Pakistan

Sindh Resilience Project (SRP)

Executive Summary

Environmental and Social Impact Assessment

Government of Sindh
Sindh Irrigation Department
and
Provincial Disaster Management Authority

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List of Acronyms

ARAP	Abbreviated Resettlement Action Plan
BP	Bank Policy
BU	Bughar Ucheto
CoI	Corridor of Impacts
DACREP	Disaster and Climate Resilience Enhancement Project
DC	Deputy Commissioner
DCRIP	Disaster and Climate Resilience Improvement Project
EC	Electrical Conductivity
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
GoS	Government of Sindh
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
ISDS	Integrated Safeguards Data Sheet
IUCN	International Union for Conservation of Nature
MEAs	Multilateral Environmental Agreements
MS	Mulchand Shah-Bunder
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NGO	Non Government Organization
OP	Operational Policy
PAP	Project Affected Person
PC-I	Pakistan Planning Commission Form – 1 Appraisal of Development Project
PCC	Public Complaint Center
PCRWR	Pakistan Council for Research in Water Resources
PD	Project Director
pH	Power of Hydrogen
PIC	Project Implementation Consultants
PID	Project Information Document
PKR	Pakistani Rupee
PDMA	Provincial Disaster Management Authority
PEPA	Pakistan Environmental Protection Act
PSC	Project Steering Committee
RAP	Resettlement Action Plan
SAR	Sodium Adsorption Ratio
SEPA	Sindh Environmental Protection Agency
SEPC	Sindh Environmental Protection Council
SH	Sunda Hilaya
SID	Sindh Irrigation Department
SIDA	Sindh Irrigation and Drainage Authority
SRP	Sindh Resilience Project
WB	World Bank
WWF	World Wildlife Fund

1 Introduction

The Government of Sindh (GoS) through the Sindh Irrigation Department (SID) and Provincial Disaster Management Authority (PDMA) intends to undertake World Bank financed Sindh Resilience Project (SRP)[1] in various parts of Sindh Province. Physical interventions under SRP include i) rehabilitation/improvement of existing earthen embankments along River Indus; ii) construction of small rainwater recharge dams in the water-scarce areas of the province; and c) construction of PDMA office building. During the first year of the SRP implementation, GoS intends to rehabilitate and improve Mulchand-Shah Bunder (MS), Sunda Hilaya (SH), Bughar-Ucheto (BU) and Indo embankments along Indus River.

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; the ESIA includes an Environmental and Social Management Plan (ESMP). In addition, an Environmental and Social Management Framework (ESMF) 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. An executive summary of the environmental and social assessment is presented in this document.

1.1. 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.[2] 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 Government of Sindh is planning to initiate a project to enhance disaster and climate resilience; increase the technical capacity of Government entities to manage natural disasters and climate variability; construction of small dams and support restoration of flood protection infrastructure on Indus River. The Sindh Resilience Project (SRP) will be financed by World Bank and will be completed in five year period. The location plan of SRP project is shown in **Figure 1**.

1.2. Aims and Objectives of the Study

The main aims and objectives of this environmental and social assessment are to:

- Provide information for decision-making on the environmental and social consequences of proposed project interventions;
- Establish an environmental and socioeconomic baseline;
- Determine potential environmental and social impacts and assess these in terms of severity, magnitude and timescale;
- Devise mitigations to address the identified environmental and social impacts;
- Promote environmentally and socially sound and sustainable development through the identification of appropriate enhancement and mitigation measures and monitoring programs that will be required to ensure development of the project without significant adverse impacts;
- Meet the provincial, national, international and WB standards;
- Public consultation and information disclosure, including amongst the local community;
- Preparation of ESIA (including ESMP) and ESMF, and
- Determine tentative costs for implementation of the ESMP.

[1] The project was initially called Disaster and Climate Resilience Project (DACREP).

[2] Sourced from the World Bank SRP PID/ISDS.

