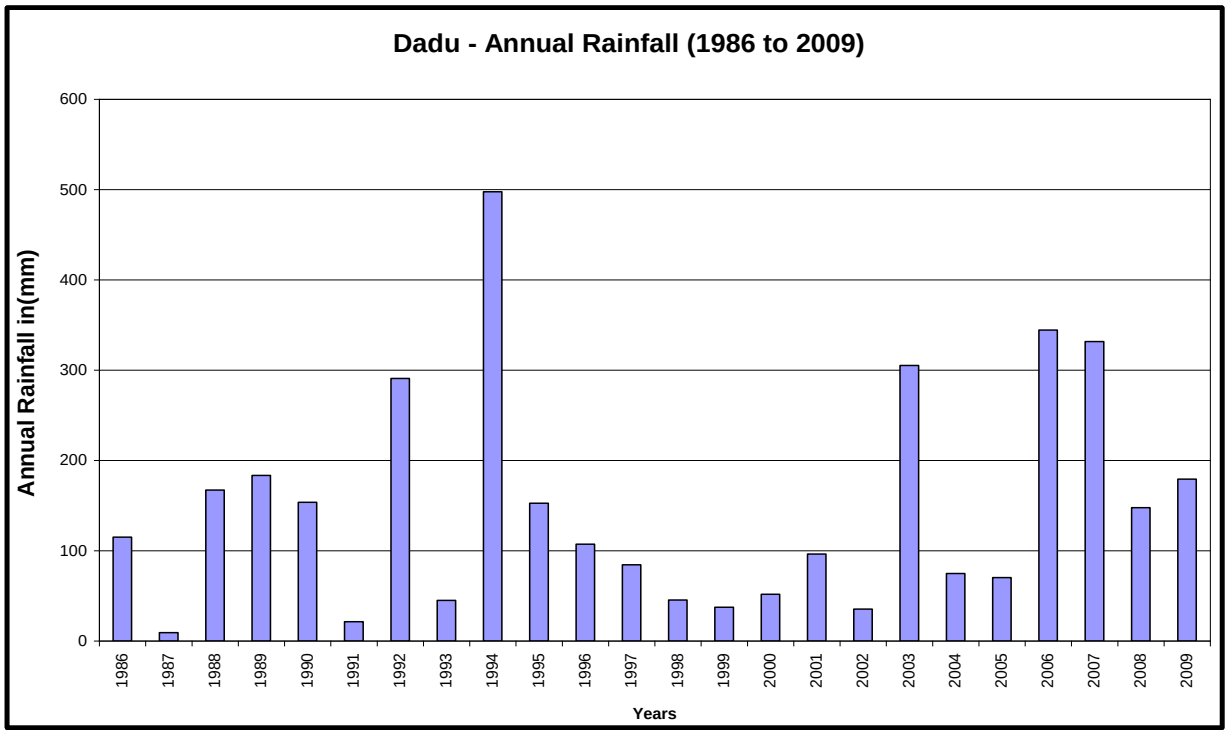

Figure 5.10: Annual Rainfall at Dadu

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

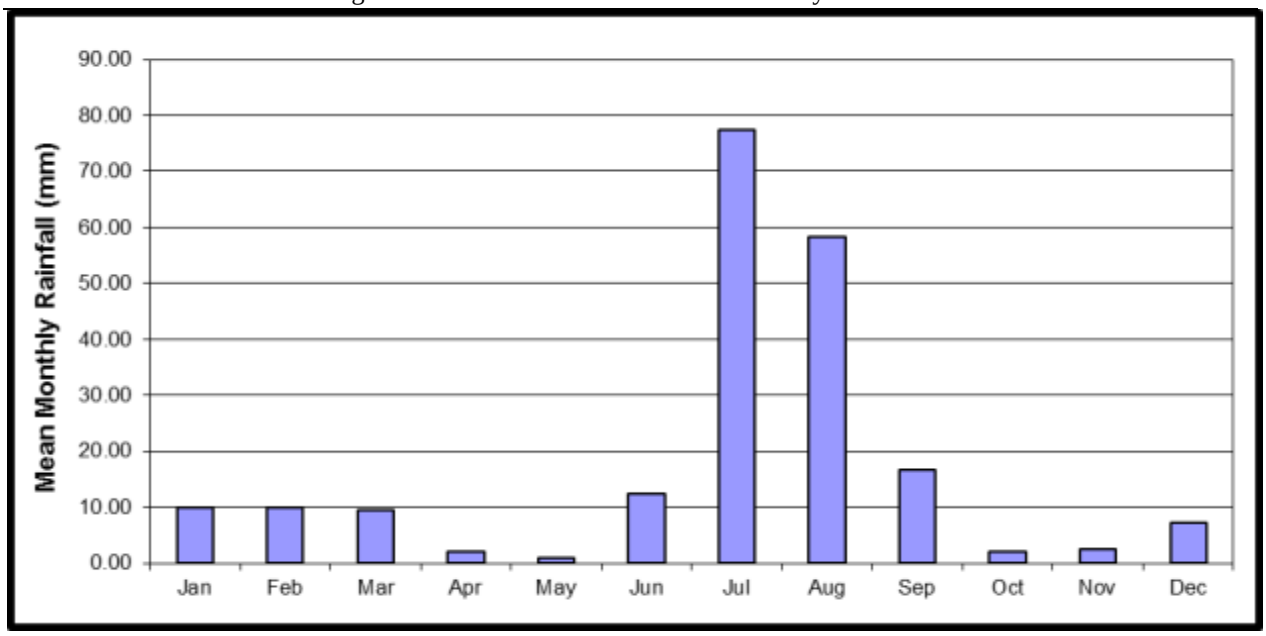

Figure 5.11: Mean Monthly Rainfall at Karachi

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

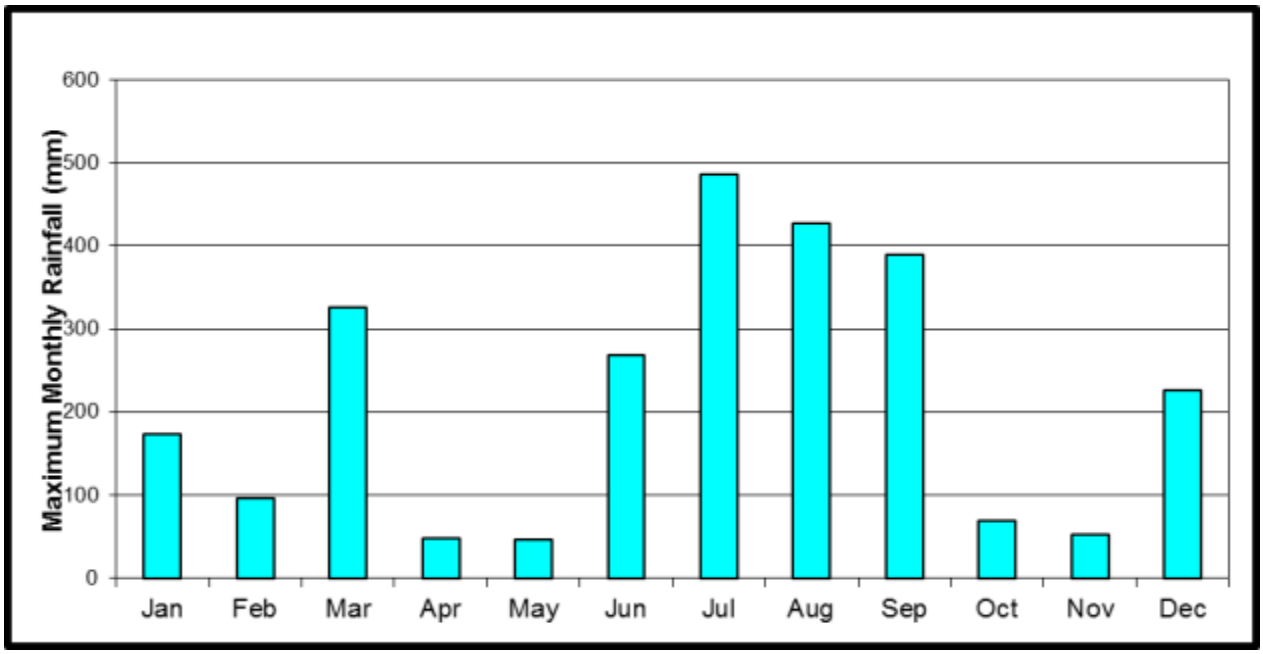

Figure 5.12: Maximum Monthly Rainfall at Karachi

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

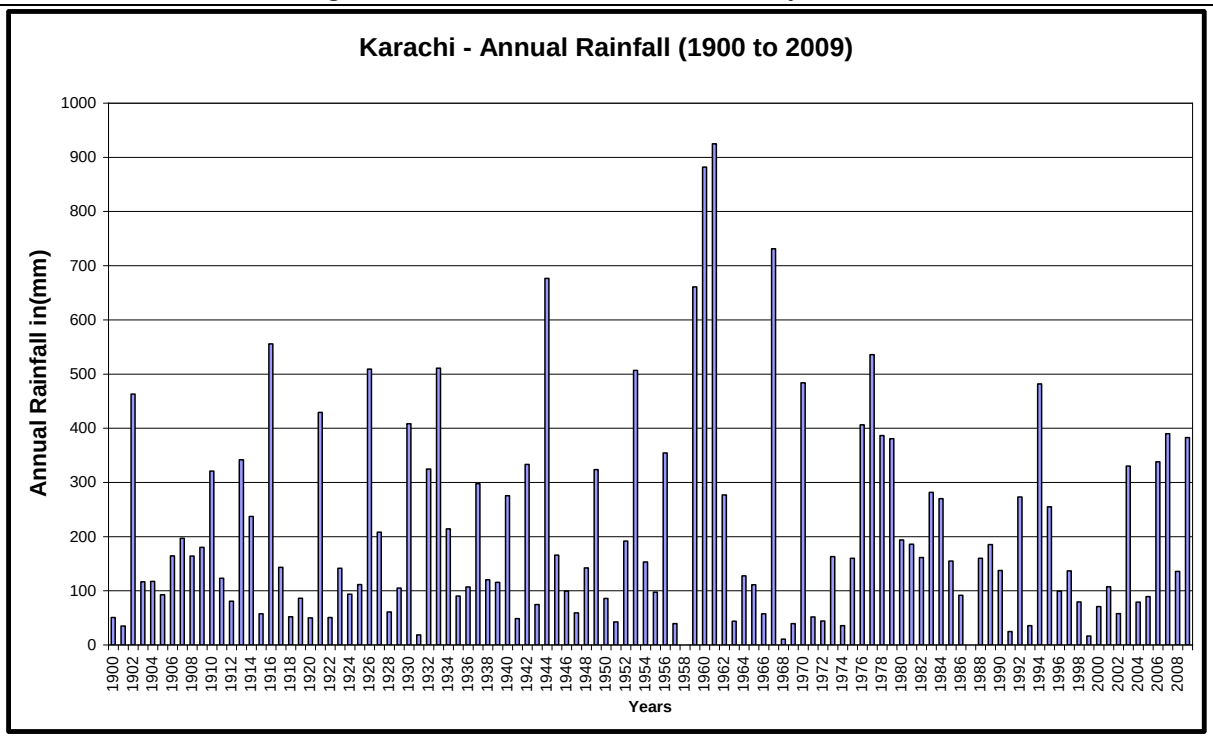

Figure 5.13: Annual Rainfall at Karachi

Source: (Pakistan Meteorological Department) Analysis by ACE in 2010

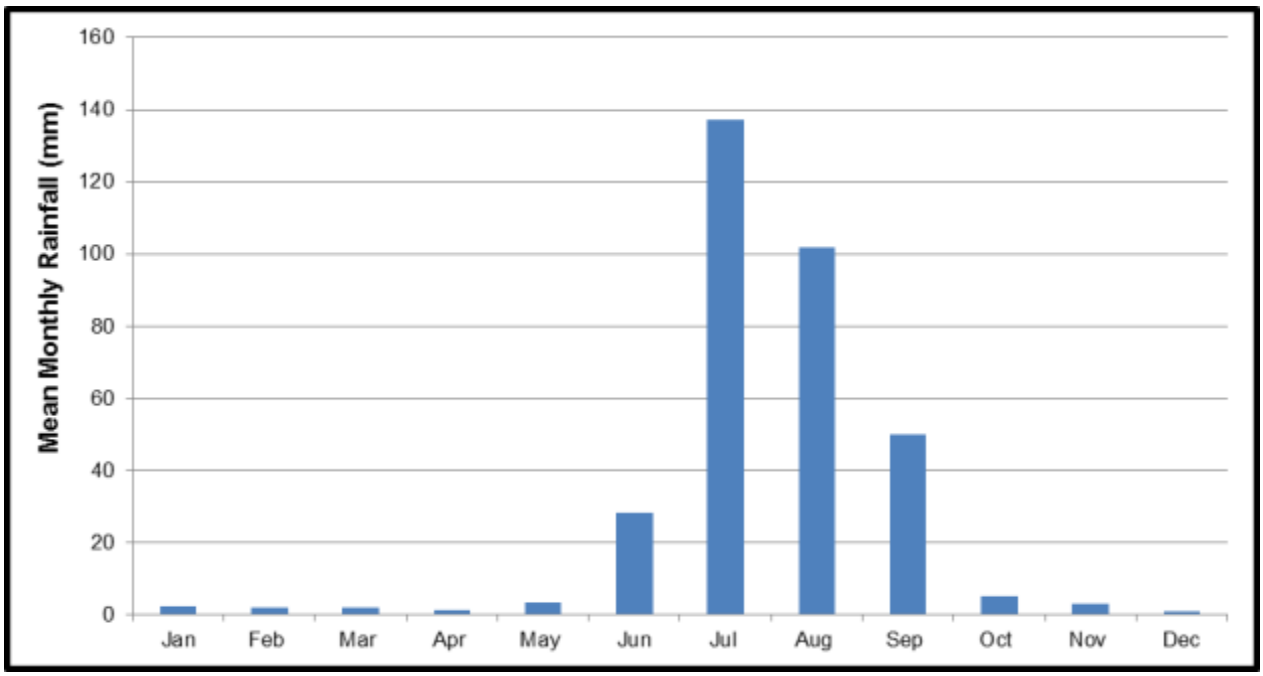

Figure 5.14: Mean Monthly Rainfall at Nagarparkar

Source: (Pakistan Meteorological Department) Analysis by ACE in 2009

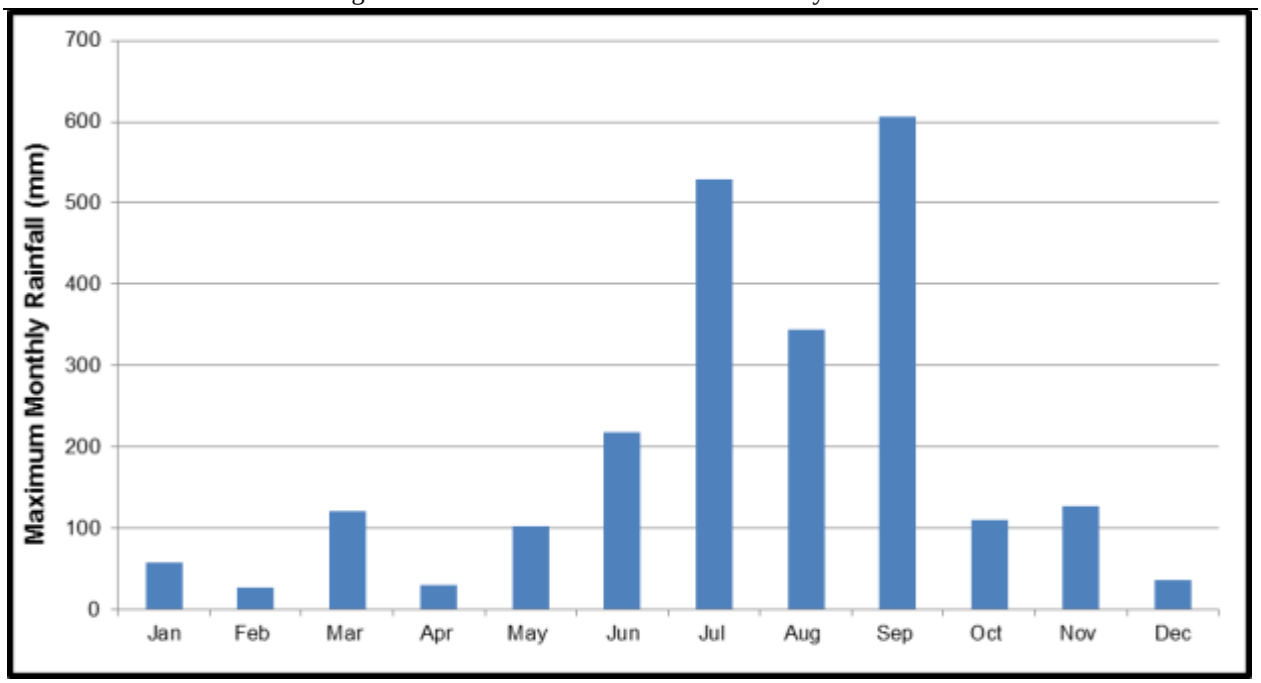

Figure 5.15: Maximum Monthly Rainfall at Nagarparkar

Source: (Pakistan Meteorological Department) Analysis by ACE in 2009

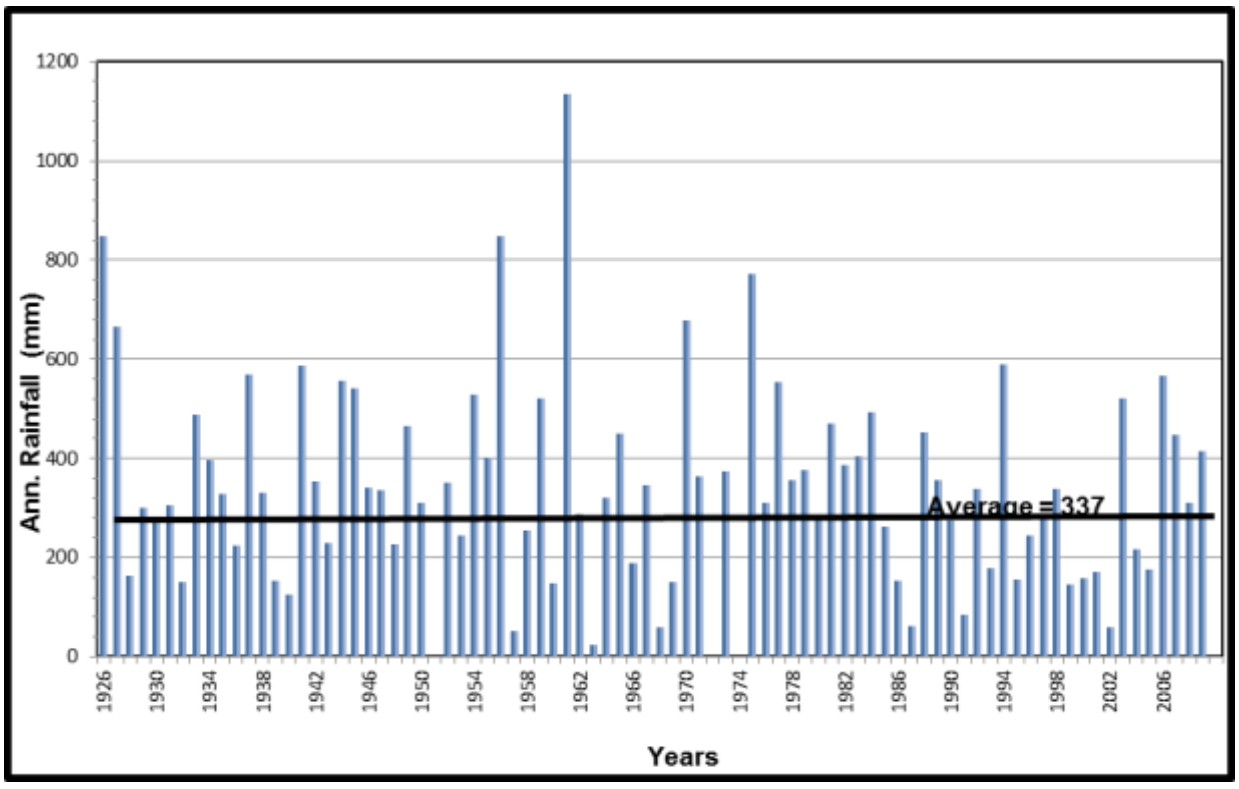

Figure 5.16: Rainfall at Nagarparkar

Source: (Pakistan Meteorological Department) Analysis by ACE in 2009

5.1.6. Temperature

The coldest season extends from December to February when dominating influence is the eastern winds. Mean monthly temperature during winters varies from 20°C near the coast to

14°C in the north. Forests are very rare in south of Nawabshah. Mean daily temperature rises rapidly from February onwards to its peak in May and June, rather earlier in the south than in the north. Mean maximum temperature reaches about 24°C in May in the south and as high as 45°C in June in the north. The severity of the heat varies from year to year - the highest temperature ever recorded on the subcontinent was 53°C at Jacobabad.

5.1.7. Humidity

The average humidity is 40-60% in the Sindh. Monthly rate of evaporation in the irrigated areas varies from 76mm in the north to 114mm in the south. Rainfall for the three months is less than 25mm... Winds are rather variable, being transitional from the northeast to southwest as the season develops. Humidity is at its lowest generally below 40%, but increases as the sea breeze becomes dominant. Evaporation is correspondingly at its highest exceeding 25mm in rocky desert areas.

July to mid-September is the monsoon season and is characterized comparatively by low day temperature, high humidity (over 60% in the south and 50% in the north), reduced evaporation (only 15 or 18mm at some stations in August) and a considerable increase in clouds in coastal areas. Occasional depressions from the east result in a 4 or 5-day period of rain and thunderstorm, especially in the south. The rainfall is very variable; instances have been recorded where a single day has considerably exceeded the highest annual average. Mid-September to November is the period of sea breeze with occasional north winds. Temperature rises slightly then falls back in November. Humidity falls to about 10 to 15% of the monsoon level and the evaporation decreases about 100mm in the north, 125mm in the south.

5.1.8. Surface Hydrology

The Indus River is the major source of surface water in the province. There are canals drawn from the rivers and a number of wetlands also exist in the province. Sindh is one of the primary beneficiaries of the Indus Basin Irrigation System (IBIS). It has three major barrages on the Indus River that divert approximately 48 million acre feet (MAF or 59.0 billion cubic meters-BCM) of water annually to the 14 main canal commands in Sindh. These canal systems have an aggregate length of 13,325 miles (21,445 km), which serve a gross command area (GCA) of 14.391 million acres (5.8million ha). There are about 42,000 watercourses (tertiary channels), which have an aggregate length of about 75,000 miles (120,000 Km). Around 78% of the area in Sindh province is underlain by saline groundwater, which is unsuitable for irrigation. Surface and sub-surface drainage systems are inadequate, resulting in much of the drainage effluent being either retained in the basin or disposed into rivers and canals. There are 13 existing surface drainage systems in Sindh, which serve a total area of over 6.2 million acres (2.5 million hectares) and have an aggregate length of about 3,811 miles (6,133 Km). In addition, there are two sub-surface drainage systems, which serve an area of 0.10 million acres (0.04million ha). Due to inadequate drainage cover, nearly one-fifth of the canal command areas have been affected by water logging and salinity.