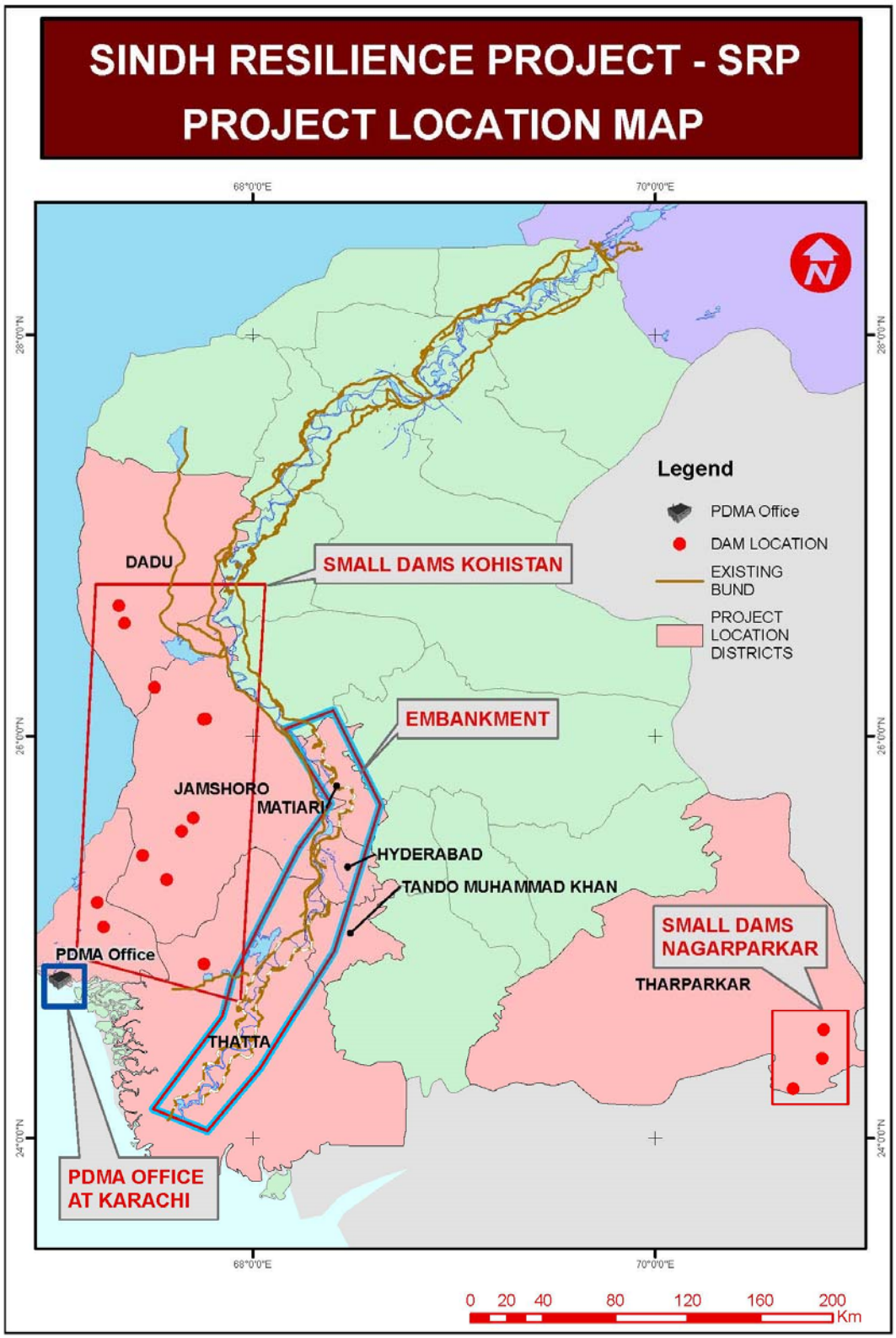

Figure 1: Location of the SRP Project Area

1.3. Study Scope

The ESIA covers the rehabilitation and improvement of MS, SH, BU, and Indo embankments along the Indus River to be undertaken during the first year of SRP implementation whereas the ESMF covers the remaining subprojects to be undertaken under SRP during later years. The scope of the study includes but not limited to:

- Collection of baseline primary and secondary information on physical, biological and socio-economic conditions prevailing in the subproject study area;
- Undertake stakeholder consultations;
- Environmental and social impact assessment of subproject interventions;
- Develop mitigation measures for impacts identified;
- Prepare environmental and social management plan including monitoring program and institutional strengthening program;
- Design and implement public awareness program;
- Prepare cost estimates for implementation of ESMP.

1.4. Study Methodology

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) was also reviewed and followed where relevant.

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).

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.

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 ESA and ESMP preparation in the area of each sub-project through Focus Group Discussions and key Informant Interviews.

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. Primary data was collected for the subproject to be undertaken during the first year to prepare detailed baseline description of the subproject area.

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

ESIA and ESMF Compilation. The last activity of the study was compilation of ESIA and ESMF covering process and outcome of the earlier steps of the study described above.

1.5. Study Team

The environment and social/resettlement team that has prepared this ESMP include Mr. Sardar M. Kakar (Team Leader and Environment Specialist), Mr. Niamatullah Khan (Senior Sociologist and Resettlement Expert), Mr. Allah Bux (Resettlement Expert), Mr. Naeem Samoon (Environmentalist), Mr. Farooq Memon (Environmentalist), Mr. Munir (Environmentalist), Mr. Attaullah Pandrani (Ecologist), and Ms. Robina (sociologist).

2 Policy, Legal and Administrative Framework

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.

2.1. Pakistan Institutional Framework

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

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.

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.

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) [3]. 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; and Projects involving trans-country or trans-province impacts. The responsibility for the review and approval of all other Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs) was delegated to the relevant Provincial Environmental Protection Agencies.

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.

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.

Sindh Irrigation Department (SID) and Sindh Irrigation and Drainage Authority. The Sindh Irrigation Department is one of the project proponents of SRP and in particular for the implementation of the component-2. 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. An Environment Management Unit (EMU) was established in SIDA under National Drainage Program in 2004 and further strengthened under the Sindh Water Sector Improvement Project to support implementation of ESIAs/ESMF/ESMPs 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 Resettlement Action Plan (RAP), the SRP may be assisted by the EMU-SIDA.

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

Provincial Disaster Management Authority (PDMA). PDMA is one of the implementation agencies of the SRP and is responsible for implementing policies and plans for disaster management in the Province. The PDMA is also responsible: (a) To formulate the provincial disaster management; (b) Coordinate and monitor the implementation of the National Policy, National and Provincial Plans; (c) Examine the vulnerability of different parts of the Province to different disasters and specify prevention or mitigation measures; (d) Lay down guidelines to be followed for preparation of disaster management plans by the Provincial Departments and District Authorities; (e) Evaluate preparedness at all governmental or non-governmental levels to respond to disaster and to enhance preparedness; (f) Coordinate response in the event of disaster; (g) Give directions to any Provincial department or authority regarding actions to be taken in response to disaster; (h) Promote general education, awareness and community training in this regard; (i) Provide necessary technical assistance or give advice to district authorities and local authorities for carrying out their functions effectively; (j) Advise the Provincial Government regarding all financial matters in relation to disaster management; (k) 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; (l) Ensure that communication systems are in order and disaster management drills are being carried out regularly; and (m) Perform such other functions as may be assigned to it by the National or Provincial Authority

2.2. National Environmental Policies and Guidelines

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; and Preserving the cultural heritage.

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; and 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.

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.

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.

2.3. Applicable Laws

The federal and provincial laws applicable to the SRP project 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, 1894
- Employment of Child Act,1991
- Sindh Wildlife protection Ordinance,2001
- Sindh Forest Act,2012
- Sindh Fisheries Ordinance 1980.

2.4. 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 1** and further discussed in the subsequent sections.

Table 1: World Bank Safeguard Policies Triggered

	Subject	Policy Reference	Triggered	Remarks
1	Environmental Assessment	OP/BP/GP 4.01	✔	As per PID/ISDS of the SRP Project, 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.
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 under SRP fall 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 WB to undertake a technical review of sites.

2.5. 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.

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.

3 Project Description

3.1. 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 1**.

3.2. Project Description

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 5 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 criteria4 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 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.

[4] 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.

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.

3.3. Project Area of Influence

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.

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 case of dam failure, development of access routes, borrow areas, contractor's camps, and disposal areas.

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.

3.4. Location of the First-Year Sub-Project

The location of subproject to be undertaken during the first year of SRP implementation (MS, SH, BU, and Indo embankments) is shown in **Figure 2**. The MS embankment is located in District Sajawal while SH, BU, and Indo embankments are located in Thatta District.