5.1.9. Characteristics of Indus River

The Indus River in its lower reaches travels through Sindh province for a distance of 370 miles (595 km); reaching Arabian Sea from Guddu Barrage. The Lower Indus River is highly braided alluvial channel with a slope of less than one-half foot per mile. Through natural accretion, the river bed has risen to such levels that during high floods the water level is above the surrounding natural ground level. The river in almost its entire length in Sindh is confined only by an intricate system of bunds (embankments).

The Lower Indus River probably presents the greatest flood management problem in Pakistan. Being at the downstream end of the river system, flood discharges are the highest, flood volumes are the largest and flood durations are the longest. The probability of high floods also is greater

in the lower reaches of the river system because the Lower Indus River receives flood flows originating in any part of the river systems in Pakistan or its tributaries in neighboring India.

The peak flood discharges at Sukkur and Kotri Barrages are shown in **Figures 5-17** and **5-18**.

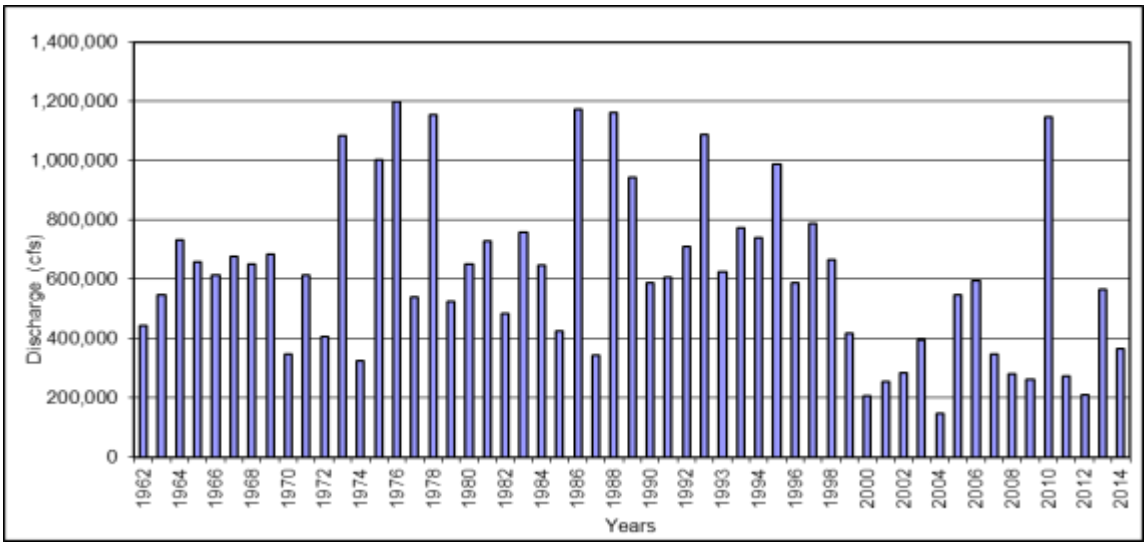

Figure 5.17: Annual Peak Discharge at Sukkur Barrage (1962-2014)

Source: (Irrigation Department, Government of Sindh)

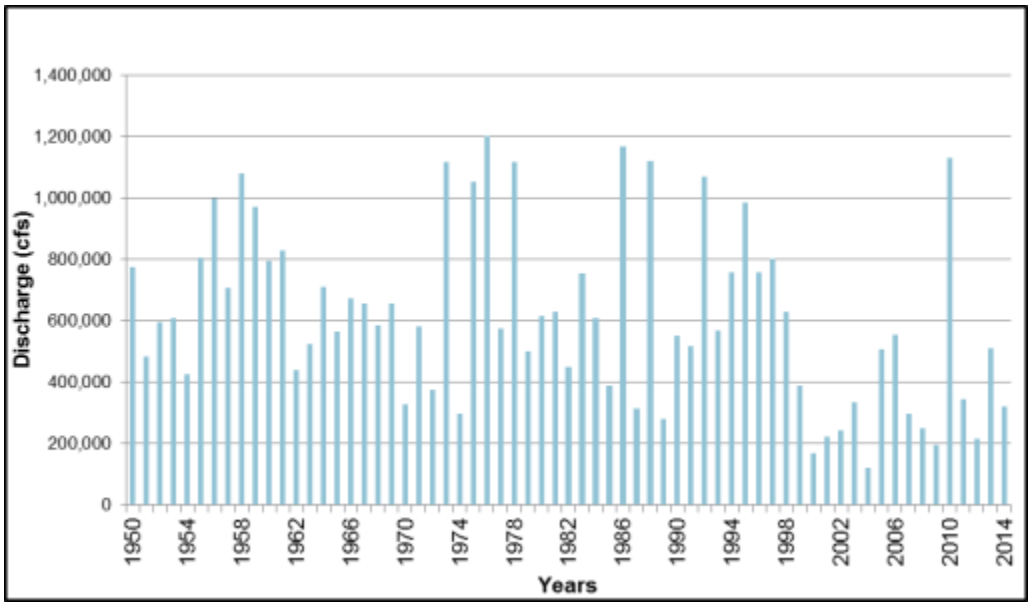

Figure 5.18: Peak Discharge on Kotri Barrage Since 1950 to 2015

Source: (Irrigation Department, Government of Sindh)

5.1.10. Characteristics of Streams / Nais in Nagarparkar

Nagarparkar is situated in the extreme south-east corner of the Sindh Province extending in the Rann of Kutch. It is spread over an area of about 1,560 sq. km. In Nagarparkar area, there exist the Karoonjhar hills, which are surrounded by plains. The A number of streams/nais are emerging from these hills where recharge and storage dams can be constructed. As shown in Figure 4.16, the average annual rainfall in the Nagarparkar area is 337 mm (13.25 inch). Due to

rocky and granite formation of Karoonjhar hills, the runoff generally goes into Rann of Kutch (seasonal HYPERLINK "https://en.wikipedia.org/wiki/Salt_marsh" \o "Salt marsh" salt marsh). Some portion of this runoff goes to the groundwater recharge before reaching the Rann of Kutch. Similarly some of the rainwater is stored in the open ponds in nullah beds, which is the major source of water for domestic use throughout the year. The rainwater can be harvested by construction of recharge dams.

5.1.11. Characteristics of Streams / Nais in Kohistan

Kohistan Region lies in western Sindh spread over three districts namely Dadu, Jamshoro and Malir between western hills of Kirther and River Indus. The area between the Kirthar Range and the River Indus is a vast strip of alluvial plains of virgin land which is irrigated by rain flood water during monsoon and after that it becomes dry and barren.

Large number of hill torrents emanate from Kirthar Range in Western Sindh. The mountainous terrain of the Kirthar Rage is almost barren having below plant life to intercept or retard the storm runoff from the catchments. The mean annual rainfall varies in the range of 82 to 221 mm Flashy floods come for a short period during the rainy season. The highest floods normally come in July and August, though some high discharges have been recorded in the winter and the early spring. The flows are usually low in early summer. Due to lack of proper management, most of the water flows unused through the Indus River into the Arabian Sea. As the flashy floods rapidly disappear, the irrigation is uncertain. It is realized that if these flood waters are harnessed, continuous irrigation supplies can be ensured.

5.1.12. Groundwater

One of the impeding factors for the 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 fresh water is available. Fresh groundwater is found mostly in a strip parallel to the left bank of Indus River and some pockets in other areas (**Figure 5-19**).

More than 30,000 tube wells in private and public sector are installed for agriculture purpose. Rapid development of groundwater by private sector is endangering groundwater sustainability by further lowering the water table and inviting intrusion of saline water into fresh water aquifer. The alluvium, which predominantly consists of sand of various grades constitute an extensive groundwater reservoir in Pakistan. The numbers of public and private tube wells in Sindh province are illustrated in the following **Table 5.1**.

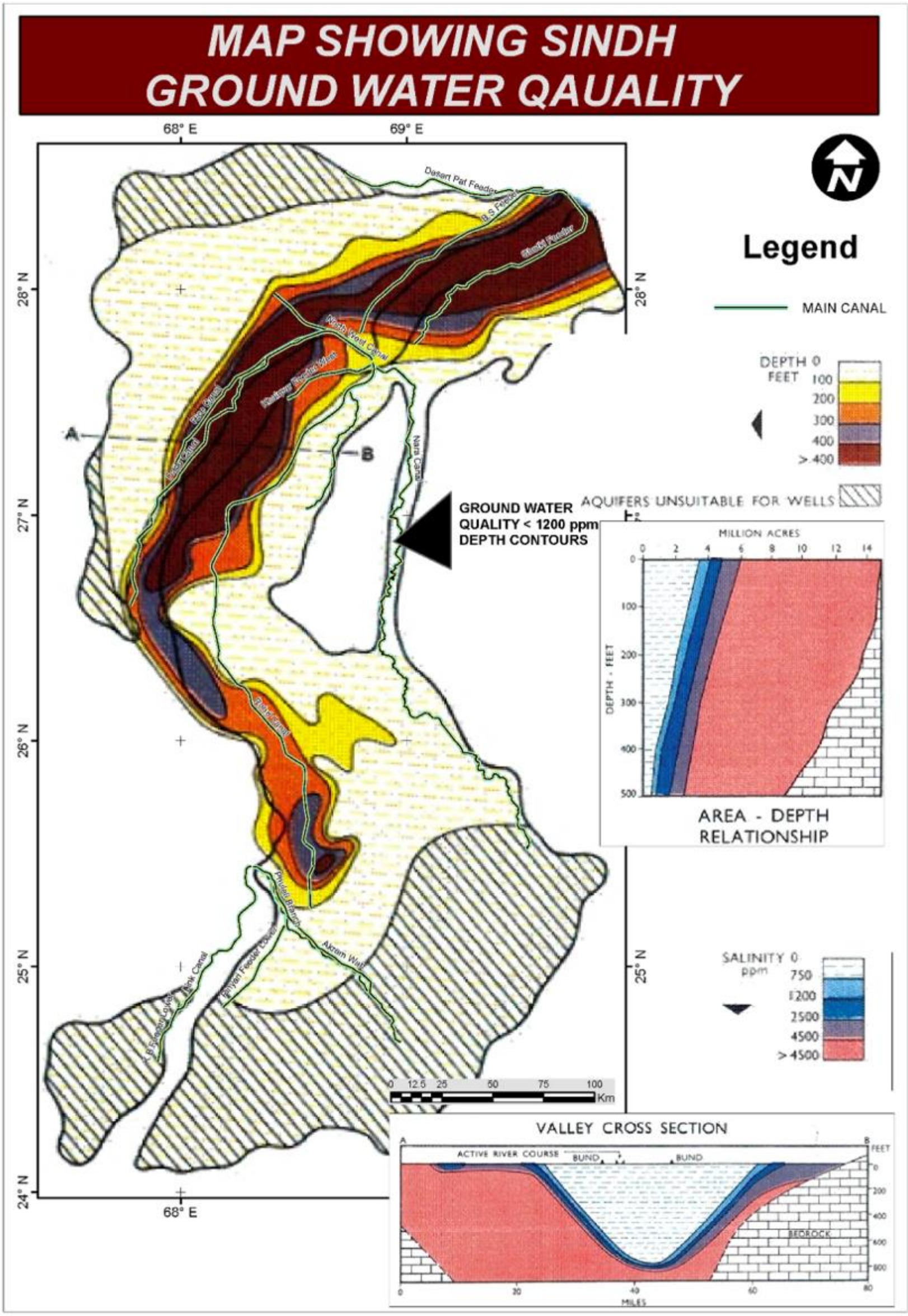

Figure 5.19: Map Showing Groundwater Quality

Source: (Groundwater in Hyderabad and Khairpur Divisions by M. H. Panhwar)

Table 5.1: Private and Public Tube wells in Sindh

Year	Public			Private			Total		
	Electric	Diesel	Total	Electric	Diesel	Total	Electric	Diesel	Total
2006-07	3	190	193	25	256	281	28	446	474
2007-08	-	-	-	14	197	211	14	197	211
2008-09				14	164	187	14	164	187
2009-10	2	3	5	4	149	153	6	152	158
2010-11	20	16	36	23	303	326	43	319	362
2011-12	11	7	18	12	290	302	23	297	320

Source: Director General of Agriculture Extension Sindh, Hyderabad.

5.1.13. Surface and Groundwater Analysis

The ground and surface water samples have been collected from some of the sub-projects and handed over to PCRWR for the analysis. The results will be incorporated in the ESMP of each sub-project.

5.1.14. Water Logging and Salinity

Water logging refers to a situation when the water table fluctuates within the root zone depth of crops (cereals, cotton, and sugarcane) fruits, and vegetables for a period long enough to affect plant germination, establishment and growth adversely (DMC 2002). As per WAPDA's criterion the land having depth to water table of less than 3m is classified as waterlogged and further categorized into two classes:

- Severely waterlogged area: Area having water table depth ranging from 0 to 1.5 m is called severely waterlogged.
- Less severely waterlogged area: Area having water table depth of 1.5 to 3 m is called less severely waterlogged.

Currently, almost 43% of the area in the [8]IBIS is classified as waterlogged having depth to water table of less than 3 m. The province of Sindh is having largest percentage of the IBIS's area (81%) classified as waterlogged. In the last few decades the waterlogged area has increased in the province of Sindh, whereas the province of Punjab has experienced considerable reduction in the waterlogged area mainly attributed to the abstraction of large amount of groundwater both from public and private tube wells (WAPDA 2005).

Sindh has arid climate with very high evaporation and little or no rainfall. The natural slopes are extremely mild, and thus natural drainage is very limited. In addition, natural drainage is also obstructed by public infrastructure, such as canals, roads, and railways. Network of manmade drains is inadequate. As a result, water seepage from the extensive system of irrigation network (main and branch canals, distributaries, minors, watercourses, and farmers' fields) result in shallow groundwater levels, which gives rise to waterlogging conditions. Waterlogging condition combined with high evaporation due to arid climate accentuates salt accumulation in the root zone - salinity - by mobilizing the salt in the ground to the root zone through a capillary rise. To dilute and leach down the salts, farmers usually apply large quantities of water, which turns into a vicious cycle of higher water application - higher losses - waterlogging - salinity that

[8]Salinity and Waterlogging in the Indus Basin of Pakistan: Economic Loss to Agricultural Economy By Sumia Bint Zaman1 and Dr. Shahid Ahmad.

can only be broken by better drainage and improved water management at all levels in the system.

5.1.15. Air and Noise Quality

As per initial assessment of the sub-project by the SRP field team, the air and noise levels are likely to be within the permissible limit of NEQS. However; detailed assessment of each sub-project will be carried during ESIAs and ESMPs preparation.

5.2. Biological Environment

The SRP project area has a diverse habitat, which supports a large variety of animal from riverine forest to the desert ecosystem of Tharparkar, and from Kirthar mountains to the mangroves forest of Indus Delta. Common animal habitats are riverine plains, mountains, desert and deltaic region. These habitats support the peculiar species according to their requirements. The following broad categories have been identified for this report focusing on the project area:

5.2.1. Fauna

Dadu District. Manchar Lake is one of the largest fresh water lakes in Pakistan, situated in Dadu district. It is a vast natural depression flanked by Khirthar range in the west, Lakhi hills in south and river Indus in the east. On the north eastern side is the protective embankment. The lake is fed by two canals, the Aral Wah and the Danister from the river Indus. The lake also collects water from numerous small streams in the Khirthar Mountains. The common large mammalian species are Asiatic jackal (Canis aureus), Red Fox (Vulpes vulpes), Jungle cat (Felis chaus), Small Indian mongoose (Herpestes javanicus), Grey mongoose (Herpestes edwardsi). While the small mammals are Five-striped Palm Squirrel (Funambulus pennant), Indian Gerbil (Tatera indica). The Desert hare (Lepus nigricollis) and Long-eared Hedgehog (Hemiechinus collaris) is also reported in the district.

Reptilian Species in the district are Indian Flapshell turtle (Lissemys punctata andersoni), Afghan Ground Agama (Trapelus megalonyx), Indian Garden Lizard (Calotes v. versicolor), Spotted Indian House Gecko (Hemidactylus brookii), Three fingered sand fish (Ophiomorus rathmai), Black Cobra (Naja). While the amphibian species are Marbled Toad (Bufo stomaticus) and Skittering Frog (Euphlyctis c. cyanophlyctis).

The avian species in the area are Little Grebe (Tachybaptus ruficollis), White Pelican (Pelecanus onocrotalus), Large Cormorant (Phalacrocorax carbo), Indian Pond Heron (Ardeola grayii), Large Egret (Egretta alba), Intermediate Egret (Egretta intermedia), Cattle Egret (Bubulcus ibis), Spoonbill (Platalea leucorodia), Yellow wattled Lapwing (Vanellus malabaricus) and House Bunting (Emberiza striolata).

Thar District. In Thar District, the fauna of the area in accordance to IUCN Red List of Threatened Species (2015), two species of the recorded mammals of the surveyed area (Asiatic wild ass and Indian pangolin) are Endangered, one species (Striped hyena) is Near Threatened, and 30 species have Least Concern status whereas two species have not been evaluated for IUCN Red List. Some of the reported mammalian species are ; Long eared hedgehog (Hemiechinus collaris), House shrew (Suncus murinus), Caracal desert lynx (Felis caracal), Jungle cat(Felis chaus), Indian desert wild cat (Felis silvestris), Grey mongoose (Herpestes edwardsi), Small Indian mongoose (Herpestes javanicus), Asiatic jackal (Canis aureus), Indian desert fox (Vulpes vulpes), Bengal fox (Vulpes bengalensis), Striped hyaena (Hyaena hyaena), Ratel or honey badger (Mellivora capensis), Mouse-tailed bat (Rhinopoma microphyllum), Lesser house bat (Scotophilus heathii).

Thatta District. The Thatta area has important habitat of mangroves, mudflats, coasts and provide habitat to species of mammals, birds, reptiles and amphibians. The key mammalian

species in the Thatta District are Fishing Cat, Jungle Cat, Desert Cat, Small Indian Civet, Bengal Fox, Jackal, Wild Boar, Mongoose, Desert hare and Squirrel are reported in the area. In small mammals, 9 species belonging to two orders and 4 families are reported. *Kharochann* is an important area for a variety of bird species. Many water birds, mainly larids and charadriids use the area during winter as staging, feeding and wintering ground. As many as 85 species of birds have been reported in the area (WWF Ecological Assessment Report 2010-11). Kharochann has a diverse habitat for reptiles and amphibians. Around 11 species of reptiles belonging to three orders and 10 families are reported which include five snakes, five lizards, one fresh water turtle. Three species of amphibians are reported in the area of which included two species of frogs and one toad.

5.2.2. Flora

The project area lies on the border land of tropical and extra tropical regions with very little rainfall. The dominant flora of this arid zone consists of communities of deciduous and xerophytic trees and shrubs. Plants and trees with small leaves and thorny species are predominant. These include: Babul (Acacia nilotica), Nim (Azadirachta indica), Ber (Ziziphus vulgaris or jujube), Lai (Tamarix Orientalis), Kirrir (Capparis aphyla), and Kandi (Prosopis cineraria) and various species of mangroves (Aegiceras majus, Brugiera gymnorhiza, and Ceriops candolleana - Chauri/Kirari) and weeds in Indus Delta. Several types of water lilies are also found in waterlogged areas, surface drains, and on the periphery of lakes. In many places, the open water is dominated by submerged aquatic vegetation filling the whole water profile. The more common weeds and lilies include: Typha Angustala, Juncus articulatus, Scipus Littotalis, Phragetes Kark, and Nyasphaea Lutus.

5.2.3. Wildlife Protected Areas

Currently, there are 23 wildlife protected area in Sindh as given in **Table 5.2**. Sindh Wildlife Department (SWD) is the management authority of protected wildlife sanctuaries (including protected wetlands), game reserves and national parks. Government of Sindh has promulgated legislation to protect these areas and their threatened species. The legislation is known as Sindh Wildlife Protection Ordinance 2001. Apart from these protected areas, a number of wetlands are present in Sindh province, 10 of which are declared wetlands of international importance (Ramsar Sites). As per Sindh Wildlife Protection Ordinance 1972 and 2001, the protected areas have been divided into the following three categories:

- **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. There is only one national park (Kirthar National Park) in Sindh province, which is located in District Dadu.
- **Wildlife Sanctuaries:** Wildlife Sanctuaries are areas which are left as undisturbed breeding grounds for wildlife. Cultivation, grazing and residing is prohibited in the demarcated areas. Special permission is required for entrance of general public. However, in exceptional circumstances, these restrictions are relax-able for scientific purposes or betterment of the respective area at the discretion of the authority. Certain wildlife sanctuaries however fall in or around the SRP project area , the list of which is presented in **Table 5.2**.
- **Game Reserves**: Game reserves are designated as areas where hunting or shooting is not allowed except under special permits. The game reserves falling in the project area is presented in **Table 5.2**.

The protected areas declared by SWD however contain pockets of lands where irrigation and cultivation is on-going since ages and even after the declaration of these areas as protected areas. There are proprietary issues as well as other legal issues pertaining to this aspect. Furthermore, the exact geographical boundaries of these protected areas are not very well defined on available maps, resulting in the approximation of these boundaries. With these limitations, an approximate location map of protected areas of Sindh within the SRP project area are summarized in **Table 5.2** and presented in **Figure 5-20** to **5-22**.