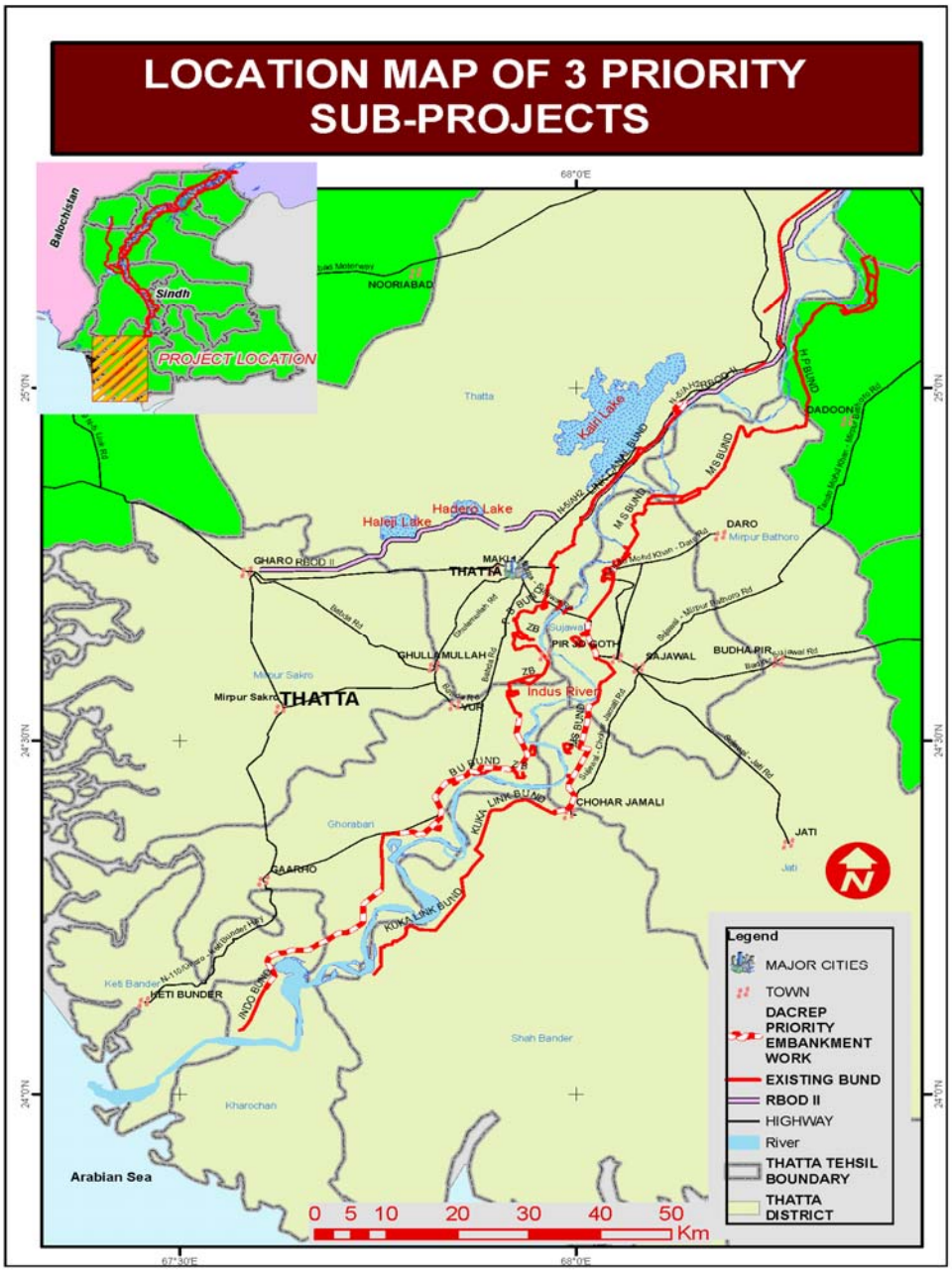

Figure 2: Location of the Embankments Sub-project

3.5. Existing Condition and Problems of the Sub-Project

The Indus flood protection bunds (levees / embankment) are designed, constructed and maintained according to Sindh Irrigation Bund Manual. The bunds are constructed of soils from river bed which are mostly sandy silts and clays. In many reaches fill and foundation material is highly erosive. The bund crest is kept 20 feet wide with a freeboard of 4 to 5 feet above the maximum observed flood level slopes are quite gentle the upstream face is protected with stone pitching. Upstream stone aprons (launching aprons) are provided in the reaches where river bed erosion is expected. There is no slope protection on the downstream face. The embankment face damages during high floods. Animal and human activity is other source of disturbance. The typical cross-section of embankment indicating project works is shown in **Figure 3**.

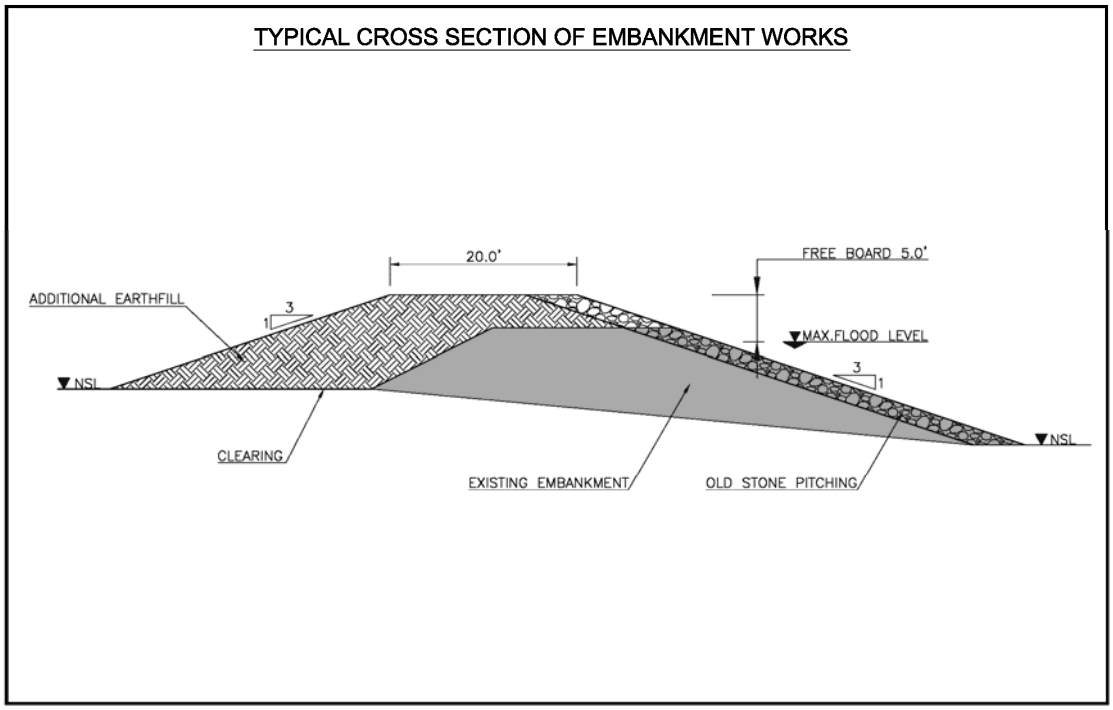

Figure 3: Typical Cross-Section

Mulchand-Shah Bunder (MS) Bund. MS Bund starts at end of Hajipur bund and stretches to length of 58/2 mile near Chuhar Jamali. Mulchand was renowned forest in Katcha (river flood plain) in which now land is heavily cultivated and forest is no more. Throughout its history the embankment has remained under severe threat. Its various portions are totally eroded and new bunds named 1st Surjani and 2nd Surjani were constructed from mile 24/7 to 29/2 and Gungri Chord Bund at mile 44/4 ends 45/3. Monarki site has remained under severe erosion attack many years. Geographically due to hills on right side up to Thatta town Indus has tendency to exert its pressure on left side. MS Bund is lying in the same location which is called wind corridor. Wind blows from south west to east and plays great have with earthen bunds during floods. As already described there was a thick forest at these locations but now there is only barren area and in case of high flood a wide body of water is created where huge wave wash is developed due to wind action. Recently when water level was maximum during 18 to 23 August 2015 and gusty wind blow for many days, continuously, serious situation was created all along earthen bunds. Dashing waves eroded the bund severely from mile 29/2 to 29/5, 36/0 to 40/0, 45/5 to 49/5, 54/0 to 55/4 and 57/0 to 58/2, pre flood fighting was carried throughout in these reaches where wind erosion occurred. Thousands of labor was engaged and abklani material was used to control the situation. At these bunds are heavily eroded and thus need stone raising, strengthening and stone pitching protection.