Table 5.2: Wildlife Protected Areas in and around SRP Project Area

	Name	Area (Ha)	District	Location	Classification
1	Bijoro Chach	121	Thatta	Near Kalankot Thatta	WLS
2	Cut Munarki Chach	405	Thatta	Near Ghorabari	WLS
3	Drigh Lake	164		Near Qambar, Larkana	WLS-R
4	Gullet Kohri	40	Thatta	Near Kotri Allahrakha, Thatta	WLS
5	Gulsher Dhand	24	Hyderabad	Near Barochobagh, Hyderabad	WLS
6	Hadero Lake	1321	Thatta		WLS
7	Haleji Lake	1704	Thatta		WLS
8	Keti Bunder North	8948	Thatta	Near Shahpur, Thatta	WLS
9	Keti Bunder South	23046	Thatta		WLS
10	Kinjhar (Kalri) Lake	18468	Thatta		WLS-R
11	Lakhi	101	Dadu	Near San, Dadu	WLS-R
12	Mahal Kohistan	70577	Dadu	Near Goth Sumar, Dadu	WLS
13	Macho Kotri	162	Thatta		WLS
14	Munarki	12	Thatta	Near Garho, Thatta	WLS
15	Norange	243	Thatta	Near Pir Patho Thatta	WLS
16	Rann of Kutch	320.463	Tharparkar	South East , Tharparkar	WLS
17	Sadnani	84	Thatta	Near Pir Patho Thatta	GR
18	Shah Lando	61	Thatta	Near Hadero Dhand, Thatta	WLS
19	Khirthar	308,733	Dadu	-	NP
20	Deh Jangisar	314	Thatta	-	GR
21	Deh Khalifa	429	Thatta	-	GR
22	Mirpur Sakro Forest	777	Thatta	-	GR
23	Surjan, Sumbak, Eri and Hothiano Mountains	406302	Dadu	-	GR

Source: IUCN Directory of South Asia Protected Areas and Sindh Wildlife Department WLS-R: Wildlife Sanctuary - Ramsar Site GR: Game Reserve NP: National Park Source

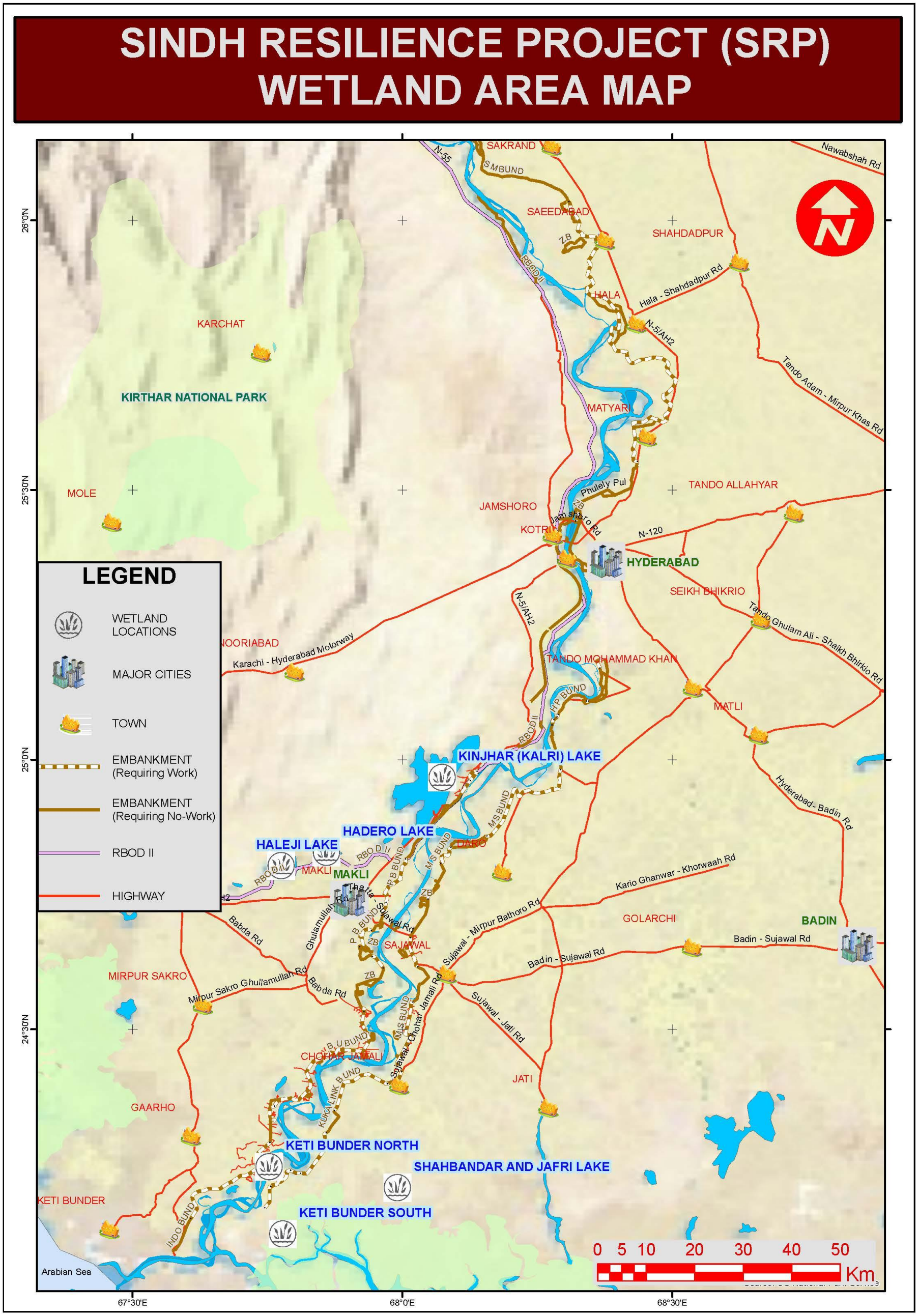

Figure 5.20: Wetlands in the Sindh

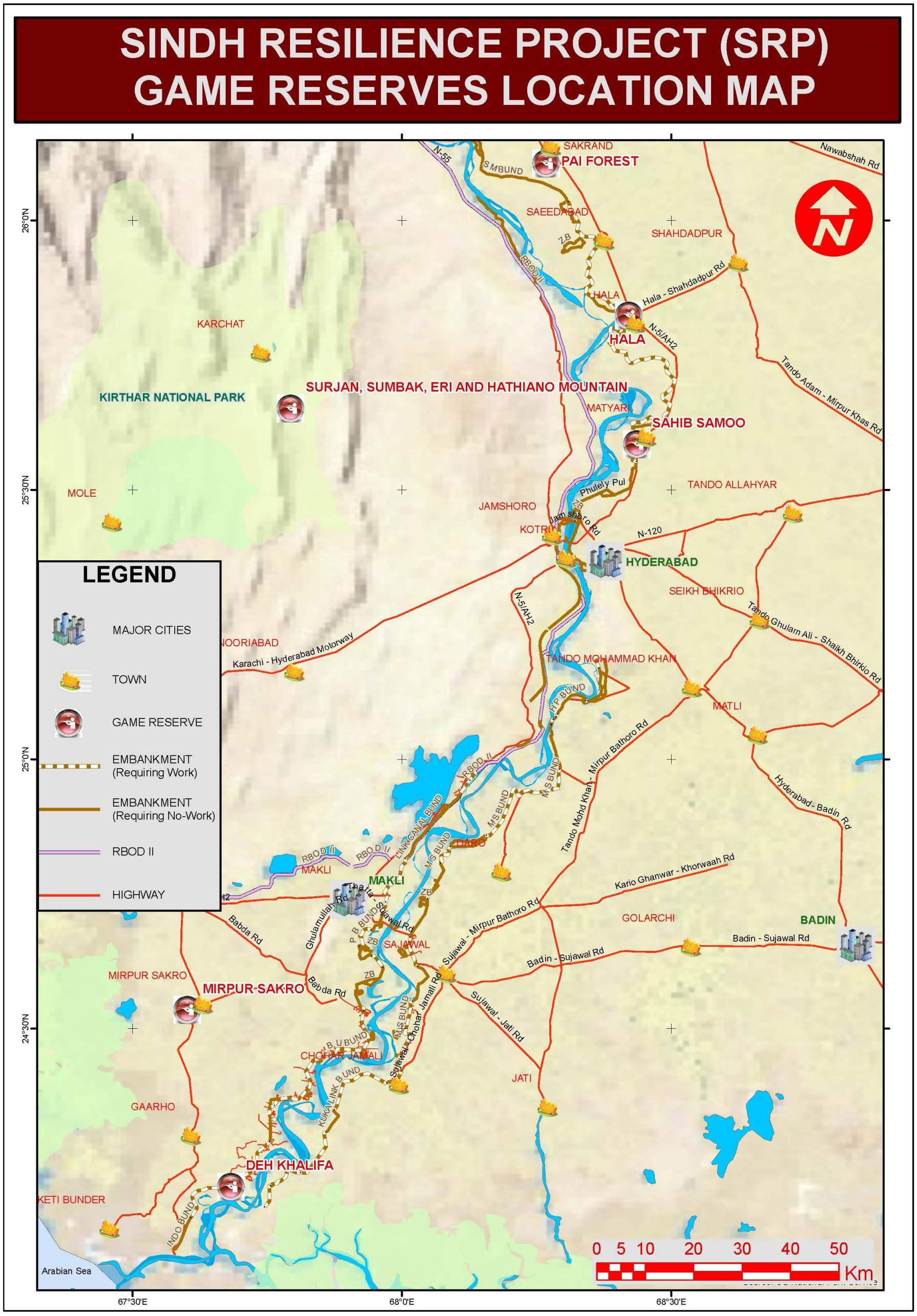

Figure 5.21: Game Reserves in Sindh

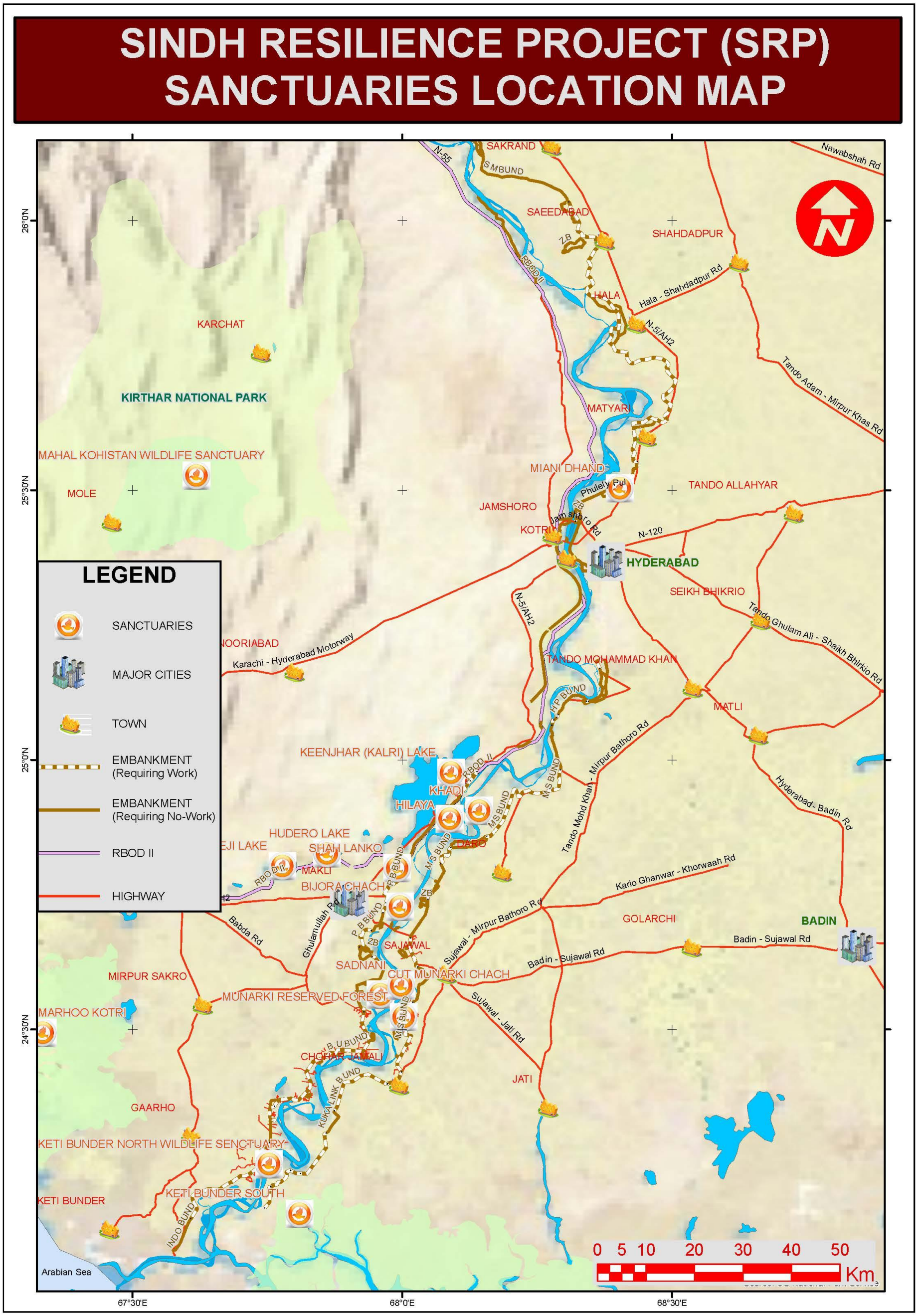

Figure 5.22: Wildlife Sanctuaries in Sindh

5.3. Archaeological Sites

The archaeological survey was conducted by the Culture and Tourism Department, GoS in 1993 and 1996. There are a total of 43 archaeological sites situated in the project districts. The number and district wise location is summarized in **Table 5.3** and shown in **Figure 5-23**. None of these sites are likely to be affected by the proposed interventions under SRP.

Table 5.3: Archaeological Sites in the Project Area

	Name/Description	Location	District
1	Ranikot Fort	Near Sann	Jamshoro
2	Amri, Mounds	Near Amri village, besides the Indus Highway	Jamshoro
3	Lakhomir-ji-Mari	Deh Nang opposite Police outpost, Sehwan	Jamshoro
4	Damb Buthi, Deh Narpirar	south of Jhangara, Sehwan	Jamshoro
5	Sehwan Fort	Sehwan	Jamshoro
6	Tomb of Yar Muhammad Khan kalhora and its adjoining Masjid	Near Khudabad	Dadu
7	Jami Masjid	Khudabad	Dadu
8	Piyaroli Mari	Deh Shouk near pir Gaji Shah, Johi	Dadu
9	Ali Murad village mounds	Deh Bahlil Shah, Johi	Dadu
10	Nasumji Buthi	Deh Karchat Mahal, Kohistan	Dadu
11	Kohtrass Buthi	Deh Karchat	Dadu
12	Othamjo Buthi	Deh Karchat or river Baran	Dadu
13	Lohamjodaro	Deh Palha	Dadu
14	Pandhi Wahi village mounds	Deh Wahi, Johi	Dadu
15	Ancient Mound	Deh Wahi Pandhi, Johi	Dadu
16	Birth place of Akbar the Great	Near the town of Umerkot	Tharparkar
17	Bhodesar mosque	Bhodesar	Tharparkar
18	Temples at Bhodesar	Bhodesar	Tharparkar
19	Fort Naokot	Naukot	Tharparkar
20	Fort Umerkot	Umerkot	Tharparkar
21	Gori Temple	14 miles north-west of Virawah	Tharparkar
22	Mound at Bhiro	Sherwah	Tharparkar
23	Mound at Shadi Pali	Deh Khuda Bux	Tharparkar
24	Jain Temple	Vira Wah	Tharparkar
25	Brick Tomb of Arzi Khokhar	Ghitori, Goth, Deh No. 24	Tharparkar
26	Tomb of Mir Khan	Ghitori Goth, Deh No. 24	Tharparkar
27	Tomb of Mir Jado	Ghitori Goth, Deh No. 24	Tharparkar
28	Tomb of Mir Murad Khan	Ghitori Goth, Deh No. 24	Tharparkar
29	Tomb of Mir Murad Khan	Ghitori Goth, Deh No. 24	Tharparkar
30	Tomb of Mir Raio	Ghitori Goth, Deh No. 24	Tharparkar
31	Tomb of Shaheed Kapri Baloch	Ghitori Goth, Deh No. 24	Tharparkar
32	A tomb (name not known) north-west of Shaheed Kapri Baluch	Ghitori Goth, Deh No. 24	Tharparkar
33	Tombs of Mir Fateh Khan and Mir Mirza Khan	Ghitori Goth, Deh No. 24	Tharparkar
34	Tomb of females of Mir dynasty	Ghitori Goth, Deh No. 24	Tharparkar
35	Tomb of Aulia Pir Ghitori Badshah Qureshi	Ghitori Goth, Deh No. 24	Tharparkar
36	Makli Graveyard (On UNESCO World Heritage Monuments List)	Makli Hill	Thatta
37	Sonda graveyard	Village Sonda	Thatta
38	Kalan Kot	Makli Hill	Thatta
39	Nawab Amir Khan's mosque	Makli Hill	Thatta
40	Building with two domes	Near Civil Hospital, Thatta	Thatta
41	Jama Masjid	Makli Hill	Thatta
42	Sasian-Jo-Takar	Mirpur Sakro	Thatta
43	Jama Masjid	Thatta city	Thatta

Source: https://upload.wikimedia.org/wikipedia/commons/1/1c/List_of_cultural_heritage_sites_and_monuments_in_Sindh.pdf

The location of the above-mentioned historical sites will be ascertained during the ESIA and ESMPs preparation for each sub-project.

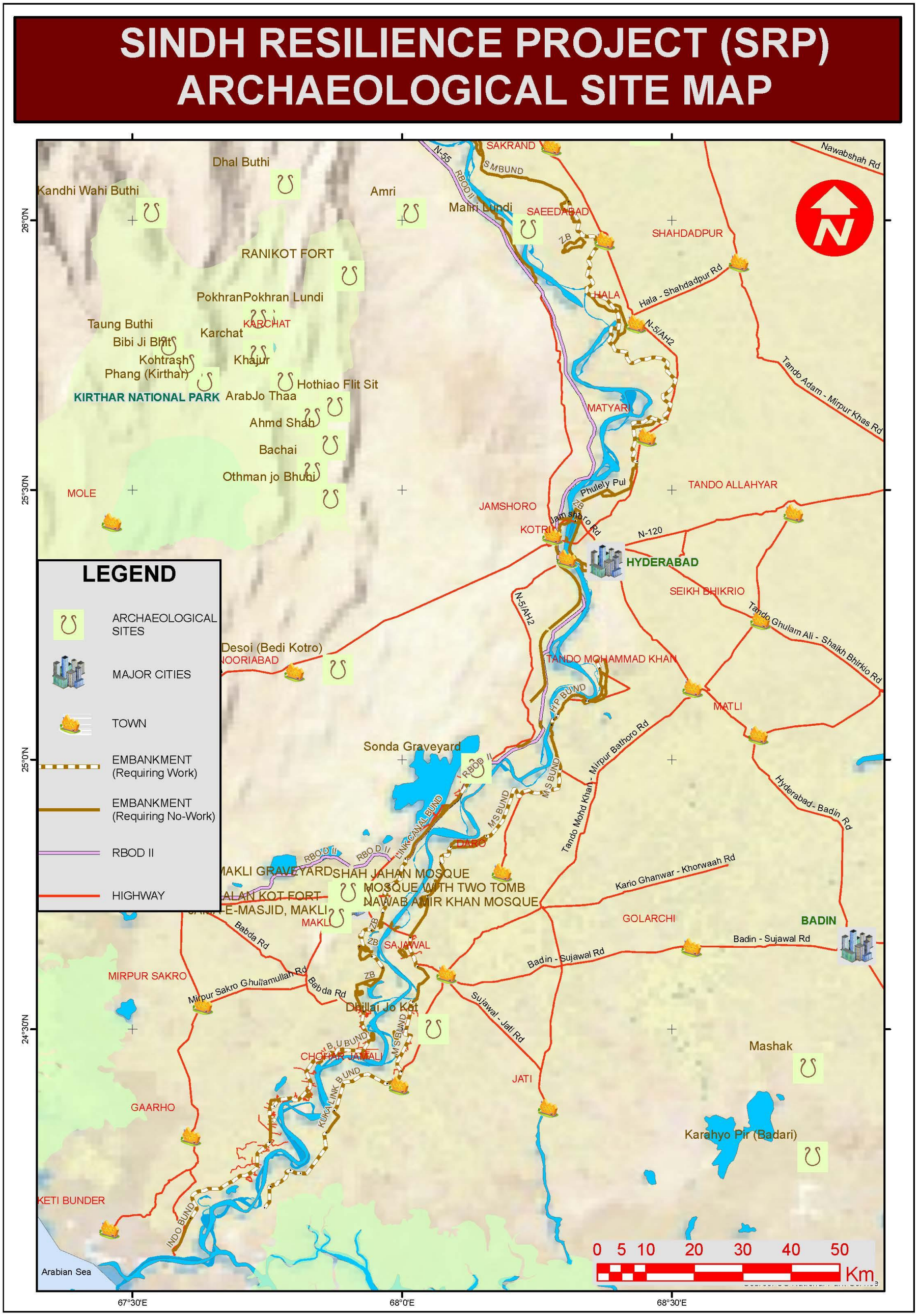

Figure 5.23: Archaeological Sites in Sindh

5.4. Social Baseline Conditions

5.4.1. Demographic Profile

Since the inception of Pakistan five Censuses have been conducted, the first one in 1951, the second one in 1961, the third one in 1972, fourth in 1981 and fifth census which was scheduled to be conducted in 1991 has been conducted in March, 1998, detailed results are as follows.

The total area of Sindh Province is 140,914 Km^2 and the total [9]population of the province in accordance to 1998 census is 30.440 million and the projected population up to 2012 is 44,807,089. The growth rate based on census 1998 of the province is 2.80, population density 216/sq.km; the male and female ratio is 16,098 and 14,342 respectively. The life expectancy in accordance to the 1996 surveys is 55.4 years and literacy rate is 45.29%. The crude death rate is 8.6% and crude birth rate is 35.5%.

5.4.2. Healthcare Facilities

As per information collected from the bureaus of statistics government of Sindh, up to 2013, the following health facilities are available in the province are given in **Table 5.4**.

Table 5.4: Health Facilities in Sindh

	Facility	No
1	Teaching Hospitals	6
2	Civil, Major Specialized and Taluka	82
3	Teaching Hospitals Bed	5,799
4	Civil, Major Specialized and Taluka-Bed	5,878
5	Dispensaries	520
6	Rural Health Centers	108
7	TB Clinics	186
8	Basic Health Units	308
9	Mother Child Health Centers	40

5.4.3. Educational Facilities

The information covers number of institutions, enrolment and teaching staff of Primary, Middle, and Secondary and Higher Secondary Schools by sex in Sindh provinces are given in **Table 5.5**.

Table 5.5: Educational Facilities in Sindh

Institutions	No of Institutions		Enrollment		Teaching Staff	
	Total	Female	Total	Female	Total	Female
Primary	44,522	7,112	3,291,974	1,349,498	102,061	28,945
Middle	2,505	758	237,003	117,776	9,959	4,177
Secondary	1,887	588	874,016	346,571	32,590	12,377
Intermediate	40	20	23,493	10,451	472	169
Degree	193	73	263,968	111,682	4,854	1,906
Post Graduate	13	5	26,488	11,113	709	225
Medical	3	-	3,346	2,117	314	53

[9] Development Statistics of Sindh,2013, Bureau of Statistics Government of Sindh.

Institutions	No of Institutions		Enrollment		Teaching Staff	
	Total	Female	Total	Female	Total	Female
Homoeopathic	9	-	2,981	1,789	136	88
Tibbia	4	0	329	19	38	0
Engineering and Technology	2	0	617	23	43	4
Law	8	0	5,528	985	114	10
Home Economics	2	2	1,106	1,106	78	78
Physical Education	2	-	157	40	8	0
Commerce	2	-	8,984	4,439	48	6
Teacher's Training (Degree level)	3	-	1,662	942	78	19
Teacher's Training (Below degree level)	25	12	2,145	838	859	337
Polytechnic/Monotechnic Institutions and Technical Colleges	75	9	21,329	930	1,102	162
Technical Training Centers	40	-	3,629	16	330	8
Vocational Training Institutes	82	69	2,649	2,182	288	205
Universities	23	-	**36,873**	**12,822**	**3,437**	1,361

5.4.4. Culture

Sindh has a rich heritage of traditional handicraft that has evolved over the centuries. Perhaps the most professed exposition of Sindhi culture is in the handicrafts of Hala, a town some 30 kilometers from Hyderabad. Hala's artisans manufacture high-quality and impressively priced wooden handicrafts, textiles, paintings, handmade paper products, and blue pottery. Lacquered wood works known as Jhandi, painting on wood, tiles, and pottery known as Kashi, hand woven textiles including khadi, susi, and ajraks are synonymous with Sindhi culture preserved in Hala's handicraft.

The Small and Medium Enterprises Authority (SMEDA) is planning to set up an organization of artisans to empower the community. SMEDA is publishing a directory of the artisans so that exporters can directly contact them. Hala is the home of a remarkable variety of traditional crafts and traditional handicrafts that carry with them centuries of skill that has woven magic into the motifs and designs used.

Sindh is known the world over for its handicrafts and arts. The work of Sindhi artisans was sold in ancient markets of Damascus, Baghdad, Basra, Istanbul, Cairo and Samarkand. Referring to the lacquer work on wood locally known as Jhandi, T. Posten (an English traveler who visited Sindh in the early 19th century) asserted that the articles of Hala could be compared with exquisite specimens of China. Technological improvements such as the spinning wheel (charkha) and treadle (pai-chah) in the weaver's loom were gradually introduced and the processes of designing, dyeing and printing by block were refined. The refined, lightweight, colorful, washable fabrics from Hala became a luxury for people used to the woolens and linens of the age.

The *ajrak* has existed in Sindh since the birth of its civilization. The color blue is predominantly used for *ajraks*. Sindh was traditionally a large producer of indigo and cotton cloth and both used to be exported to the Middle East. The *ajrak* is a mark of respect when it is given to an honored guest or friend. In Sindh, it is most commonly given as a gift at Eid, at weddings, or on other special occasions like homecoming.

5.4.5. Religion

Sindh's population is mainly Muslim (94.81%), and Sindh is home to nearly all (93%) of Pakistan's Hindus, who form 8.41% of the province's population. The majority of Muslims are Sunni Hanafi followed by Shia and Ahmadis. The non-Muslim communities include Hindus, Christians, and Zoroastrians 5.19% of Sindh. A large number of Hindus migrated to India after the independence of Pakistan in 1947 while Muslim refugees, Muhajirs, arrived from India.

5.4.6. Languages

According to the 1998 Population Census of Pakistan following are the major languages of the province: Sindhi (59%); Urdu (19%); Punjabi (10%) (including Standard, Saraiki, Hindko, and Pahari-Potowari dialects 7%, 1%, 1% and 1% respectively); Pashto (5%); Balochi (5%); and Dhatki (Thari) majority in two districts (Tharparkar and Umerkot covering 20% of Province land). Other languages include Kashmiri, Gujarati, Memoni, Dari, Kutchi, Khowar, Shina, Kashmiri, Bengali, Lari (dialect), and Brahui.

5.4.7. Gender Issues

The female population in Pakistan according to the 1998, Census, is around 48%. In view of this situation, the gender issues assume special focus and need to be properly addressed and evaluated. The status of women in rural Sindh, as for the rest of the villages in Pakistan, is acutely disadvantaged. Women bear a disproportionately high share of burden of poverty; have unequal access to economic options and social services lower endowments of land and other productive assets. Women are severely hindered in their horizontal and vertical social mobility.

Gender Discrimination has become an issue in Pakistan with many Government and non-Government organizations working to resolve the issue. Other parts of Pakistan, women in Sindh commonly face problems in family law, discrimination at work place, discrimination in education, physical or psychological abuse, and social restrictions. In Sindh culture, there are different norms, which become hurdles for women to get basic right like education, mobility, and freedom. Arranged forced marriages are still common and women commonly have no access to court for justice due to cultural hindrance. The literacy rate and school enrolment ratio of girls in province is very low, with girls remaining at home to complete domestic chores.

Honor killing are specifically criminalized in Pakistani law, with punishment of 10-14 years in prison. However the US Department of States reported that each year, hundreds of women, girls and men are killed in the name of restoring the family's honor. Marriages are sometimes arranged in order to settle disputes between different clans, particularly in rural areas.

Within the agriculture sector, there is unique relationship that exists between the women and nature. Women are pre-dominant in all the sub-sectors of agriculture namely farming, processing and distribution. The predominant role of women in agriculture has enabled most women farmers to become increasingly responsible for educational and other material needs of their wards, especially for female headed households.

5.4.8. Poverty

A major part of population lives in rural areas and poverty is pervasive in rural Sindh. About 37% of the rural population lives below the poverty line, compared to 33% in Pakistan on an overall basis. Over 70% of the rural population is landless. Analysis of 2001 Pakistan Rural Household Survey data shows that rural households, including the landless, derive 56% of their income from agriculture, directly or indirectly. A typical poor household in rural Sindh has little assets or land, depends on wage income, and is significantly larger than the non-poor household in Sindh or even compared to the average poor household of Pakistan. The rural poor tend to be employed mostly as agriculture wage workers. Rural Sindh is highly dependent on public

services with little role of the private sector. Thus reforms to improve public service delivery and stimulate rural growth that raises agricultural and nonagricultural wages are fundamental for reducing poverty.

The Benazir Income Support (BISP) Project poverty assessment report reveals that the overall mean poverty score, which may vary between 0 and 100, is highest for Punjab (27.7), and lowest for Sindh (20.3). The corresponding scores for KP and Balochistan are higher than Sindh but lower than Punjab.

A major part of population (over 60 percent) lives in rural areas and poverty is pervasive in rural Sindh.

5.4.9. Indigenous People

Pakistan does not have any separate policy to define indigenous peoples or to protect their rights and cultural identities. However, the World Bank's Policy OP 4.10 on `Indigenous Peoples' defines indigenous peoples, in a generic sense of the term, to a distinct, vulnerable, social and cultural group possessing the following characteristics:

- Self-identification as member of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitat or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- An indigenous language, often different from the official language of the country of region.

There are no indigenous people in the project area except two local communities with distinct culture that are vulnerable and poor. These are the *Mohanas* (boat people) of Manchar Lake and the original Thari people who have a distinctive culture and lifestyle, conditioned to living in almost perpetual drought. A majority, though not all, of these people are Hindus belonging to what are termed as the `scheduled castes'.

The total Scheduled Cast population in Sindh was around 300,000 as per the 1998 Census. Out of these, 93% were amongst the rural population of Sindh and out of this rural population, 87% were residing in the Tharparkar District. The Hindu Schedule Cast tribes in Sindh that may be termed as `ethnic minorities' are mainly Bheels, Kolhi's, Oads and Meghwar. Some Muslim tribes of Tharparkar can also be considered as ethnic minorities, given that their culture and lifestyle is very similar to the Hindu tribes. The Bheels are mostly nomads, while the Kolhi's and Meghwar (who migrate seasonally) are engaged largely in non-farming work e.g. road construction and house building. Large numbers of women also work on construction sites. Women of these tribes are well known for their hard work and put in long hours of physical labor whether in Thar or outside.

5.5. Climate Change

5.5.1. Impacts on Indus Basin

The Pakistan Meteorological Department's technical report "Climate Change in Pakistan" 2012, focused on Sindh province to cater extremes on optimism and pessimism on future state of climate three open ended scenarios A1B, A2 and B1 were taken care of during simulations. According to Business-as-usual scenarios (A2), the mean daily temperature in Pakistan is likely by 5.5°C while the moderate scenarios project it to the level of 4.5°C by the end of 21st century.

The optimistic category assuming clean environment and highly human friendly demographic features (B1) produced 3.4°C rise in temperature over the present level (See **Figure 5.23**).

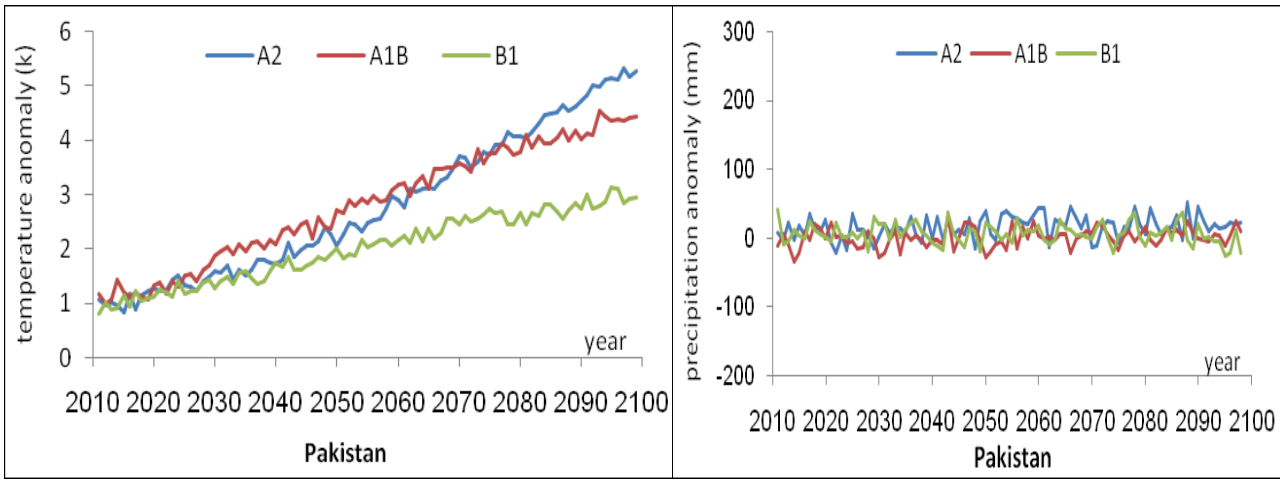

Figure 5.24: ***Future temperature (a) and rainfall (b) projections on decadal scale for Pakistan under A1B, A2 and B1 SERS scenarios for 21st century.***
(Source: Pakistan Meteorological Department's technical report "Climate Change in Pakistan" 2012)

The studies carried out by International Centre for Integrated Mountain Development (ICIMOD) indicate that there may be 10% to 30% of water shortage in the Indus River during the winter due to retreat of glaciers. While there may be 10% to 20% increase in flood flows of 21st century due to increased temperatures in the summer. These studies also indicate that glaciers are retreating at rates of 10 m to 60 m per year and many small glaciers (<0.2 sq.km) have already disappeared. Thus climate change impact on the water resources is likely to affect Indus Basin of Pakistan especially within the downstream areas because of reduced water flows in the dry season and higher flows and resulting flood problems during the wet season. Changes in climate may also increase the occurrence of hydrological extremes such as droughts and floods.

5.5.2. Temperature Projections

The Indus delta is highly vulnerable part to the impacts of climate change in terms of frequent floods and droughts due to the added energy to the physical processes producing local weather systems and the advected air masses from adjoining land and sea. To understand the features of thermal regime of the deltaic region in future, the projections on yearly and 10-yearly basis have been prepared by the regional climate models at city scales. In general, 4°C rise in temperature over the deltaic plains is expected by the end of this century (See **Figure 5.24**). However, warming rate is less at locations near the coast where maritime air mass will prevail with its increased dominance especially in summer making the atmosphere relatively moist.

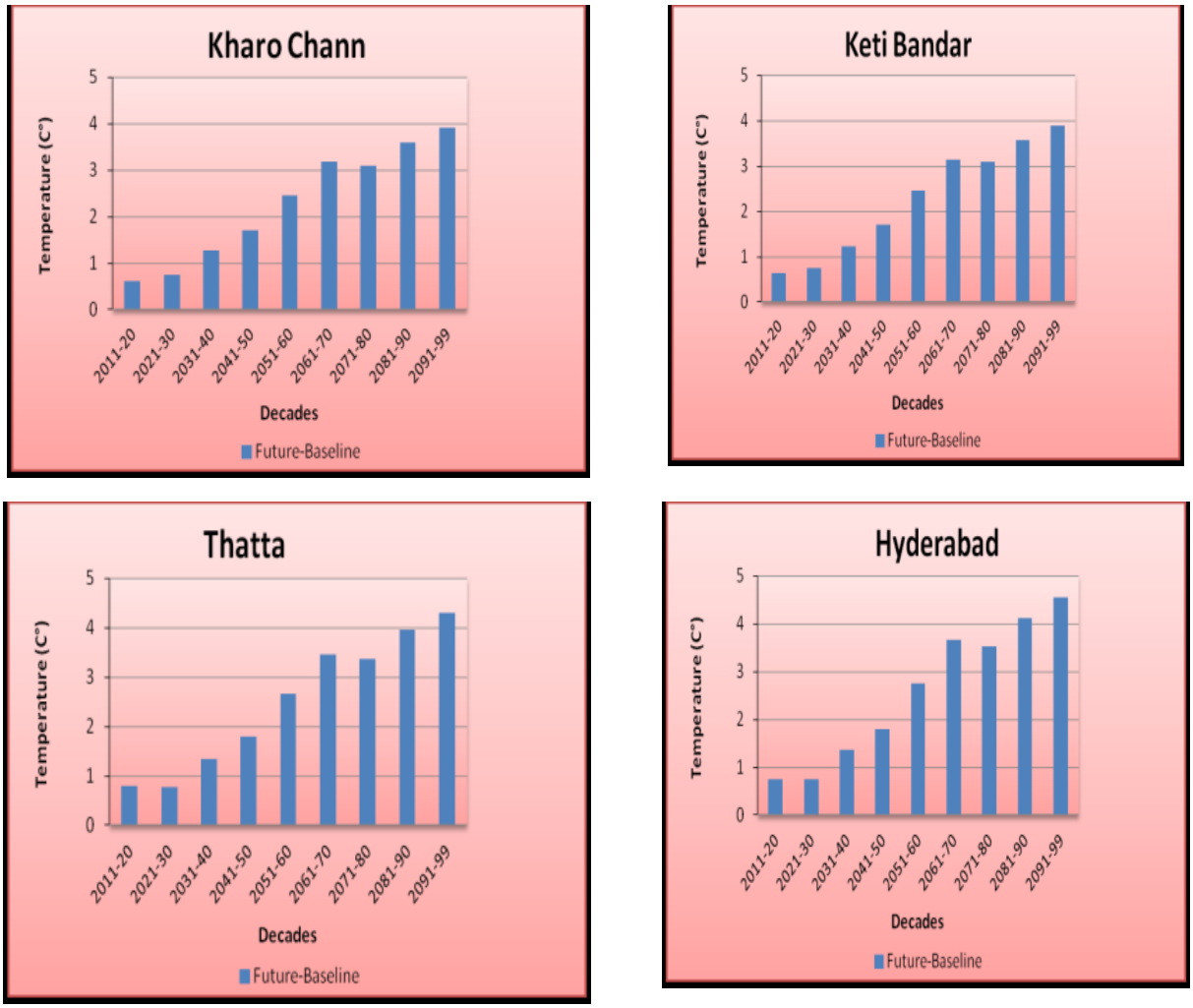

Figure 5.25: Mean daily future temperature projections for the Indus Delta on decadal basis during 21st century.

(Source: Pakistan Meteorological Department's technical report "Climate Change in Pakistan" 2012)

5.6. Impacts Assessment

This ESMF/RPF has identified significant environmental and social impacts, methodologies and practices for the assessment of anticipated impacts complying with the World Bank OP 4.01 and Sindh Environmental Protection, 2014 requirements as follows:

- A screening survey will be carried out for each sub-project to determine applicability and level of detail of the environmental assessment.
- Baseline information on prevailing bio-physical environmental conditions will be collected from both primary and secondary sources. Primary data on flora, fauna, fisheries, water quality, borrow areas and noise levels will be collected through site visits and surveys.
- The scoping process will be carried out during which issues that should be taken into consideration will be identified and the terms of reference for the ESMP and ESIA will be prepared.
- The assessment process will consist of a number of elements based on previous studies and incorporation of additional information to be gathered during site visits, discussions with officials of government departments and non-governmental Organization (NGOs),

and meetings with groups from the communities living in as well as adjacent to the project area. This will also form part of public information dissemination process. The contents of this report also conform to the requirements of the Sindh Environmental Protection Agency (SEPA).

- Open consultation sessions shall be held with different stakeholder groups who may be affected by the project. The consultation process will be carried out in accordance with the World Bank Operational Policy (OP4.01) on public consultation.

5.6.1. Physical Components of the Subprojects

The components of the project responsible for environmental and social impacts and therefore relevant for our analysis are the physical works. The summary list of potential physical activities is provided below.

Rehabilitation of flood embankments along the Indus River downstream of Kotri Barrage. The strengthening and rehabilitation of embankments may include following construction activities and works:

- area clearing
- Borrow pit excavation
- Earth fill construction with roller compaction
- Placement of sand / gravel spall bedding layer
- Placement of stone riprap (stone pitching and launching apron)
- Construction of gabions

The stones for ripraps, stones for gabions and bedding materials will be obtained from commercial quarries at Jungshahi area in district near Thatta. The earth fill material will be obtained from nearby borrow pits of suitable soils. The gabion nets will be manufactured at site or arranged from manufactures at Karachi. The borrow areas will be subject to environmental and social screening as well as this assessment will be included in the relevant ESMP/RAP of the sub-project.

Construction of Small Dams in Dadu, Jamshoro and Tharparkar Districts. The small dams are mostly earthen embankment constructed with impervious earth. The reinforced concrete spillway structures will be provided to cater for floods. A majority of dams might be either groundwater recharge dams without any outlets. However storage dams shall be provided with outlets pipes for downstream delivery. At some dams, arrangement for tube wells construction with solar pumping arrangement is proposed for development of command area and drinking water for local population.

The following works and construction activities are foreseen at small dams:

- area clearing
- Excavation in rock / soil at dam foundation
- Excavation in borrow pits
- Earth fill construction with roller compaction
- Placement of filter / stony toe drains
- Placement of sand / gravel / spall bedding
- Placement of stone riprap (stone pitching and aprons)

- Construction of *Landhi* (hut) for dam supervisor / operators
- Construction of drilled tube wells with solar pumps

The stone and gravel material will be obtained from commercial quarries at Jungshahi in Thatta district or from Thana Bola Khan or Bohlari rock quarries. Earth fill will be obtained from nearby area of each dam. During ESMP or ESIA preparation, the environmental and social screening of the borrow areas will be carried out. Cement shall be arranged from Karachi, Thatta or Nooriabad cement factories.

5.6.2. Assessment of Potential Impacts and Generic Mitigation

The potential negative impacts are assessed in the subsections below. The generic mitigation measures have also been provided here; additional measures may be added as a result of the subproject-specific environmental assessments to be carried out during the Project implementation. The interactions are characterized in **Table 5.6**. As can be seen from the table, most of the potentially negative impacts of the project activities are moderate, localized, short term, and reversible in nature.

Table 5.6: Summary of Environmental and Social Impacts during Construction Phase

	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
Rehabilitation of Embankments							
1	Disposal of excavated/surplus material					✔	
2	Development of Borrow Pits				✔		
3	Surface water quality						✔
4	Groundwater quality						✔
5	Traffic Dislocation					✔	
6	Damage to Crop					✔	
7	Soil quality and erosion				✔		
8	Solid waste					✔	
9	Land acquisition/resettlement impacts					✔	
10	Dust Pollution					✔	
11	Construction of approach/access roads					✔	
12	Noise Pollution					✔	-
13	Pollution from Labor Camp				✔		
14	Destruction of Fauna and Flora				✔		
15	Impact on riparian habitat and vegetation					✔	
16	Destruction of Fish					✔	
17	Occupational health and safety				✔		
18	Employment	✔					
19	Land acquisition						✔
Construction of Small Dams							
1	Disposal of excavated/surplus material					✔	
2	Development of Borrow Pits				✔		
3	Surface water quality						✔
4	Groundwater quality	✔					
5	Traffic Dislocation					✔	
6	Damage to Crop					✔	
7	Soil quality and erosion		✔				
8	Solid waste					✔	

	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
9	Land acquisition / resettlement impacts					✔	
10	Dust Pollution					✔	
11	Construction of approach/access roads					✔	
12	Noise Pollution					✔	
13	Pollution from Labor Camp				✔		
14	Destruction of Fauna and Flora				✔		
15	Fish		✔				
16	Occupational health and safety				✔		
17	Employment	✔					
18	Land acquisition				✔		
Environmental impacts Assessment for PDMA Building							
1	Acquisition of land				✔		
2	Soil contamination from wastes					✔	
3	Clogging of drainage works and introduction of hazardous wastes				✔		
4	Dust generation				✔		
5	Noise disturbance during construction.				✔		
6	Risk of construction debris dumped into nearby water bodies or disposal of construction waste along the settlements and risk of unauthorized access to the construction areas.				✔		
7	Construction accidents, handling of asbestos material, working under an exposure of noise and dust, potential negative impact of materials used in the construction					✔	
8	Construction of the building near historic structure.				✔		
9	Building code of Pakistan, if not considered in designing and construction				✔		

D: Definite large, frequent and serious impact M: Likely medium and more frequent impact S: Possible small and infrequent impact

5.6.3. Impacts of Embankments and Small Dams Construction

The rehabilitation of the Indus River embankments and construction of small dams involve major earth work and concreting. Potential impacts and associated mitigation measures are discussed below.

- **Disposal of Excavated Earth**: The rehabilitation and improvement works of various embankments and small dams involve massive earth works. Proper disposal of excavated earth is imperative. Therefore, excavated earth would be used for making the Dam body and Indus River levees. Proper cut and fill methodology would also be incorporated in the designing of small dams. The surplus excavated material removed would be disposed of properly and, where possible, utilized as fertilizer in the fields.
- **Dust Pollution:** Dust pollution is expected due to heavy traffic particularly on earthen roads in the project area. This would cause serious negative impact (e.g., causing respiratory infection problems) on workers and population in the vicinity of construction area and those located on the approach roads. To mitigate the negative impact, all access roads would be sprinkled with water.

- **Noise Pollution:** Operation of a large number of earth moving machineries, dump trucks, generators, pumps would cause noise levels exceeding allowable limits of 80 to 90 dB. The impact will be medium and negative but of a temporary nature. This would need mitigation for site staff, laborers, camp dwellers, pump operators. There are standards set in the NEQS for fieldwork/earth machinery in Pakistan. In addition, the IFC Environmental and Health Safety (EHS) guidelines for "Noise Management" will also be followed. To mitigate the impact of noise, all concerned staff should be provided with the necessary ear protection gears and their use while on duty should be made mandatory. In addition, silencers should be used as much as possible on vehicles and machineries in use.
- **Safety hazards**: the construction works and operation of construction machinery and vehicles will pose safety risks for the construction works as well as nearby communities. To mitigate these risks, the construction workers will be provided regular safety trainings, they will be required to use appropriate personal protective equipment (PPE), and they will be required to follow the Safety Plan prepared by the contractors. To protect the communities from safety risks, work area will be fenced to stop any unauthorized access, vehicle speed will be limited to 30 km per hour while passing near/through communities, local communities will be prior informed about the nature and extent of construction activities, and regular liaison will be maintained with them in this regard.
- **Labor Camps:** Labor camps, servicing and refueling of vehicles would cause air, soil, and water pollution. The impact will be medium and negative but of a temporary nature. For mitigation, provision of septic tanks and treatment of wastewater would be made. Treated water would also be used for sprinkling on earthen access roads to control dust pollution.
- **Borrow Pits:** Extraction of material from borrows pits may damage ecosystem balance of the area, upset the aquifer and leave an un-scenic site. The impact will be small and negative but of a permanent nature. For mitigation, necessary measures in planning borrow pits would be adopted, which include;
    - Prior to development of borrow pit, agro-ecological significance of the site will be surveyed;
    - Bio-physical profile needs to be prepared by Environment Experts;
    - the borrow pits in the agriculture active lands and standing crops shall be avoided;
    - A contract agreement needs to be signed with the land owner.
    - Restoration of the site after completion of works.
    - A safe distance from the Indus River banks and dams embankments to be kept to ensure safety against short circuiting of seepage path.

- **Approach Roads**: Construction of access roads including movement of earth moving equipment and transport of materials would cause additional load on existing roads. Access roads to project sites may also damage the crop. Cultivated areas would be avoided for constructing access roads.
- **Temporary Diversion on the Perennial Rivers:** In the case of small dams, if there is a perennial river and the flow is utilized downstream, the diversion channels is required during the construction period and would have to be filled back properly and restore the site including re-plantation of trees and vegetation.

- **Destruction of Flora and Fauna:** The destruction of some flora would take place during construction of approach roads, areas of labor camps, oil and vehicle storage areas. There is a possibility of tree removal due to the project activities. Mitigation measures include avoiding access roads through vegetation and compensate damages by extensively planting at least five trees in the immediate vicinity for every tree cut and bringing them to maturity.
- High noise level may disturb the fauna in wildlife sanctuaries if located close to the work area. Working would be confined to day light hours. No night travel would be allowed. This will have limited and negligible impact on fauna. Extended canal closures for rehabilitation works may have short to medium term adverse impact on the aquatic and other terrestrial lives. Detailed ESIAs and ESMPs will identify and analyze such impacts and location of such impacts in detail and will propose adequate mitigation measures.
- **Reptile Communities:** These communities will be affected during construction phase of embankment. This impact will be temporary and not significant.
- **Chance Find Procedure:** The following procedure shall be initiated in the event of the discovery of a previously unidentified archaeological or culturally important site or artefact during construction:
    - In the event of discovery of any PCR (site or artefact) which have not been identified in the sub-project specific ESMP, the contractor shall immediately cease all works in that area and report the find to the Engineer. Works may not recommence until approval is given by the Engineer.
    - Upon receiving a report of a chance find of a graveyard or architectural feature, the Engineer shall immediately mobilize his environmental team to the site to make recommendations. These recommendations shall be forwarded to the Client for approval. Approval for the contractor to continue shall be given by the Engineer once the Client has agreed to the proposed measures to be implemented and once these measures are included within the social management plan.
    - In addition, detailed chance find procedure shall be devised in each ESMP.

5.6.4. PDMA Building Construction Phase impacts and Mitigation Measures

The impacts associated with the PDMA building are mostly during the construction phase; therefore; some generic mitigation measures specific to the area of impacts are recommended as given below.

Notification and Worker Safety: The local construction and SEPA and communities should be notified of upcoming activities. The public will be notified of the works through appropriate notification in the media and/or at publicly accessible sites (including the site of the works). All legally required permits will be acquired for construction of the PDMA building. The Contractor formally agrees that all work will be carried out in a safe and disciplined manner designed to minimize impacts on neighboring residents and environment. Workers' PPE will comply with international good practice (always hardhats, as needed masks and safety glasses, harnesses and safety boots). Appropriate signposting of the sites will inform workers of key rules and regulations to follow.

- **Air Quality**: During pneumatic drilling/wall destruction dust shall be suppressed by ongoing water spraying and/or installing dust screen enclosures at site. The surrounding environment (sidewalks, roads) shall be kept free of debris to minimize dust. There will

be no open burning of construction / waste material at the site. There will be no excessive idling of construction vehicles at sites.

- **Noise:** Construction noise will be limited to restrict times (9am-6pm). During operations the engine covers of generators, air compressors and other powered mechanical equipment shall be closed, and equipment placed as far away from residential areas as possible.
- **Water Quality:** The site will establish appropriate erosion and sediment control measures such as e.g. hay bales and / or silt fences to prevent sediment from moving off site and causing excessive turbidity in nearby streams and rivers.
- **Waste management**: Waste collection and disposal pathways and sites will be identified for all major waste types expected from demolition and construction activities. Mineral construction and demolition wastes will be separated from general refuse, organic, liquid and chemical wastes by on-site sorting and stored in appropriate containers. Construction waste will be collected and disposed properly by licensed collectors. The records of waste disposal will be maintained as proof for proper management as designed. Whenever feasible the contractor will reuse and recycle appropriate and viable materials (except asbestos).
- **Water Quality**: The approach to handling sanitary wastes and wastewater from building sites (installation or reconstruction) must be approved by the local authorities. Before being discharged into receiving waters, effluents from individual wastewater systems must be treated in order to meet the minimal quality criteria set out by national guidelines on effluent quality and wastewater treatment. Monitoring of new wastewater systems (before/after) will be carried out.
- Construction vehicles and machinery will be washed only in designated areas where runoff will not pollute natural surface water bodies.
- **Cultural Sites**: If the building is a designated historic structure, very close to such a structure, or located in a designated historic district, notification shall be made and approvals/permits be obtained from Archaeology Department and all construction activities planned and carried out in line with provincial and national legislation. It shall be ensured that provisions are put in place so that artifacts or other possible "chance finds" encountered in excavation or construction are noted and registered, responsible officials contacted, and works activities delayed or modified to account for such finds.
- **Acquisition of Land**: If expropriation of land required, or if loss of access to income of legal or illegal users of land occurred, a RAP/ARAP will be prepared for any land acquisition and other negative impacts related to loss of assets, relocation, loss of livelihood etc.
- **Toxic material**: If asbestos is located on the project site, it shall be marked clearly as hazardous material. When possible the asbestos will be appropriately contained and sealed to minimize exposure. The asbestos prior to removal (if removal is necessary) will be treated with a wetting agent to minimize asbestos dust. Asbestos will be handled and disposed by skilled and experienced professionals. If asbestos material is being stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately. Security measures will be taken against unauthorized removal from the site. The removed asbestos will not be reused. Temporarily storage on site of all hazardous or toxic substances will be in safe containers labeled with details of composition, properties and handling information. The containers of hazardous substances shall be placed in a leak-proof container to prevent spillage and leaching. The

wastes shall be transported by specially licensed carriers and disposed in a licensed facility. Paints with toxic ingredients or solvents or lead-based paints will not be used.

- **Direct or Indirect Hazards**: In compliance with national regulations the contractor will ensure that the construction site is properly secured and construction related traffic regulated. This includes but is not limited to signposting, warning signs, barriers and traffic diversions: site will be clearly visible and the public warned of all potential hazards. Traffic management system and staff training, especially for site access and near-site heavy traffic. Provision of safe passages and crossings for pedestrians where construction traffic interferes. Adjustment of working hours to local traffic patterns, e.g. avoiding major transport activities during rush hours or times of livestock movement. Active traffic management by trained and visible staff at the site, if required for safe and convenient passage for the public. Ensuring safe and continuous access to office facilities, shops and residences during renovation activities, if the buildings stay open for the public.

5.6.5. Post Construction Phase Impacts

The assessment of environmental impacts during post construction phase is given in the following matrix (**Table 5.7**) and their mitigation measures in post construction phase are given below.

Table 5.7: Summary of Environmental and Social Impacts after Construction Phase

	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
POST CONSTRUCTION PHASE OF SMALL DAMS							
1	Increase in water availability and supply	✔					
2	Improvement Water Quality and Quantity for Drinking and Irrigation	✔					
3	Sedimentation					✔	
4	Improvement of Groundwater Quality	✔					
5	Reclamation of Salt affected soils		✔				
6	Water Logging		✔				
7	Flora		✔				
8	Fauna	✔					
9	Increase in Agriculture Production	✔					
10	Increase in Livestock Production	✔					
11	Increase in Employment	✔					
12	Increase in Land Value	✔					
13	Increase in Cultivation Area	✔					
14	Washing of Cloths	✔					
15	Additional use of Pesticides					✔	
16	Restoration of borrow areas					✔	
17	Impacts on downstream water users				✔		
18	Impacts in case of dam failure (breach)				✔		
19	Breeding of mosquitos					✔	
POST CONSTRUCTION PHASE OF INDUS RIVER EMBANKMENTS							
1	Enhanced protection against embankment breaches and flood	✔					
2	Flora						
3	Fauna		✔				
4	Increase in Agriculture Production		✔				
5	Increase in Livestock Production		✔				
6	Increase in Employment		✔				
7	Increase in Land Value	✔					
8	Increase in Cultivation Area		✔				

	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
9	Restoration of borrow areas					✔	
POST CONSTRUCTION PHASE OF PDMA BUILDING							
1	Waste generation and management					✔	
2	Effluent discharge					✔	
3	Improper parking					✔	

D: Definite large, frequent and serious impact M: Likely medium and more frequent impact S: Possible small and infrequent impact.

Water Quality: The impact of discharging untreated municipal sewage and industrial effluent into the Indus River System or in the reservoir area of Dams would continue to contaminate the water. However; after construction of the Small Dams, it is anticipated that the water quantity and quality will be improved.

Irrigation Water Availability: The Small Dams will serve as a source of water storage and water availability would increase for irrigation, domestic and livestock use. This would be a positive impact. Further, as a result of better water management there will be a positive impact of increased water availability and supply and consequently increased production

Ground Water Quality and Levels: Seepages from Dams and over-irrigation are two sources which raise ground water levels. With project intervention (construction of Small Dams), there would be proper applications of water to the fields and proper water management and scheduling that would mitigate the rise of groundwater table. The groundwater quality would also improve through seepage and subsequent recharge of aquifer.

Surface Runoff: The project intervention as such will not have any significant impact on surface runoff. However, there would be a better management of surface water through integrated water resources management due to tree plantations along the canal banks and drainage lines that would also improve soil water holding capacity and runoff retention.

Seepage and Wetland Recharge: One of the main sources of wetlands, marsh land/swamps recharge in downstream of Kotri Barrage is seepage from Indus River, canals or distributaries. The other sources for wetland recharge are direct rainfall and surface runoff. The seepage from Indus River will continue and there is no proposal for lining of the embankment. However, no significant impact is foreseen since the wetlands (declared as Ramsar Sites) are located far away from the proposed project area. This aspect will however be investigated in detail during the environmental assessment studies for each sub-project, and adequate mitigation measures will be proposed where required. The ESMPs will be prepared for each sub-project.

Water Borne/Related Disease: Improper intervention and disposal of wastes by the contractor during may increase the probability to attract flies and other disease vectors. Direct contact with them can be dangerous and unsafe to the workers and local public, as malaria, infectious diseases such as cholera and dysentery can spread through contact with these stagnant water accumulated in depression and wastes.

Soil Salinity and Alkalinity: Soil Salinity/Alkalinity will tend to reduce in the command area of small dams as a result of water availability, change in cropping pattern and cropping intensity.

Soil Erosions: Bank erosion of the Indus Rive, which normally occurs in unlined/non pitched reaches of the River, will reduce with the rehabilitations and stone pitching under the SRP.

Land Productivity: After construction of small dams, the water availability will be increased and as a result there will be increase in cultivated area, change in cropping pattern, cropping intensity and crop yield.

Tree cutting. Some trees may need to be felled for physical works for the Indus River embankments and dam axis points. In case of embankments, the frequency of this possibility on-site is remote since existing alignment will be followed. However, there is likelihood of trees being removed for approach roads required for construction activities. The mitigation efforts should be made to adopt approach road alignment through least vegetative areas. However, wherever unavoidable, it should be made mandatory to plant five times larger the number of trees cut and restoration of vegetation by concerned contractors after the work is completed.

Bird Communities/Habitats: The construction and improvement work of the irrigation system would likely lead to higher use of chemicals, such as pesticides, herbicides and fertilizers. This, if not maintained properly through the PMP, in turn might cause water pollution, which would have an adverse impact on birds that feed on water and aquatic food from such water sources. Given the mitigation plans in place to implement an exhaustive PMP and IMP and the level of such far-fetched threat, no significant impact on bird communities due to any of the physical intervention is foreseen.

5.7. Environmental Code of Practices

In addition to the earlier suggested mitigation measures, sixteen (16) Environmental Codes of Practices (ECoPs) are given in **Annex-C** prepared in line with the World Bank operational policies and national regulatory system. These ECoPs are to be implemented by the Contractor during construction works.

5.8. Environmental and Social Mitigation Plan

The generic Mitigation Plan prepared on the basis of the impact assessment discussed above is presented in **Table 5.8**. The subproject-specific mitigation plans will be included in the respective safeguard instruments (ESMP) to be prepared for each subproject. The generic plan in **Table 5.8** will be used as a reference and guidance while preparing the subproject-specific ESMPs.

Table 5.8: Generic Environmental and Social Mitigation Plan for Small Dams and Embankments Components

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
Land acquisition (Temporary or Permanent)	Private or government land may be acquired to complete the sub-project	- Land shall be acquired in accordance to this ESMF/RPF, LAA (1894) and World Bank OP: 4.12.	- Land is acquired in line with ESMF/RPF, LAA (1894) and World Bank OP: 4.12.	Before contractor mobilization	IA
Resettlement and other project related social impacts	The sub-projects may dislocate the residential, commercial and public structures.	- If unavoidable, the ARAP/RAP and SIA shall be prepared and implemented in line with the ESMF/RPF, and World Bank OP: 4.12.	- ARAP/RAP and SIA is prepared and implemented before physical work commencement.	Before contractor mobilization	IA

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
Contractor Mobilization and Establishment of campsite and machinery/equipment	Changes in land use pattern Influx of external workforce Social conflicts	- Site for camp shall be selected keeping in view the cultural norms of the area to avoid undue interference of the Construction contractor's staff with the local residents. - Bio-physical profile of the site shall be prepared - Local residents shall be given priority in the employment opportunities generated during construction and operations phase. - The land shall be rented for the campsite and equipment. No resettlement is envisaged for this purpose. - Photographic record of the area will be maintained to record pre-project condition of the area. - Community liaison will be maintained.	- Bio-physical profile of the site is prepared. - Development and implementation of policy on local employments Employment record Bio-physical profile and photographic record is maintained before interventions.	Initially on weekly basis and later on, on monthly basis	ESMU, PIC
	Vehicles may spread oils and chemicals	- Proper disposal of used oil and chemical waste shall be ensured. - Efficient Use of Chemicals shall be ensured.	Visual inspection	Daily	PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		- Good housekeeping practices shall be ensured at workshop areas. - Mixing of waste into fresh water sources shall not be allowed.			
	Deterioration of air quality due to machinery and equipment	- Proper engine tuning of machinery/equipment to meet NEQS limits. - Water should be sprinkled where needed and appropriate, particularly at worksites near the communities. - The contractor will submit and implement traffic management plan before commencement of works. - Consultation with the communities.	Monitoring shall be done on stack of machinery and equipment. The parameters required to be monitored are Smoke, H2S, SOx, CO, VOCs and NOx. Evidence of measurement records. Water sprinkling is done. The communities are consulted. Traffic management plan is submitted before commencement of physical works and implemented.	Monthly effects monitoring	ESMU and PIC
	Noise	- Equipment with high levels shall be fitted with noise reduction devices.	- Monitoring compliance to NEQS for noise (SRO72(KE)/	On-demand noise monitoring in case of complaint or	ESMU, Contractor and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		- The contractor will submit and implement traffic management plan before commencement of works. - Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed. - Use of PPEs such as ear plugs and ear muffs by the workers shall be ensured. - Avoid night time activity - The contractor will conduct on demand the noise monitoring in case of complaint and follow the required mitigations if noise level exceeds the standards. - Community liaison will be maintained.	2009) . - Consultation with communities is carried out. - The noise measurements shall be done twice on monthly basis at 7m from the source. The duration of sampling shall be 24 hours @ 15 seconds interval over 15 minutes every hour (averaged). - Noise monitoring report is submitted when required.	request if levels are exceeded despite mitigation measures Monthly ESMP Compliance monitoring Reports or as and when required.	
	Land degradation due to solid waste disposal of campsite	Maintaining of record of solid wastes disposition and recyclable wastes management approach shall be adopted. The wastes, if recyclable should be sold/given away for recycling; biodegradable wastes should be buried in an earthen pit for biodegradation, the remaining inert	-Visual inspection -record of waste disposal (whether given away, recycled, or buried)	Weekly monitoring by PIC and will be part of Monthly ESMP compliance monitoring and Quarterly Reporting	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		waste can be buried separately as described below; Ensure proper disposal of camp site waste at designated landfill/disposal sites. If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping. Prior to dumping the contractor should get the NOC from local authorities for disposal of solid waste. An impervious liner shall be laid to waste sites before the dumping of solid waste. The impervious liner shall be approved by the environmental and social specialist. After the dumping of solid waste the depression should be covered by scarified material or soil. Community liaison will be maintained.			
		Good housekeeping practices within the camp site shall be adopted to minimize waste generation. Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed	Visual inspection	Weekly monitoring by PIC and will be part of Monthly ESMP compliance monitoring and Quarterly Reporting	ESMU and PIC
	Soil/Water contamination	Waste management plan to be prepared for appropriate	Monitoring compliance to NEQS of	Monthly ESMP Compliance	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		disposal of sewage – such as septic tank and soaking pits. Erosion control practices such as silt fences, hay bales, flow retarders, sediment ponds and re-vegetation over the disturbed areas shall be carried out. The cleared sites shall be restored through self-sustaining grass or vegetation cover.	sanitary waste water generated from campsite. The monitoring parameters will be TSS, BOD, COD and Oil and Grease. Waste management plan in place Photographic record is maintained. The proposed fencing and re-vegetation is carried out.	monitoring and Quarterly reporting	
	Loss of vegetation	The construction crew shall be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood shall not be allowed.	Use of LPG cylinders at campsite	Monthly ESMP Compliance monitoring and Quarterly reporting	ESMU and PIC
	Occupational health and Safety issues for site personnel	Contractor will prepare and implement an OHS Plan. PPE will be used OHS trainings will be provided Firefighting equipment shall be made available at the camps.	Use of personal protective equipment at campsite	Monthly ESMP Compliance monitoring reports Quarterly reporting	ESMU and PIC
	Safety issues for local communities	Contractor will prepare and implement an OHS plan Road signage shall be fixed at appropriate locations	Visual inspections Training record Record of accidents	Monthly ESMP Compliance monitoring reports Quarterly	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		to reduce safety hazard associated with project-related vehicular traffic. Protective fencing to be installed around the Camp to avoid any accidents Project drivers shall be trained on defensive driving. Vehicle speeds near/within the communities shall be kept low, to avoid safety hazard and dust emissions. Community liaison will be maintained.		reporting	
	Damage to infrastructure	All damaged infrastructure shall be restored to original or better condition. Follow the guidelines given in section 4.5.2.1.	Visual inspections Photographic records Infrastructure restoration records	Monthly ESMP Compliance monitoring reports Quarterly reporting	ESMU and PIC
Construction works	Soil erosion and contamination	Erosion control practices such as silt fences, hay bales, flow retarders, sediment ponds and re-vegetation over the disturbed areas shall be carried out. The cleared sites shall be restored through self-sustaining grass or vegetation cover. Material borrowing and disposal plan should be prepared. Cultivation fields	Evidence of plan in place. Photographic record. The proposed fencing and re-vegetation is carried out.	Monthly ESMP Compliance monitoring reports Quarterly reporting	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		should be avoided for borrowing material to the extent possible. Written consent of the land owner should be obtained for material (soil) borrowing. If borrow area is within privately owned land to a depth of approximately 0.3m (1ft). Photographic record (before, during, after) should be kept for the disposal areas.			
	Loss of natural vegetation	Compensatory tree plantation (five times the trees cut down for construction) should be carried out at appropriate locations within the project area	Evidence of plantation. Photographic record	Monthly ESMP Compliance monitoring reports Quarterly reporting	ESMU and PIC
	Site overburden	The top soil should be kept separate from subsoil and rocks. The contractor will use only sites approved by ESMU/PIC for dumping of the surplus materials. The contractor will prepare and submit overburden management plan to PIC.	Visual inspections Top soil is kept separate and surplus material is dumped in depression. The overburden management plan is submitted and implemented. Monitoring Particulate Matter	Daily Monitoring reports Fortnightly monitoring reports of PM10 Quarterly Reporting	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		Wind direction shall be considered while selecting sites for stockpiles. Stockpiles of overburden shall be kept covered where possible. Ensure proper disposal of construction waste at designated landfill/disposal sites. If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping. Prior to dumping the contractor should get the NOC from local authorities for disposal of solid waste.			
	Damage to infrastructure	All damaged infrastructure shall be restored to original or better condition.	Visual inspections Photographic records Infrastructure restoration records	Monthly ESMP Compliance monitoring reports Quarterly reporting	ESMU and PIC
	Sites of Historical, Cultural, Archeological or Religious Significance	Proponent shall ensure that the construction contractor staff is educated about the location and importance of the cultural sites that exist in the Project area. Consultation with the Department of	Consultation is carried out before and during implementation of the ESMP. Evidence of training provided to contractor staff. Evidence of maps in place	Immediately after chance find, to be reported in next quarter.	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		Antiquities government of Sindh shall be carried out before and during implementation of the ESMP. The contractor shall ensure that these sites are not affected by the construction related activities including movement of the project vehicles and obtaining material for construction. These aspects will be included in the trainings to be conducted for the contractor's staff. In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, contractor shall ensure that the work is stopped at that site, the provincial and federal archeological departments are notified immediately, and their advice is sought before resumption of the construction activities at such sites. Graveyards shall not be disturbed during the construction activities including movement of the project vehicles and obtaining borrow	with these sites shown. Record of appropriate action taken in case of chance finds. Photographic record of chance find		

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		material for construction. Community liaison will be maintained.			
	Noise pollution	Equipment with high levels shall be fitted with noise reduction devices. Consultation with the communities will be carried out. The contractor will submit and implement traffic management plan before commencement of works. Regular inspection, maintenance and lubrication of the construction vehicle and equipment shall be performed Use of PPEs such as earplugs and earmuffs by the workers shall be ensured. Avoid night time activity. The contractor will conduct on demand the noise monitoring in case of complaint and follow the required mitigations if noise level exceeds the standards. Community liaison will be maintained.	Monitoring compliance to NEQS for noise SRO72(KE) / 2009). Consultation with the communities is carried out. Traffic management plan is submitted and implemented by contractor. The sampling shall be done twice on monthly basis at 7 m from the source. The duration of sampling shall be 24hours @ 15 seconds interval over 15 minutes every hour(averaged)	Monthly, Quarterly reporting and as and when required by the	ESMU, Contractor and PIC
	Air pollution	Consultation with the communities.	Monitoring shall be done on	Monthly and Quarterly	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		The contractor will submit and implement traffic management plan before commencement of works. Proper engine tuning of machinery/equipment to meet National Environmental Quality Standards of Pakistan limits. Water should be sprinkled where needed and appropriate, particularly at worksites near the communities. Community liaison will be maintained.	stack of machinery and equipment. The parameters required to be monitored are Smoke, H2S, SOx, CO, VOCs and NOx. Evidence of measurement records. Traffic management plan is submitted and implemented.	reporting Quarterly reporting	
	Blocked access due to earthworks and stockpiling of excavated material.	A bypass route should be constructed at the project site to divert the traffic, thus avoiding the public traffic passing through the site. Traffic management plan will be in place. Community liaison will be maintained. Consultations will be carried out.	Traffic diversion plan Traffic management indicators shall be based on the data gathered on volume of traffic passing through villages, types of vehicles, foot traffic, etc.	Fortnightly monitoring reports. Quarterly reporting	ESMU and PIC
	Impact on vulnerable groups	Avoid loss of common property resources through proper identification of vulnerable groups as part of subproject screening. Ensure participation	Regular community consultations on environmental impacts and mitigating measuers Compliance	Monthly ESMP Compliance monitoring and Quarterly reporting	ESMU and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		of vulnerable groups in project activities through consultations, to ensure planned investments take the well-being of such groups into consideration Community liaison will be maintained.	with social screening requirements of subprojects		
	Impact on gender	Ensure facilities in construction camps. Ensure gender access to water for household and other usage remains undisturbed through provision of alternate water points, as required. Community liaison will be maintained.	Facilities available for women at work camps Number of alternate water points available	Fortnightly monitoring reports Quarterly reporting	Execution by construction contractor Monitoring by Environmental and social specialist
	Occupational and Safety Hazards	Contractor will prepare and implement an OHS plan PPE will be used OHS trainings will be provided Road signage shall be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. Protective fencing to be installed around the Camp to avoid any accidents Project drivers shall be trained on defensive driving. Vehicle speeds near/within the communities shall be kept low, to avoid	As discussed in section 3	Fortnightly monitoring reports Quarterly reporting	Execution by Contractor and PIC

Activity	Potential Impacts	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Responsibility
		safety hazard and dust emissions. Community liaison will be maintained.			
Dame Failure	Impacts on life and livelihoods	ICOLD Dame safety measure shall be followed	The Engineers will ensure the safety measures are addressed during construction of the dams.	Monthly during construction and once after construction.	Execution by Contractor and PIC
Lower riparian issues after construction of dams	Lower riparian may raise concerns about the sub-project	Lower riparian user's concerns will be addressed at the design and construction phase. Community liaison will be maintained.	The concerns of lower riparian's are addressed in the design.	Monthly during construction and once after construction.	Execution by Contractor and PIC
Borrow areas	Impacts on landscape, agriculture, flora and fauna.	The mitigation measure given in devised in this ESMF/RPF shall be followed and borrow areas shall be restored after completion of the works. Community liaison will be maintained.	Mitigation measures are followed and borrow areas are restored after works completion.	Monthly during construction and once after construction.	Execution by Contractor and PIC

6. Resettlement Policy Framework

This Resettlement Policy Framework (RPF) has been prepared for SRP as required under the World Bank Involuntary Resettlement policy 4.12.

6.1. Purpose of Resettlement Policy Framework

The purpose of this RPF is to provide policy and legal framework and procedures to mitigate unavoidable resettlement impacts. These procedures are in conformity to the World Bank OP/PB 4.12 on Involuntary Resettlement, as well as the applicable laws and regulations of Government of Sindh.

6.2. World Bank Resettlement Policy

The WB's experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive s kills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. The OP4.12 provides safeguards to address and mitigate these impoverishments risks. The overall objectives of the Policy are:

The policy guidelines for resettlement process for the Project are principally derived from the World Bank Operational Directive OD 4.30, "Involuntary Resettlement". Summary of general policy guidelines, which are being adopted for the Project, is as follows:

- Involuntary resettlement is to be dealt with from the earliest stages of the Project preparation.
- Involuntary resettlement should be avoided or minimized wherever feasible; exploring all viable alternate Project designs.
- Where unavoidable, resettlement plans should be conceived, developed and executed as development programs, with resettlers provided sufficient investment resources and opportunities to share in the Project benefits.
- Persons to be displaced should have their former living standards and income earning capacity improved, or at least restored, and should be provided adequate support during the transition period.
- Community participation in the planning and implementation of resettlement should be encouraged and facilitated. The compensation process should be fully transparent.
- Given the complexity of resettlement in development projects, the concerned government agencies and departments should upgrade their institutional capacity to design and implement Resettlement Action Plans.

The key principles of World Bank Involuntary Resettlement Policy are:

- The need to screen the project early on in the planning stage;
- Carry out meaningful consultation;
- At the minimum restore livelihood levels to what APs were before the project, improve the livelihoods of affected vulnerable groups;

- prompt compensation at full replacement cost is to be paid;
- Ensure that APs who have no statutory rights to the land that they are working, are eligible for resettlement assistance and compensation for the loss of land or assets; and
- Disclose all reports.

Scope and Triggers: The Involuntary Resettlement Policy (OP/BP 4.12) is triggered by the project as proposed works, the construction of small dams, rehabilitation of Indus River embankments/levees under component-2 and construction of PDMA office building could lead to involuntary resettlement impacts (temporary or permanent) due to encroachment on government lands, for agriculture construction of kacha rooms grain/agriculture input, animal sheds and grazing. The construction activities may also involve use of some lands for temporary purposes, such as storage of construction material, establishment of construction camps. In case of resettlement impacts, the SID and PDMA will be responsible for undertaking a social impact assessment and preparing a Resettlement Action Plan (RAP) for each subproject in line with this RPF and submit to the World Bank for review and clearance, prior to award of the civil works contract for the respective subprojects. The IAs will also engage a third-party for validation of RAP implementation.

6.3. Resettlement Planning for SRP

A separate Resettlement Action Plan (RAP) will be prepared for each subproject involving resettlement impacts and shall be based on the following principles:

- identify possibility of land acquisition and resettlement during screening of sub-projects;
- minimize resettlement through relocation/realignment of the project site, where possible;
- if resettlement is unavoidable, prepare a Resettlement Action Plan (RAP) in line with World Bank OP 4.12;
- undertake meaningful consultation with project affected persons (APs);
- ensure APs are clearly identified including those with no formal rights;
- restore their livelihood;
- pay compensation in time before land is acquired, and;
- disclose all relevant information.

The project will also engage a third party for validation of RAP implementation.

6.4. Resettlement Processing Requirements

Early screening will be done for every sub-project right after its identification. Early Screening will help to select sites where lands will be free from all encumbrances. Resettlement will be avoided or, where this is not possible, then minimized. If resettlement is likely to occur, a social impact assessment survey will be conducted to assess the type and magnitude of resettlement impacts. A Resettlement Action Plan (RAP) will be prepared based on the detailed design of the proposed sub-project by following the principle laid down in RPF. The RAP with a detailed compensation and/or rehabilitation plan will be implemented before access to the land for civil works is allowed.

A rapid resettlement impacts screening exercise of indicative sub-projects will be conducted to identify possible adverse social impacts. Efforts will be made to avoided, minimized, and/or mitigate/compensate resettlement impacts and a screening mechanism will be laid down. This

will allow the possibility to exclude certain activities/sub-projects if their environmental or social impacts are significant.

A subproject level Social Assessment (SA) will be undertaken; the SA will clarify the nature and extent of potential impacts and benefits including any impacts on poverty, vulnerable groups and gender. SA will identify subproject specific stakeholders and describe the mechanisms adopted for consultation and their outcome. Consultation will be carried out with key stakeholders including potentially affected communities, institutional stakeholders and other groups, which will be involved in project design and implementation. The RAP will be prepared in order to analyze and develop mitigation measures for any identified impacts. Appropriate grievance-handling procedures and arrangements for monitoring the RAP implementation will be in place and managed by the Irrigation Department Government of Sindh.

6.5. Criteria for Eligibility of APs

The criteria for the eligibility of the project Affected Person (APs) in accordance to the World Bank OP 4.12 is:

- those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country);
- those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets--provided that such claims are recognized under the laws of the country or become recognized through a process identified in the resettlement plan; and;
- those who have no recognizable legal right or claim to the land they are occupying.

All of the above categories of the APs will be eligible for compensation under the RAPs.

6.6. Compensation Eligibility and Entitlements for Affected Persons

The following persons will be eligible for compensation or rehabilitation provisions under the SRP:

- All persons losing own land encroached lands or non-land assets, i.e. crops and trees;
- Tenants and share-croppers of leased land whether registered or not;
- All encroachers and squatters losing structures on encroached lands;
- APs losing business or income from temporary use of land for construction related activities, such as disturbance to land, crops, and business operations both permanently and also temporarily during construction;
- Loss of communal property, lands and public infrastructure;
- Vulnerable APs identified through the social impact assessment (SIA);
- In the event of relocation from encroached lands, all displaced persons will receive transitional and other support to re-establish livelihoods;
- The affected persons will be eligible for rehabilitation subsidies and for the compensation of lost land, structures and utilities along with loss of livelihood;
- There will also be special provisions for vulnerable displaced persons i.e. very old, physically or mentally handicapped, poor below the poverty line, widows, and women headed household, and socially isolated.

The compensation and rehabilitation entitlements are summarized in the Entitlement Matrix below.

Table 6.1: Entitlement Matrix

Asset	Specification	Affected People	Compensation Entitlements
Permanent land acquisition	The landowner will have a title to the land.	Landowner	Full compensation for land to be acquired is accordance to the latest market rate. Compensation will be at replacement cost as per LAA (1894)
Arable Land Temporary land Use during construction period	Access is not restricted and existing or current land use will remain unchanged	Farmer/Titleholder	Full compensation for crops and trees for the period land used temporarily. Land rehabilitated/restored to its former quality following completion of works; Compensation in cash for all damaged crops and trees as per item below
		Leaseholder (registered or not	1. Cash equivalent to market value of gross yield of affected land for the temporary use period. 2. Land rehabilitated/restored to its former quality following completion of works; 3. Compensation in cash, for all damaged crops and trees.
		Sharecroppers (registered or not	Compensation in cash or kind for all damaged crops and trees.
		Agricultural workers	Compensation in cash or kind for all damaged crops and tree.
		Squatters / encroachers	Compensation in cash, for all damaged crops and tree.
		Leaseholder (registered or not)	Cash equivalent to market value of gross yield of affected land for the remaining lease years (up to a maximum of 3 years).
		Sharecroppers (registered or not)	Cash compensation equal to the market value of the lost harvest share once (temporary impact) or twice (permanent impact).
		Agricultural workers losing their contract	Cash indemnity corresponding to their salary (including portions in kind) for the remaining part of the agricultural year.
		Squatters	1 rehabilitation allowance

Asset	Specification	Affected People	Compensation Entitlements
			equal to market value of 1 gross harvest (in addition to crop compensation) for land use loss.
	Additional provisions for severe impacts (More than 10% of land loss)	Farmer/ Leaseholder	1 severe impact allowance equal to market value of gross harvest of the affected land for 1 year (inclusive of winter and summer crop and additional to standard crop compensation).
		Sharecroppers (registered or not)	1 severe impact allowance equal to market value of share of harvest lost (additional to standard crop compensation).
		Squatters	1 severe impact allowance equal to market value of gross harvest of the affected land for 1 year (inclusive of winter and summer crop and additional to standard crop compensation).
		Squatters	Accommodation in a government resettlement area or a self-relocation allowance.
Houses and Structure	The no-titled holders (squatter and encroachers) will only be eligible for compensation for the loss of assets and livelihood.	All relevant project-affected personnel (PAP) (including all non-titled PAPs such as squatters and encroachers)	Cash compensation at replacement rates for affected structure and other fixed assets free of salvageable materials, depreciation and transaction costs. In case of partial impacts full cash assistance to restore remaining structure. No compensation for land will be provided.
Crops	Crops affected	All PAPs (including squatters and encroachers)	Crop compensation in cash at full market rate for two harvests or project period by default for impacts caused by infrastructure development. All other crop losses will be compensated at market rates based on actual losses.
Trees	Trees affected	All APs (including squatters and encroaches)	The loss of fruit and non-fruit bearing trees will be compensated for based on their type, productive age or the market value of the produce for the remaining period of its average life.
Business Employment	Temporary or permanent loss of business or employment	All APs including squatters and encroachers	Business owner: (i) Cash compensation equal to one year income, if loss is permanent based on type of business; (ii) cash compensation for the period

Asset	Specification	Affected People	Compensation Entitlements
			of business interruption, if loss is temporary. Worker/employees: Indemnity for lost wages for the period of business interruption up to a maximum of 3 months.
Relocation	Transport and transitional livelihood costs	All PAPs affected by relocation	Provision of allowance to cover transport expenses based on the latest transportation rates and livelihood expenses (based on type and nature of livelihood) for one month.
Community assets			Rehabilitation/substitution of the affected structures/utilities (i.e. mosques, footbridges, roads, schools and health centers.)
Vulnerable AP livelihood			Subsistence grants to displace, poor /vulnerable families like (i) female headed households with dependents, (ii) disabled household heads, (iii) households falling under the generally accepted indicator for poverty, (iv) elderly households with no means of support and landlessness; (v) households without security of tenure; and (vi) ethnic minorities and indigenous peoples. Other groups may also qualify as "vulnerable" in the light of disadvantages circumstances e.g. children. Grants will be at least equal to Official Poverty Line per household for up to three months.
Unforeseen / unanticipated impacts			Any unforeseen / unanticipated impacts due to the sub-projects will be documented and mitigated based on the spirit of the principle agreed upon in this framework.

6.7. Cut-off Date

The cut-off date shall be set to prevent false claims for compensation or rehabilitation appearing after disclosure of the resettlement action plan. For non-land related losses it is the date of the start of the census while for land related losses, it is the date of notification of section 4 under LAA (1894). Compensation eligibility for non-land losses will be limited by a cut-off date for each subproject on the day of the beginning of the census survey for the impact assessment in

order to avoid an influx of outsiders. Each affected person will be identified and issued with an identification which confirms their presence on the proposed site of a sub-project prior to the cut-off date. The cut-off date will be announced through local means of communication including face-to-face communication with communities. Any persons who would settle/or build assets on encroached lands in the affected areas after the cut-off date will not be eligible for compensation.

6.8. Valuation and Replacement of Assets

The following methodology will be adopted for assessing unit compensation rates:

- Rent for temporary use of land will be fixed as per prevailing market rate in agreement of affected person.
- Houses and other structures will be valued at replacement cost plus labor cost based on the area, type and material of the affected item. No deductions will be made for depreciation, salvageable materials or transaction costs and taxes. Rates for building structures will be evaluated by the Works and Services Department where relevant using the latest/current Composite Schedule Rates that are regularly published by the Works and Services Department, Government of Sindh.
- Crops will be valued at current market rates of gross value of harvest as valued by the Agricultural Department.
- The loss of fruit and non-fruit bearing trees will be compensated for based on their type, productive age and the market value of the produce for the remaining period of its average life. The value of younger fruit trees will be based on the expenditure made to bring the tree to its current state. This will be assessed by the Horticultural Wing of the Agriculture Department.
- The value of trees that would have been used for timber will be calculated based on the average volume and quality of wood produced and taking into consideration the size classes as determined by girth, diameter at breast, height and volume as assessed by the Forest Department, Government of Sindh.

6.9. RAP Preparation

The RAP preparation activities will be initiated as part of the preparation of each new sub-project involving resettlement impacts. The requirement will be to take the completed detailed design of proposed sub-project and carry out a measurement survey and enumeration. The SRP consultant team will acquire map of the land from the Revenue Department and overlay sub-project detailed design with clear demarcation of government land, and also carryout demarcation on the ground in the presence of local community representatives in a transparent manner to avoid any confusion. After assessment of all impacts of a sub-project, a Resettlement Action Plan will be prepared to compensate/mitigate the identified impacts. Any unforeseen or additional impacts will be mitigated in the light of principles and procedures laid down in RPF. The appraisal will entail the following studies and investigations:

- **Socioeconomic Survey**: A socio-economic survey of 25% project affected households (AHs) will be carried out to provide a detailed socio-economic profile of the population in the project areas. The information gathered will focus on:
  i. household composition and demography;
  ii. ethnicity;
  iii. education;
  iv. livelihood patterns and income baseline;

v. land ownership patterns;
vi. displaced persons income levels and expenditure patterns;
vii. displaced persons views on the subproject and various resettlement and rehabilitation options;
viii. specific impacts on the poor, women and other vulnerable groups.

- The data will be gender disaggregated to identify specific gender related issues. The survey will be used to investigate the APs socio-economic condition, identify the project impacts on APs and to establish a benchmark for monitoring and evaluating the implementation of a subproject's compensation and rehabilitation program.

- **Census Survey:** A census of all AHs will be undertaken based on the categorizations in the entitlement matrix. The Census will determine the exact number of AHs/APs and how they will be affected by the specific impacts of a subproject. The Census will also identify all severely and vulnerable AHs.
- **Impacts Assessment and Inventory:** This task will be based on a Detailed Measurement Survey (DMS) which identifies the nature and magnitude of loss. The survey will include all losses including encroached land (residential and agricultural), immovable structures, communal, public and cultural/religious facilities, crops, trees and business incomes and wages. The impact assessment will also include a survey of compensation rates as detailed above and also the incomes of the AHs.
- **Mitigation of Impacts:** The project will endeavor to avoid resettlement by changing the sub-project site or modification in the design. If unavoidable, the ARAP and RAP shall be prepared in line with this ESMF/RPF, World Bank OP 4.12 and LAA (1894) and will cover all resettlement related impacts. The ARAP/RAP shall be implemented and monitored by the project proponent before contractor mobilization or physical works commencement.
- **Gender Impacts, Social Inclusion and Mitigation Measures**: The RAP will include measures ensuring that the socio-economic needs and priorities of women and other marginalized groups are identified, addressed and mitigated. The gender provisions will be incorporated to safeguard the specific needs and problems of women, displaced persons or other marginalized during subproject implementation. The socio-economic data gathered will be gender-disaggregated. Gender roles will be analyzed and the needs, aspirations and priorities of women will be taken into consideration during consultation and preparing mitigation measures and reported in the RAP. Female staff will be hired to collect data and assist women in consultations, resettlement options and activities. Female household heads will be registered as the recipients of compensation and rehabilitation measures due to their households. Women and marginalized groups will be included in the consultation process through meetings and will be encouraged to participate in the RAP planning and implementation process. Due consideration will be given to complaints and grievances lodged by women and marginalized APs following the procedures outlined in this RPF.
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- **RAP Compilation**. Subsequent to the tasks described above, RAP will be compiled documenting the process and outcome of the resettlement assessment. The RAPs may need to be updated to take into account changes in the final designs or any unforeseen or additional impacts during the construction phase. The RAPs should be updated (i) on the

completion of detailed engineering design but prior to the award of civil works contracts and (ii) during the subproject civil works where design changes during construction result in changes to the resettlement impacts. Land will not be possessed until all amended RAPs or addendum to a RAP get approved by the World Bank, payments made and APs vacate the land within the agreed notice period, mentioned in the RAP of a sub-project. The RAPs will include a time bound program which is related to the date that the land is required for construction purposes. The RAP will include an entitlement matrix spelling out the exact amount of compensation to be paid to each household against each type of eligibility and loss.

6.10. Stakeholder's Analysis, Identification and Consultation

A stakeholder's analysis, identification and consultation will be carried out during preparation of the ARAP and RAP. Consultations with potential affected persons and beneficiaries were carried out including vulnerable communities, potential affectees, intended beneficiaries of and indicative sub-projects for the preparation of RPF. Consultations were also undertaken with district governments, provincial line departments, and other stakeholders mentioned in the ESMF/RPF. Further consultations will be carried out particularly with affected persons, beneficiaries and other key stakeholders during preparation and implementation of RAPs of sub-project. The timing and nature of these consultations will vary depending upon the implementation program. Sub-project specific stakeholders will be identified through the initial social impact assessment of each subproject. Stakeholder consultations will be carried out over the preparation of the subproject through community meetings, focus group discussions and interviews of key informants for their views and recommendations for the sub-project preparation and implementation. These recommendations will be included in RAP and with description of actions defined to address them.

Specific consultations will be carried out with the APs of each sub-project to identify their needs and preferences for compensation and rehabilitation measures. In this regard the affected persons, including the displaced persons, will be thoroughly informed on the results of the census and impact assessment and their preferences for compensation and other resettlement assistance will be given due consideration. The processes and mechanisms ensuring the active involvement of APs and other stakeholders will be detailed in the RAPs, with the list of participants, the location, date and minutes of consultation meetings.

6.11. Institutional Arrangements and Implementation Mechanism

The IA of SRP has overall responsibility for implementation of all resettlement tasks. The IA will be assisted by the Project Implementation Consultants (PIC) for implementation of ARAP/RAP and ESMP. The Environmental and Social Management Unit (ESMU) will oversee and direct all the activities during the implementation of ARAP/RAP. ESMU will be responsible for implementing the RAP according to the agreed principles and procedures. The Environment/Social Monitoring and Evaluation Consultants (ESMECs) to be hired by the IA as an independent and third party will be responsible for the monitoring and evaluation of the ARAP/RAP implementation.

6.12. Information Disclosure Plan

The entire RPF, after its clearance from the World Bank, will be translated into Sindhi and disclosed to the public through websites of the IAs and the World Bank InfoShop, and shared with institutional stakeholders, APs and beneficiary communities. Arrangements would also be made to provide information to women and other marginalized groups through participatory mechanisms. Before implementation of the project, a communications strategy will be developed

for addressing the requirement for public consultation and participation. The Social and Resettlement Specialist of the IA will be responsible to ensure that all RAPs are properly and meaningfully disclosed to the APs, their concerns addressed and necessary changes made in a subproject design for this purpose. Before the socio-economic baseline surveys are conducted, the IAs will need to have developed a workable strategy for public consultation and information disclosure, the Social and Resettlement Specialists of the project will take the lead in assuming this responsibility. During the census and Detailed Measurement Survey (DMS), each affected household will be directly informed about the subproject entitlements and procedures.

The IAs (SID and PDMA) will play a significant role in this process. The consultation process will need to outline the legal procedures that are to be followed if any. The details of the process will have to be clearly communicated to any affected people and in a form that can be easily understood / communicated. The information given should also include the provisions of the OP 4.12 principles and outline the rights and obligations of APs. The range of options for compensation can be identified further, along with their entitlements for lost assets in addition to the entitlements outlined in this RPF.

6.13. Resettlement Budget and Financing

Due to the emergency nature of SRP, a framework approach will be used to identify subprojects for rehabilitation of embankments of Indus River and construction of small dams infrastructure during project implementation. Therefore, specific locations have not been identified during preparation. Consequently it is difficult to calculate accurate quantities of adverse impacts and any estimate of the cost of resettlement. The detailed cost estimation will be carried out when preparing a sub-project specific RAP in line with this RPF. All RAP preparation and implementation costs, including cost of compensation, various eligible allowances, monitoring, evaluation, grievances redress, as well as contingencies, will be estimated and included in the RAP and they will be considered an integral part of each of the sub-project costs. Each RAP will include a budget section indicating.

- unit compensation rates for all affected items and allowances,
- methodology followed for the computation of unit compensation rates, and
- a cost table for all compensation expenses including contingencies.

Finances for RAP: Financing for each subproject specific RAP cost, including compensation, allowances, and administration of RAP preparation and implementation, will be provided by the Government of Sindh as counterpart funds. Costs for external monitoring tasks can be allocated under the loan. In order to ensure that sufficient funds are available for RAP tasks, the Government of Sindh will have to allocate 100% of the cost of compensation at replacement cost and expected allowances estimated in each RAP plus 10% of contingencies before RAP approval or implementation. Being the project owner, The Government of Sindh is responsible for the timely allocation of the funds needed to implement the RAPs. Allocations will be reviewed twice a year based on the budget requirements indicated in RAPs. Regarding the flow of RAP finances, it is noted that the budget for land, crops, trees, structures compensation will be disbursed by SID, through the ESMU will be responsible to disburse the compensation to the APs with assistance from the field offices. A timetable will be set within RAP and the compensation will be done before award of contract, commencement of the physical works or acquiring the land.

6.14. Monitoring and Reporting

The objective of monitoring and reporting of RAP implementation is to identify implementation problems and successes as early as possible so that the implementation arrangements can be

adjusted. Two types of monitoring will be designed in the RAP i.e. internal and external monitoring. The internal monitoring is to be carried out by the Social and Resettlement Specialist of IA and to be assisted by the PIC. The external/independent monitoring is to be carried out by Environmental and Social Monitoring and Evaluation Consultants (ESMEC) to be hired by the IA for the project. The IA will prepare the terms of reference (TORs) for the ESMEC before RAP implementation begins, which will be cleared by the Bank.

Monthly, quarterly and annual RAP implementation reports will be produced by the ESMU and PIC while ESMEC will be responsible to carry out regular external monitoring.

The implementation of entire RAP will be monitored along with the status of resolution of all complaints (with details) and also the consultation plan. Internal monitoring will be carried out routinely by the social specialist and PIC. Results of internal monitoring will be communicated to concerned Affected People and to the Bank through monthly and quarterly progress reports. Indicators for the internal monitoring will be those related to process and immediate outputs and results.

This information will be collected directly from the field that will report monthly to the Social and Resettlement Specialists to assess the progress and results of RAPs implementation, and to adjust the work Program, if necessary. The monthly reports will be consolidated into quarterly reports and a standard progress and supervision report will be sent to the World Bank and other relevant stakeholders. Specific monitoring benchmarks will include but not be restricted to information campaign and consultation with APs; status of compensation for affected structures and other assets; relocation of APs; payments for loss of income; and income restoration activities.

This information will be collected by the field offices, responsible for monitoring the day to day resettlement activities of a subproject through the review of census information for all APs; consultation and informal interviews with APs; in depth case studies; sample survey of APs; key informant interviews; and community public meetings.

External monitoring will need to be carried out for the entire process of RAPs implementation including impacts and outcome indicators of the RPF and these indicators will be specified in RAPs. External monitoring will be initiated the beginning of the RAP implementation, and its results will be communicated to all concerned APs, the IA and the Bank through quarterly and annual reports. If required by the Client, monthly reports may be produced. The external monitoring will be done through verifying the internal RAP implementation reports of the ESMU and PIC, interviewing a random sample of APs in the field, observing the functioning of the resettlement operation at all levels, to assess its effectiveness and compliance with the RAP, checking the type of grievance issues and the functioning of grievance redress mechanisms, surveying standards of living of the APs and advising IA regarding possible improvements in implementation of the RAP.

Sub-projects having implementation time frame under 6 months will be monitored only once. External Monitoring tasks will include;

- review and verification of internal monitoring reports prepared by field offices and Social Specialists of IA;
- review of the socio-economic baseline census information of pre-project conditions;
- identification and selection of impact indicators;
- impact assessment through formal and informal surveys of APs consultation with APs, officials, community leaders for preparing review report; and

- Assessment of resettlement efficiency, effectiveness, impact and sustainability, drawing lessons for future resettlement policy formulation and planning for SID and P&D and other relevant government agencies.

The ESMEC will also assess the status of subproject affected vulnerable groups such as female headed households, disabled/elderly, and families below the poverty line and socially isolated. The ESMEC will consider indicators in monitoring and evaluation of sub-projects RAPs such as socio-economic conditions of the APs in the post resettlement period; communications and reactions from APs on entitlements, compensation, options, alternative developments and relocation timetables; changes in housing and income levels; rehabilitation of squatters; valuation of assets; grievance procedures; disbursement of compensation; and level of satisfaction of APs in the post resettlement period.

The ESMEC will carry out a post-implementation evaluation of the RAP about a year after completion of its implementation. The compelling reason for this study is to find out if the objectives of the RAPs have been attained or not. The benchmark data of socioeconomic survey of severely affected APs conducted during the preparation of the RAP will be used to compare the pre and post subproject conditions. The ESMEC will recommend appropriate supplemental assistance for the APs. The outcome of the study will show if the objectives of the RAPs have been attained or not.

6.15. Grievance Redress Mechanism (GRM)

Broadly, a grievance can be defined as any discontent of dissatisfaction with any aspect of the project or organization. Grievance Redress is a platform provided by the governance institution to the citizens to voice their dissatisfaction about poor or inadequate performance of the institution (whether as a whole, or individual stakeholders) and holds it or them accountable.

The grievance redress system as proposed for the sub-projects to handle issues that emerge from construction activities of the sub-projects, or can be plausibly described as a consequence of these activities.

Grievances may arise from the implementation of the proposed sub-projects sub-project activities.

6.15.1. Objectives of Grievance Redress Mechanism

A grievance redress mechanism (GRM), consistent with the requirements of the World Bank safeguard policies will be established to prevent and address community concerns, reduce risks, and assist the project to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM has been designed to help achieve the following objectives:

Open channels for effective communication, including the identification of new environmental issues of concern arising from the project;

Demonstrate concerns about community members and their environmental well-being; and

Prevent and mitigate any adverse environmental impacts on communities caused by project implementation and operations.

The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Opportunities for confidentiality and privacy for complainants are to be honored where this is seen as important.

6.15.2. Principles, Procedures and Timelines

Bearing in mind the range of possible grievances, following three basic standards shall underpin the proposed systems for handling these:

All grievances submitted in writing to staff assigned under the proposed Public Complaints Center (PCC) will be formally recorded, and a written acknowledgement issued;

Grievances will be dealt with on a referral basis; those that the Contractor or the Project Implementation Consultant (PIC) are unable to resolve will be referred to the Grievance Redress Committee, with a final provision for appeal to Project Director SRP and the Project Steering Committee (PSC) or Secretary Irrigation Department Government of Sindh if an issue cannot be resolved with the Committee.

Every effort will be made to address or resolve grievances within the following fixed time-lines, which will be an indicator against the performance of the handling system: Acknowledgement of a written submission will be issued to the complainant within three working days. If not resolved earlier by the Contractor or Supervisory staff on site, grievances will be tabled for discussion/resolution during Committee meeting within one week of receipt of the written submission. If not satisfactorily resolved by the Grievance Redress Committee, the grievance will be referred to consideration by PSC or Secretary, SID within one week.

The cases that prove impossible to resolve through Grievance Redress Committee may be referred to the PSC to be established under the Planning and Development Department (P&DD), Government of Sindh, comprising senior representatives from P&DD and Irrigation Department. This Board will meet as needed to adjudicate on cases and either send their recommendations for endorsement to the Secretary, P&DD or refer these for legal action. Where feasible, a response will be forthcoming to such appeals within one month of submission.

If the complainant is not satisfied, the complaint will have the option to seek redress through court of law.

6.15.3. Records and Monitoring

The Project Director's Office will maintain the data base in the Office to document all complaints received from the local communities. The information recorded in the data base register will include date of the complaint, particulars of the complainant, description of the grievance, actions to be taken, the person responsible to take the action, movement of the document (forwarded to whom / which Committee), follow up requirements and the target date for the implementation of the mitigation measure. The data base will also record the actual measures taken to mitigate these concerns. All complaints received in writing or received verbally will be properly recorded and documented.

6.15.4. Dissemination

Once finalized, procedures to be followed through the grievance handling system will be translated into local languages (Sindhi and Urdu). These shall be made available (in both leaflet and poster format) to all stakeholders, through the PD office and Deputy Commission (DC) offices of Thatta and Sujawal.

The PD will ensure that copies of the standard grievance registration form are available with, Consultants and Contractor and are kept in sufficient numbers in local government and area administration offices as DC at Sujawal and Thatta during the entire period of implementation. PD shall also ensure that the database of all grievances submitted is updated on a regular basis, and that information on the status of individual cases is made available as required.

6.15.5. Proposed Mechanism for Grievance Redress

It is proposed to establish the following prior to commencing project implementation activities including pre-construction activities:

A Public Complaints Center (PCC), which will be responsible to receive, log, and resolve complaints;

A Grievance Redress Committee (GRC), responsible to oversee the functioning of the PCC.

A non-judicial decision-making authority e.g. Project Steering Committee or Secretary Irrigation Government of Sindh for resolving grievances that cannot be resolved by PCC;

Grievance Focal Points (GFPs), which will be educated people from each community on each sub-project site. The GFPs should be community members who easily approached by the community. The GFPs will be provided training by the Environment and Social Section of the PIC and IA.

6.15.6. Public Complaints Center

In its capacity as the Project Implementation Body the IA in consultation with the Secretary Irrigation, Government of Sindh will establish a Public Complaints Centre (PCC) in the PD office. The IA and the local government bodies will issues public notices to inform the public within the project area of the Grievance Redress Mechanism. The PCC's phone number, fax, address, email address will be disseminated to the people through displays at the respective offices of the DC Sajawal and Thatta.

The PCC will be staffed by a full-time officer from the IA and will be independent of the PIC and contractor/operator. The officer should have experience and/or training in dealing with complaints and mediation of disputes. The PCC officer will have resources and facilities to maintain a complaints database and communicate with contractor, Site Engineers, PIC and DC Sujawal and Thatta and also with complainants.

The PCC will be responsible to receive, log, and resolve grievances. Given that the female community members have restricted mobility outside of their villages and homes, the female IA staff will be required to undertake visits to the local communities. The frequency of visits will depend on the nature and magnitude of activity in an area and the frequency of grievances

6.15.7. Grievance Redress Committee (GRC)

The GRC would be notified by Project effectiveness date. The PD office will be the secretariat of the GRC. The GRC will function as an independent body that will regulate the grievance redress process. It will comprise of, Environmental and Social Officers of IA, Senior Engineer from IA, Representative of DC office of concerned districts and senior members from civil society in sub-project areas.

6.15.8. Grievance Focal Points (GFPs)

The GFPs will be literate people from each community that will assist and facilitate the community members in reporting grievances resulting from project activities. The GFPs will be provided training by the PIC in facilitating grievance redress. Two GFPs (a female and male) will be selected for each sub-project.

6.15.9. Role and Responsibilities of PCC

The PCC will log complaint and date of receipt onto the complaint database and inform the PIC and the Contractor;

The PCC will instruct contractors and PIC to refer any complaints that they have received directly to the PCC. Similarly, the PCC will coordinate with local government to "capture" complaints made directly to them;

The PCC, with the PIC and the Contractor, will investigate the complaint to determine its validity, and to assess whether the source of the problem is due to project activities, and identify appropriate corrective measures. If corrective measures are necessary, PCC, through the PCI, will instruct the Contractor to take necessary action;

The PCC will inform the Complainant of investigation results and the action taken;

If complaint is transferred from local government agencies, the PCC will submit interim report to local government agencies on status of the complaint investigation and follow-up action within the time frame assigned by the above agencies;

The PCC will review the Contractors response on the identified mitigation measures, and the updated situation;

The PCC will undertake additional monitoring, as necessary, to verify as well as review that any valid reason for complaint does not recur.

During the complaint investigation, the PCC should work together with the Contractor and the PIC. If mitigation measures are identified in the investigation, the Contractor will promptly carry out the mitigation. PIC will ensure that the measures are carried out by the Contractor.

6.15.10. GRM Steps and Timeframe

Procedures and timeframes for the grievance redress process are as follows:

Stage 1: When a grievance arises, the affected person may contact directly with the contractor/operator and the project manager to resolve the issue of concern. If the issue is successfully resolved, no further follow-up is required;

Stage 2: If no ad hoc solution can be found, the affected person/s will submit an oral or written complaint to the PCC by themselves or through GRM entry points (the CFP, SDA, PIC, Contractor/Operator). For an oral complaint the PCC must make a written record. For each complaint, the PCC must investigate the complaint, assess its eligibility, and identify an appropriate solution. It will provide a clear response within five (5) working days to the complainant, and Contractor. The PCC will, as necessary, through PIC; instruct the Contractor to take corrective actions. The PCC will review the Contractor's response and undertake additional monitoring. During the complaint investigation, the PCC will work in close consultation with the Contractors, and the Supervising Engineer (during construction) and with the SID (during operation). The contractors during construction and the IA during operation should implement the redress solution and convey the outcome to the PCC within seven (7) working days;

Stage 3: If no solution can be identified by the PCC or if the complainant is not satisfied with the suggested solution under Stage 2, the PCC will organize, within two (2) weeks, a multi-stakeholder meeting under the auspices of the SID, where all relevant stakeholders (i.e., the complainant, IA, contractor/operator, relevant local government offices) will be invited. The meeting should result in a solution acceptable to all, and identify responsibilities and an action plan. The contractors during construction and the IA during operation should implement the agreed-upon redress solution and convey the outcome to the PCC within seven (7) working days;

Stage 4: If the multi-stakeholder hearing process is not successful, the PCC will inform Project Steering Committee (PSC)or Secretary Irrigation Department Government of Sindh accordingly, and the PSC or Secretary SID will organize a special meeting to address the problem and identify a solution; and

Stage 5: If the affected people are still not satisfied with the reply in Stage 4, he or she can go through to local judicial proceedings.

6.15.11. Reporting

The PCC will record the complaint, investigation, and subsequent actions and results in the monthly Environmental Management and Monitoring reports. In the construction period and the initial operational period covered by loan covenants the IA will periodically report progress to the World Bank, and this will include reporting of complaints and their resolution.

The tracking and documenting of grievance resolutions within the PCC and/or IA will include the following elements: (i) tracking forms and procedures for gathering information from project personnel and complainant(s); (ii) dedicated staff to update the database routinely; (iii) systems with the capacity to analyze information so as 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 IA and including PCC reports into the monthly ESMP Compliance monitoring report to the World Bank.

ANNEX - A

TOR FOR ENVIRONMENT SPECIALIST, GENDER SPECIALIST, ECOLOGICAL SPECIALIST AND SOCIAL AND RESETTLEMENT SPECIALIST OF ESMU

1. Environment Specialist and the Social and Resettlement Specialist

The Environment Specialist and the Social and Resettlement Specialist will be responsible for the supervision of implementation of ESMF/RPF as well as the ESMPs and Checklists that would be prepared for the subprojects. The Environment and Social and Resettlement Specialist will supervise the contractors‟ teams to ensure that all environmental commitments are incorporated into the construction activities and work processes. Specifically, the Environment and Social Specialist's responsibilities will include:

- Implementation of all aspects of ESMF/RPF, including environmental screening and filling the screening checklists for each subproject to be undertaken under SRP.
- Preparation of ESMPs and Checklists for subprojects.
- Supervising and supporting contractors in achieving their responsibilities as outlined in the ESMF/RPF and subsequent ESMPs and Checklists;
- Carrying out frequent field visits and conduct monitoring for ESMF implementation;
- Identifying and preparing environmental induction and training materials;
- Conduct/manage ESMF/RPF trainings for the IA personnel in accordance with the Training Plan given in ESMF/RPF;
- Managing the GRM;
- Responding to environmental incidents as required;
- Preparing quarterly progress reports for submission to World Bank and other stakeholders as defined in the ESMF/RPF and sub-project specific ESMPs.
- The Environment and Social and Resettlement Specialist will ensure that the project remains compliant to the following World Bank operational policies and guidelines:
    - OP / BP 4.01 Environmental Assessment
    - P / BP 4.04 Natural Habitats
    - OP 4.09 Pest Management
    - OP 4.11 Physical Cultural Resources
    - OP / BP 4.12 Involuntary Resettlement
    - OP 4.10 Indigenous Peoples
    - OP / BP 4.36 Forests
    - OP / BP 4.37 Safety of Dams
    - OP / BP 7.50 Projects on International Waterways

- OP / BP 7.60 Projects in Disputed Areas
- Bank's Policy on Access to Information WB EHS Guidelines

The consultant will also make use of the Health, Safety, and Environmental Guidelines in his/her supervision tasks.

Qualification:

The Environment Specialist should be MSc / BSc in environmental sciences, Environmental Management or engineering with five years of relevant experience. Working experience on WB project would be an asset. While the Social and Resettlement Specialist should have Master in Social Sciences or Resettlement Studies and have experience of five years in preparing and implementation of social and resettlement studies (SIA and RAPs) for the World Bank funded projects.

2. Gender Specialist

Overall Responsibilities of the Gender Specialist will to ensure that gender issues are considered in project activities for SRP Project. The specialist shall ensure that adequate attention is paid to gender in conducting all surveys and collection and analysis of demographic, physical, economic and consultation for the sub-projects. The specialist will ensure that gender-disaggregated analysis is conducted on all of the following aspects in preparing the sector plans.

- Collection of gender disaggregated socio-economic baseline information for each sub-project.
- To what extent are gender differences recognized during the environmental and social impacts assessment surveys of the sub-projects. If so –how; if not, what are some practical options that could be explored through this project design?
- What are the ways in which women participate in decisions related to the sub-project designing, implementation and monitoring under SRP.
- Undertaking consultation with the female community members in the sub-project area.
- To establish measureable gender-related targets and indicators for sub-projects under SRP.
- To design, capacity building, education and training in a gender-sensitive manner.
- The specialist will conduct on-the-job site inspections and furnish periodic progress reports about implementation of the ESMF/RPF and ESMP. She or he will report on the participation of men and women and recommend opportunities for them to participate in the project planning, designing, implementation and monitoring.
- Provide recommendations for gender best practices to ensure that participatory planning methods are culturally appropriate, inclusive and can encourage women and men to engage in the process;
- Explain and evaluate practical barriers to women's participation in the designing and implementation of the sub-projects;
- Ensure that the gender issues identified and analyzed are relevant and of interest to both men and women—this will help both sexes formulate ideas and engage in the adaptation process;

- Establish a method for gender-focused and disaggregated monitoring and evaluation of the sub-projects under SRP.

- Prepare recommendations for planned outcomes, outputs and activities outlined in the ESMF/RPF and ESMPs.

Qualifications:

- A minimum of a Master's degree or higher degree in Social Sciences, Development Studies, or Gender/Women's Studies.

- A minimum of ten year experience in the area of gender research and analysis, project design and implementation of field-based, institution building and policy programs, stakeholder consultations, gender monitoring and evaluation and mainstreaming including policy analysis and design of programs that address gender equality issues, of which, at least five years of experience should be in the World Bank funded projects.

3. Ecological Specialist

The specialist will have a university degree in the relevant discipline and over 10 years of experience in assessing the conservation of wetlands, protected areas, biodiversity assessment and preparing management plans for water sector projects. The Ecological Specialist will:

- Review ESMPs and other relevant reports to be prepared during the project implementation for the conservation of the environmental hotspots falling in the sub-project area;

- Assess the current status and impacts of the construction works on the ecological function and biological value of the hotspots, recommend mitigation measures;

- Conduct necessary analyses and field investigations to determine the impacts on aquatic ecology and suggest mitigation measures;

- Produce quarterly ecological monitoring reports

Qualifications:

MSc. Zoology with 15 years relevant experience.

ANNEX-B

FINDINGS OF FIRST ROUND PUBLIC CONSULTATIONS

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
Bhansar Dam Nagar parker	Bhansar Village	15-10-2015	16	1. Ishaq Shoro 2.Luqman 3.Khuda Bux 4.Rehmatullah 5.Nizam Shoro 6. Sahib Khan Shoro 7. Khan Shoro 8. Yamin Shoro 9. Noor Muhammad 10.Muhammad Nawaz 11. Muhammad Essa 12. Tayyab 13. Arbab 14. Muhammad Hashim 15. Loang	○ The villagers were very happy about the construction of dam to be constructed on Bhansar Nai. ○ They understood that construction of dam will result in rising of water table which will make drinking water available for the local people; ○ They reported that they face scarcity of water for agriculture and only few acres are cultivated; ○ They believed that because of construction of dam there will be increased water availability for agriculture resulting increase in crop production; ○ They demanded that local people be hired for construction activities of dam.
Bhansar Dam Nagar parker	Bandhi Village	15-10-2015	8	1. Kastoro Kolhi 2. Shankar Lal 3. Neelo Kolhi 4. Aalam Chand 5. Ajmal 6. Theetho 7. Geno Kolhi 8. Devji	○ The villagers told that currently they are using pond water of Bhansar Nai and they support the construction of dam at that site; ○ They reported that they will not be affected by noise from construction activities as they are located at some distance from the work area; ○ According to them, after project, an increase in the

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
					crop production as well as livestock expected which is positive impact of the sub-project.
Sankar Dam Nagarparkar	Sankar Village	15-10-2015	14	1. Heerchand 2. Partab 3. Tagji 4. Nellaram 5. Kaiji 6. Gopal 7. MoolChand 8. Vaelho 9. Padho 10. Asso 11. Pahlaj 12. Poono 13. Peero 14. Mohan	○ The villagers were very glad that finally the government had decided to construct a dam in their area. ○ They pointed that agriculture land in their area is suitable for cultivation and only few acres are cultivated due to the scarcity of water. ○ They believed that due to construction of dam, there will be increased availability of water for agriculture, livestock and domestic consumption. ○ The villagers expressed their willingness to work as laborers during the dam construction works.
Sabusan Dam Nagar parker	Sabusan Village	18-10-2015	8	1. Ramzan Khaskheli 2. Vevek Meghwar 3. Khato Mal 4. Nanji Meghwar 5. Sukh Dev Menghwar 6. Tek Chand Meghwar 7. Tilok Chand 8. Dalpat Meghwar	○ The villagers told that construction of dam will have only positive impact on them as water scarcity is the main hurdle to economic growth in the area. ○ They believed that with the increased availability of water for agriculture more land will be brought under cultivation and agricultural production will improve. ○ They demanded that since there is availability of local labor in the area, they should be given priority in doing unskilled work during construction of dam. ○ They understood

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
					that with the construction of reservoir, water table will rise and there will be better access to drinking water.

PHOTO GALLERY

Consultation with the beneficiaries of Bhansar Dam at Village Bhansar

Consultation with the beneficiaries of Sankar Dam at Village Sankar

Consultation with people settling near to MS Bund at 57/2 Miles

Consultation with the people settling near MS Bund at 57/2 Miles

Consultation with the beneficiaries of Sabusan Dam at Sabusan Village

Consultation with the beneficiaries of Sabusan Dam at Sabusan Village

Consultation with the communities near MS Bund at 57/2 Miles

Consultation with the communities near MS Bund at 57/2 Miles

Consultation with the communities near SH Bund

Consultation with the communities near SH Bund

Public Consultation near BU Bund

Public Consultation near BU Bund

Public consultation at Ghora Bari town near BU bund

Public consultation at BU bund

Public consultation at Indo bund

Public consultation at Dandari village near Indo bund

FINDINGS OF SECOND ROUND PUBLIC CONSULTATIONS

S. No.	Stakeholders participating		Key Issues/Topics Raised by the Participant	Answers of the Consultant Team
	Names of Participant	Identification		
1	**Khuda Bux**	**Social Mobilizer**	1.1. He said that as a social mobilizer, he felt that in development works advocacy campaigns are not carried out to inform the local people about the project objectives and involving them in the project cycle. 1.2. He pointed out that the districts of Thatta and Sajawal are vulnerable to the effects of climate change like floods and drought. He was glad that a project has been launched to mitigate the effects of these climatic disasters. 1.3. He pointed out that without community participation development can never be sustainable. 1.4. He questioned whether people residing near proposed dam sites have been consulted by the consultant team. 1.5. He inquired that how it will be ensured that mitigation measures mentioned in the environment assessment reports are implemented by the Contractor.	○ Our team has carried out detailed primary stakeholder consultation at SH, BU, Indo and MS bund the details of which are provided in the ESMF/RPF document. ○ Environmental and social survey for proposed small dams has not been started by our team as yet. Our team comprises of two male sociologists and a female gender specialist. They will carry out detailed consultation sessions both with the male and female stakeholders during the environmental and social survey of the proposed small dams. ○ To ensure the implementation of the mitigation measures mentioned a detailed mechanism has been outlined in the ESMP. Different institutions will be involved in the implementation of the Environmental Management Plan having different roles. The Contractor's environmental team will be responsible for implementation of the mitigation measures. They will be supervised by the project implementation consultants. IA will hire environmental and social experts who will monitor the performance of the consultant's environmental team. In addition third party monitoring will also be carried out to check environmental compliance status. With participation of large number of institutions there is transparency.
			He proposed that stone pitching be carried out along PB bund so that people residing in nearby villages are protected from the flood.	a) Contractor staff will be strictly prohibited from entering forests and causing cutting of trees there. b) The proponent is well aware of the need to carry out pitching work along PB bund in view of its

S. No.	Stakeholders participating		Key Issues/Topics Raised by the Participant	Answers of the Consultant Team
	Names of Participant	Identification		
				vulnerability to floods and it has been included in the scope of works under SRP.
2	**Abdul Khalique Soomro**	**Landlord**	1. He pointed out that PB Bund was heavily damaged during the floods. He questioned whether pitching along PB bund has been included in the proposed works under SRP? 2. He pointed out that 'Landhi' (flood monitoring stations established along the Indus river bund) play an important role in flood monitoring. Unfortunately in the past no maintenance work was carried out on these structures. It is proposed that additional landhis be constructed along bunds. 3. He raised the concern that Keenjhrar Lake is being contaminated by discharge of untreated wastewater. It is proposed to take measures to prevent discharge of untreated wastewater into Keenjhar Lake. He also proposed that Hadero and Haleji Lake be activated.	Section 1.01 The Superintendent Engineer pointed all bunds below Kotri Barrage which have been damaged during 2010 floods have been included under the scope of works which also includes PB Bund. Also previously established landhis will be rehabilitated and more landhis will be established along Indus River bunds to facilitate flood monitoring. Section 1.02 Your concerns regarding deterioration of water quality in Keenjhar Lake have been noted. Moreover a proposal for the activation of Hadero Lake has been sent for approval.
3	**Ghulam Mohiuddin Soomro**	**Landlord**	He pointed out that Monarki bund was damaged during 2010 floods. Can the irrigation officials explain the reason for the damage to Monarki bund?	The quality of steel plating carried out at Monarki bund was of good quality which is evident from the fact that those portions of the bund where steel plating was carried out resisted the 2010 floods. The steel plating got damaged in some portions due to corrosion of steel plates accelerated by high concentration of salt in the soil constituting the bund.
4	**Ali Muhammad Hingoro**	**Landlord**	1. He pointed out that he belongs to Ghora Bari which is near to BU bund. Along the bund there are access routes which are used by the locals during their daily routine. It is proposed that rehabilitation of these access routes be included in the scope of works. 2. The purpose of this project is	3. In reaches of the bunds where stone pitching/ widening works are proposed your proposal for repair/maintenance of access ramp will also be included. 4. Tree plantation has been proposed in the ESMP. For every cut down tree five trees will be planted by the contractor.

S. No.	Stakeholders participating		Key Issues/Topics Raised by the Participant	Answers of the Consultant Team
	Names of Participant	Identification		
			to enhance the environmental resistance to climatic disasters. Will tree plantation be carried out in this project to achieve this objective?	
5	**Ghulam Rasool Dal**	**Teacher (HST)**	He proposed that repair/maintenance of access routes along bund be included in the scope of works.	In reaches of the bunds where stone pitching/ widening works are proposed your proposal for repair/maintenance of access ramp will also be included.

PHOTO GALLERY

Maulana Shafi Muhammad carrying out recitation of the Holy Quran

Dr. Ali Asghar Mahesar (Deputy Director-PMO) explaining objectives of the consultative workshop

Executive Engineer (Sindh Irrigation Department) welcoming the participants of the workshop

Superintendent Engineer (Sindh Irrigation Department) briefing about the importance of river bunds in providing protection against floods

Assistant Executive Engineer-Small Dams) highlighting the importance of small dams in recharge of groundwater

Banner displayed at workshop venue highlighting the title of workshop in Sindhi language

Regional Head (Associated Consulting Engineers) briefing about the environmental and social assessment carried out by the consultants

Team Leader (Consultants for Environmental and Social Assessment of SRP) giving presentation on the environmental and social aspects of the project

Team leader (ACE) explaining the project

Participants of the consultative workshop

location map

Participants of the consultative workshop

Participant expressing his views about the importance of public participation in development projects

Superintendent Engineer, Irrigation Department thanking the participants for their active participation in the workshop

Participant expressing his views during the question-answer session

Participant during question- answer session

Participants of the workshop

ANNEX-C

ENVIRONMENTAL CODE OF PRACTICES (ECOPS)

Introduction

The objective of preparation of the Environmental Code of Practices (ECoP) is to address less significant environmental impacts and all general construction related impacts for the proposed SRP project implementation. The ECoPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. This ECoP will be annexed in the general conditions of all the contracts to be carried out under the SRP project. The list of ECoPs prepared for the SRP is given below:

- ECoP 1: Waste Management
- ECoP 2: Fuels and Hazardous Substances Management
- ECoP 3: Water Resources Management
- ECoP 4: Drainage Management
- ECoP 5: Soil Quality Management
- ECoP 6: Erosion and Sediment Control
- ECoP 7: Borrow Areas Development and Operation
- ECoP 8: Air Quality Management
- ECoP 9: Noise and Vibration Management
- ECoP 10: Protection of Flora
- ECoP 11: Protection of Fauna
- ECoP 12: Protection of Fisheries
- ECoP 13: Road Transport and Road Traffic Management
- ECoP 14: Construction Camp Management
- ECoP 15: Cultural and Religious Issues
- ECoP 16: Workers Health and Safety

The Contractor shall prepare a 'Construction Environmental Action Plan' (CEAP) demonstrating the manner in which the Contractor will comply with the requirements of ECoPs and the mitigation measures proposed in the ESMP of the ESIA Report. The CEAP shall be submitted to the ESU of PIC and ESMU for review and finally shall be approved by the ESU of PIC. The CEAP will form the part of the contract documents and will be used as monitoring tool for compliance. Violation of the compliance requirements will be treated as non-compliance leading to the corrections or otherwise imposing penalty on the contractors.

ECOP 1: WASTE MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall: ○ Develop waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste.) prior to commencing of construction and submit to SID and PIC for approval. ○ Organize disposal of all wastes generated during construction in an environmentally acceptable manner. This will include consideration of the nature and location of disposal site, so as to cause less environmental impact. ○ Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. ○ Segregate and reuse or recycle all the wastes, wherever practical. ○ Collect and transport non-hazardous wastes to all the approved disposal sites. ○ Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. ○ Provide refuse containers at each worksite. ○ Request suppliers to minimize packaging where practicable. ○ Place a high emphasis on good housekeeping practices. ○ Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	The Contractor shall: ○ Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. ○ Store, transport and handle all chemicals avoiding potential environmental pollution. ○ Store all hazardous wastes appropriately in bunded areas away from water courses. ○ Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. ○ Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. ○ Construct concrete or other impermeable flooring to prevent seepage in case of spills

ECOP 2: FUELS AND HAZARDOUS SUBSTANCE MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels, oil, lubricants, paints and other hazardous substance.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous substance on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall: o Prepare spill control procedures and submit the plan for PIC and SID for approval. o Prepare a Contractor Worker code of conduct to be approved by the ESMU. o Train the relevant construction personnel in handling of fuels and spill control procedures. o Store dangerous goods in bunded areas on a top of a sealed plastic sheet away from watercourses. o Refueling should occur only within bunded areas. o Make available MSDS for chemicals and dangerous goods on-site. o Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site approved by Sindh EPA. o Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored and personnel trained in the correct use. o Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. o Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. o Store hazardous materials above flood plain level. o Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area should preferably slope or drain to a safe collection area in the event of a spill. o Put containers and drums in permanent storage areas on an impermeable floor that slopes to a safe collection area in the event of a spill or leak. o Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. o Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ECOP 3: WATER RESOURCES MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous Material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall: ○ Follow the management guidelines proposed in ECoPs 1 and 2. ○ Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables
Discharge from construction sites	During construction both surface and groundwater quality may be deteriorated due to construction activities in the river, sewerages from construction sites and work camps. The construction works will modify groundcover and topography changing the surface water drainage patterns, including infiltration and storage of storm water. The change in hydrological regime leads to increased rate of runoff and in sediment and contaminant loading, increased flooding, groundwater contamination, and effect habitat of fish and other aquatic biology.	The Contractor shall: ○ Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials ○ Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site ○ Divert runoff from undisturbed areas around the construction site ○ Stockpile materials away from drainage lines ○ Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot ○ Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil Erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall: ○ Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion ○ Ensure that roads used by construction vehicles are swept regularly to remove sediment. ○ Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds)
Construction activities in water	Construction works in the water bodies will increase	The Contractor shall:

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
bodies	sediment and contaminant loading, and effect habitat of fish and other aquatic biology.	• Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site • Monitor the water quality in the runoff from the site or areas affected by dredge plumes, and improve work practices as necessary • Protect water bodies from sediment loads by silt screen or bubble curtains or other barriers • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables. • Use environment friendly and nontoxic slurry during construction of piles to discharge into the river. • Reduce infiltration of contaminated drainage through storm water management design • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.
Drinking water	Groundwater at shallow depths might be contaminated and hence not suitable for drinking purposes.	The Contractor shall: • Control the quality of groundwater to be used for drinking water on the bases of NEQS and World Bank standards for drinking water. Safe and sustainable discharges are to be ascertained prior to selection of pumps. • Tube wells will be installed with due regard for the surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination • All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned
	Depletion and pollution of groundwater resources	• Install monitoring wells both upstream and downstream areas near construction yards and construction camps to regularly monitor and report on the water quality and water levels. • Protect groundwater supplies of adjacent lands

ECOP 4: DRAINAGE MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall: • Prepare a program for prevent/avoid standing waters, which PIC and ESMU will verify in advance and confirm during implementation • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to the relevant standards provided by Sindh EPA, before it being discharged into recipient water bodies. • Ensure the internal roads/hard surfaces in the construction yards/construction camps that generate has storm water drainage to accommodate high runoff during downpour and that there is no stagnant water in the area at the end of the downpour. • Construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem. • Reduce infiltration of contaminated drainage through storm water management design
Ponding of water	Health hazards due to mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position

ECOP 5: SOIL QUALITY MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	The Contractor shall: • Strictly manage the wastes management plans proposed in ECoP1 and storage of materials in ECoP2 • Construct appropriate spill contaminant facilities for all fuel storage areas • Establish and maintain a hazardous materials register detailing the location and quantities of hazardous substances including the storage, use of disposals • Train personnel and implement safe work practices for minimizing the risk of spillage • Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site • Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall: • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds

ECOP 6: EROSION AND SEDIMENT CONTROL

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils that affects the growth of vegetation which causes ecological imbalance.	The Contractor shall: • Reinstate and protect cleared areas as soon as possible. • Mulch to protect batter slopes before planting • Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turfings/tree plantations
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, (ii) destruction of aquatic environment in nearby lakes, streams, and reservoirs caused by	The Contractor shall: • Locate stockpiles away from drainage lines • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds • Remove debris from drainage paths and sediment control structures • Cover the loose sediments and water them if

	erosion and/or deposition of sediment damaging the spawning grounds of fish, and (iii) Destruction of vegetation by burying or gullying.	required • Divert natural runoff around construction areas prior to any site disturbance • Install protective measures on site prior to construction, for example, sediment traps • Control drainage through a site in protected channels or slope drains • Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion • Observe the performance of drainage structures and erosion controls during rain and modify as required.

ECOP 7: BORROW AREAS DEVELOPMENT AND OPERATION

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	In case, the borrow pits developed by the Contractor, there will be impacts on local topography, landscaping and natural drainage.	The Contractor shall: • Reuse excavated or disposed material available in the project area to the maximum extent possible • Identify borrow pits in consultation with the local governments and PIC as well as IA. • Obtain the borrow material from: • barren land or land without tree cover outside the road reserve; • Do not dug the borrow pits within 5m of the toe of the final section of the road embankment. • Dig the borrow pits continuously. Ridges of not less than 8 m widths shall be left at intervals not exceeding 300 m and small drains should be cut through the ridges to facilitate drainage • Slope the bed level of the borrow pits, as far as possible, down progressively towards the nearest cross drain, if any, and do not lower it than the bed of the cross-drain, to ensure efficient drainage. . Follow the below for restoration of borrow areas are: • Return stockpiled topsoil to the borrow pit if is used for agriculture; • Return stockpiled topsoil to the borrow pit and all worked areas to be stabilized through re-vegetation using local plants. • Control at each site by ensuring that base of the borrow pit drains into a sediment trap prior to discharging from the site.

ECOP 8: AIR QUALITY MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall: • Fit vehicles with appropriate exhaust systems and emission control devices, in compliance with the NEQS. Maintain these devices in good working condition. • Operate the vehicles in a fuel efficient manner • Cover haul vehicles carrying dusty materials moving outside the construction site • Impose speed limits on all vehicle movement at the worksite to reduce dust emissions • Control the movement of construction traffic • Water construction materials prior to loading and transport • Service all vehicles regularly to minimize emissions • Limit the idling time of vehicles not more than 2 minutes
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall: • Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. • Focus special attention on containing the emissions from generators • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites • Service all equipment regularly to minimize emissions
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard.	• Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds) • Minimize the extent and period of exposure of the bare surfaces • Reschedule earthwork activities or vegetation clearing activities, where practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site • Restore disturbed areas as soon as practicable by vegetation/grass-turfing • Store the cement in silos and minimize the emissions from silos by equipping them with filters.

EC0P 9: Noise and Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall: • Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall: • Appropriately site all noise generating activities to avoid noise pollution to local residents • Use the quietest available plant and equipment • Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines) • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures • Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall: • Notify adjacent residents prior to any typical noise event outside of daylight hours • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions • Employ best available work practices on-site to minimize occupational noise levels • Install temporary noise control barriers where appropriate • Notify affected people if noisy activities will be undertaken, e.g. blasting • Plan activities on site and deliveries to and from site to minimize impact • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas

ECOP 10: PROTECTION OF FLORA

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall: • Reduce disturbance to surrounding vegetation • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • Make selective and careful pruning of trees where possible to reduce need of tree removal. • Control noxious weeds by disposing of at designated dump site or burn on site. • Clear only the vegetation that needs to be cleared in accordance with the plans. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill and construction of diversion roads. • Do not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work caps to prevent fuel wood collection

ECOP 11: PROTECTION OF FAUNA

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,	The Contractor shall: • Limit the construction works within the designated sites allocated to the contractors • check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal
	Impact on migratory birds, its habitat and its active nests	The Contractor shall: • Not be permitted to destruct active nests or eggs of migratory birds • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and located active nests • Minimize the release of oil, oil wastes or any other substances harmful to migratory birds to any waters or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall: • Restrict the tree removal to the minimum required. • Retain tree hollows on site, or relocate hollows, where appropriate • Leave dead trees where possible as habitat for fauna • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition.
Construction camps	Illegal poaching	• Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching.

ECOP 12: PROTECTION OF FISHERIES

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from boats and disposal of wastes into the river	The Contractor shall: • Ensure that boats used in the project are well maintained and do not have oil leakage to contaminate river water. • Contain accidental spillage and make an emergency oil spill containment plan to be supported with enough equipment's, materials and human resources • Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river
Construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	The Contractor shall: • follow mitigation measures proposed in ECoP 3 : Water Resources Management and ECoP 4: Drainage Management

ECOP 13: ROAD TRANSPORT AND ROAD TRAFFIC MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall: • Prepare and submit a traffic management plan to PIC and IA for their approval at least 30 days before commencing work on any project component involved in traffic diversion and management. • Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary diversions, necessary barricades, warning signs/lights, road signs. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Sindh and Pakistani Traffic Regulations. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Urdu: • Location: chainage and village name • Duration of construction period

		• Period of proposed detour/alternative route • Suggested detour route map • Name and contact address/telephone number of the concerned personnel • Name and contact address/telephone number of the Contractor • Inconvenience is sincerely regretted.
	Accidents and spillage of fuels and chemicals	• Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate road traffics/transport vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit

ECOP 14: CONSTRUCTION CAMP MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall: • Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the IA for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters. • Code of Conduct to be prepared by the Contractor, signed by his workers and approved by the PD.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation	Contractor shall provide the following facilities in the campsites: • Adequate housing for all workers

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	facilities will increase pressure on the local services and generate substandard living standards and health hazards.	• Safe and reliable water supply. Water supply from tube wells that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. Female toilets should be clearly marked in language understood by the persons using them to avoid miscommunication. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient. • Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon. • Provide child crèches for women working on the construction site. The crèche should have facilities for dormitory, kitchen, indoor/outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall: • Ensure proper collection and disposal of solid wastes within the construction camps • Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment's/vehicles needed. • Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition. Cover the bed of the pit with impervious layer of materials (clayey, thin concrete) to protect groundwater from contamination. • Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall: • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Make available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protecting of biodiversity in the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall: • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Initial health screening of the laborers coming from outside areas

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis • Complement educational interventions with easy access to condoms at campsites as well as voluntary counseling and testing • Provide adequate drainage facilities throughout camps to ensure that disease vectors habitats (stagnant water bodies, puddles) do not form. Regular mosquito repellant sprays in monsoon. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	The Contractor shall: • Prepare an occupational health and safety plan for ESMU review and approval. This should include job hazard analysis, where risks for each job position are identified and mitigation eg. PPE, barriers, changes to design, working near water, at heights, with electricity, in confined spaces, etc. are specified. • Conduct OHS training and first aid to staff as a mandatory activity. Locate nearest emergency care facility and keep first aid supplies in the working areas and in the camps • Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Maintain register to keep track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing/site office. Ensure that these houses/rooms are of sound construction and capable of withstanding storms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camps

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall: • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases as the work decreases (do not wait for completion of the entire work. • Give prior notice to the laborers before demolishing their camps/units • Maintain the noise levels within the national standards during demolition activities • Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site by IA. • Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. • Restore the site to its original condition or to an agreed condition with the landowner defined prior to the commencement of the works (in writing). • Not make false promises to the laborers for future employment in O&M of the project.

ECOP 15: CULTURAL AND RELIGIOUS ISSUES

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall: • Communicate to the public through community consultation and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction.

		• Do not block access to cultural and religious sites, wherever possible • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) should there be any mosque/religious/educational institutions close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious institution. • Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given by the IA • Provide separate prayer facilities to the construction workers. • Show appropriate behavior with all construction workers especially women and elderly people • Allow the workers to participate in praying during construction time • Resolve cultural issues in consultation with local leaders and supervision consultants • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters

ECOP 16: WORKER HEALTH AND SAFETY

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise,	The Contractor shall: • An Occupational, Health and Safety Plan shall be prepared by the Contractor and submitted to ESU of PIC and ESMU for review and approval. The plan shall be approved by the ESU of PIC. The OHS shall include a job hazard analysis and safety precautions (like PPEs, barriers, change to design) and make ensure use of the PPEs and other measures during construction time. • The contractor will train his workers and project management staff in (not limited to) first aid

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases), (ii) risk factors resulting from human behavior (e.g. STD and HIV) and (iii) road accidents from construction traffic.	and basic infection control at work, transportation and handling of hazardous wastes, use of PPEs, fire safety etc. • Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national acts and rules of the Government of Sindh • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job • Appoint an environment, health and safety manager to look after the health and safety of the workers • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters. •
	Child and pregnant labor	The Contractor shall: • not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977).
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	• The contractor will arrange first aid facilities at the site. A trained first-aider should be present at the site and arrangements made with a local doctor to be available on call. Appropriately equipped first-aid stations should be easily accessible throughout the place of work • Contact numbers and location of the nearest

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		healthcare/emergency center should be displayed at the worksite. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules • Provide adequate lighting in the construction area and along the roads
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECoP 14 Construction Camp Management: • Adequate ventilation facilities • Safe and reliable water supply. Water supply from deep tube wells that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECoP 2 • Solid waste collection and disposal system in accordance with ECoP1. • Arrangement for trainings • Paved internal roads. • Security fence at least two m height. • Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal	• The contractor shall provide a reasonable ratio of toilets for all workers at the construction sites. • Location of toilet facilities should be at least six meters away from storm drain system and surface waters. These toilets should be

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	hygiene.	cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. Alternatively, each toilet facility should have septic tank and soaking pit. • Contractor should provide clean drinking water facilities to the construction workers at all the construction sites.
Other ECoPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECoPs to reduce health risks to the construction workers and nearby community: • ECoP 2: Fuels and Hazardous Substance Management • ECoP 4: Drainage Management • ECoP 8: Air Quality Management • ECoP 9: Noise and Vibration Management • ECoP 13: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall: • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Commence the malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.