Sonda - Hilaya (SH) Bund. The SH Bund is an important bund line as directly under heavy thrust of river water. The water touched the bund all the way during flood 2015. The Sonda Hilaya Bund is the first line of defense, which protects National High way, Keenjhar Lake, Link Canal, Sonda Distributary and bridges as well as valuable government and private property from the river flood. During flood 2015, when peak discharge was passing from dated August 18 to 21, 2015 the seepage and leakage observed at outside slope of SH bund at different places, which damaged almost the outer slope from mile 0/4 to 3/2, resultantly acute emergency was created. All the efforts were made i.e. stone dumping, earth work and providing Manglies (coffer dams / ring bunds) at different places to control the situation from any mishap or loss to bund. Due to direct current of flow all along the SH Bund during the flood 2015, serious situation was faced along mile 1/6 to 2/1 where the launching of stone apron was observed and remained only 8 ft. instead of 38 ft. Therefore dumping of stones was started along the reach on emergency basis day and night times to restrict it from further launching and keep it away from the body of Bund. Also stone pitching was damaged from mile 1/0 to 3/0. There is need to widening of bund where it is eroded, repair of damaged stone pitching and recoupment of stone apron.

Baghar-Uchito (BU) Bund and Indo Bund. The Baghar-Uchito (BU) bund is located on right side of Indus just below Thatta, city to Babda town. During flood the BU and Indo Bund faced severe wave wash actions that

started eroding slopes of the Bunds. Luckily the tide was low and the wind was in opposite direction. The extent and magnitude of the damage was enormous that slopes of the Bunds converted to 3:1 and became vertical 2 to 5 ft. Consequently these Bunds become vulnerable and susceptible to upcoming floods. Wave wash action as assessed by the SID, has significantly inflicted bruises to Bund slopes on different reaches of the BU and Indo Bunds.

3.6. Proposed Interventions under Subproject

The rehabilitation and strengthening of embankments mostly include following type of works:

- Widening of bunds in reaches where embankments were eroded during past floods
- Reconstruction of stone pitching with gravel bedding
- Recouping of stone aprons
- Construction of gabion groins
- Construction of huts (landhis) for inspection and monitoring staff.

MS Bund. The PC-I of the MS Bund sub-project, prepared by Irrigation Department Government of Sindh proposes the following interventions: a) Stone Pitching on reaches from Mile 29/2 to 19/5; 36/0 to 40/0; and 45/0 to 58/2; and b) Raising and strengthening of MS Bund from Mile 55/4 to 58/2.

SH Bund. In order to cope with the problem described earlier, it is proposed for strengthening, widening and raising of Bund and recouping of stone apron, so that upcoming flood may pass safely and to save this important Bund from future flood damages. The proposed works on this embankment include stone apron along bund from 1/6 to 2/1 Miles and repair to damaged stone pitching along bund from 1/0 to 3/0 miles (different reaches) and widening of bund from 0/4 to 3/2 miles.

BU and Indo Bunds. In order to cope with the problems with the existing structure as described earlier, it is earnestly essential to provide stone pitching along above badly affected miles of BU and Indo Bund so that upcoming flood may pass safely and causing no damage to Bunds. The rehabilitation works for the BU Bund are stone pitching along bund from miles 13/3 to 14/7, 15/5 to 16/1, 16/2 to 16/4, 18/2 to 18/7, 19/0 to 20/7, 21/4 to 23/4, 23/7 to 24/1, 24/1 to 24/2, 28/0 to 29/6 , 30/3 to 32/1, 33/5 to 33/6, 35/2 to 35/3. The works for Indo Bund are to provide stone pitching along bund from miles 0/0 to 1/0 and 5/0 to 10/0.

3.7. Construction Materials

The quantities of the main construction materials are given in the **Table 2** below. The fill for earthwork will be obtained from uncultivated land from river side. The sandy and organic soils shall be avoided. The stones for pitching and launching aprons shall be obtained from limestone quarries of Chilya and Khanote. The gabion meshes shall be obtained from Karachi.

Table 2: Summary of Major Construction Materials

Material	SH Bund		BU and Indo Bund		MS Bund	
	Quantity	Source	Quantity	Source	Quantity	Source
1. Earth fill	-	-	16,519,442 (cft)	Borrow area from river side	3,646,335 (cft)	Borrow area from river side
2. Stone for pitching and apron						
(i) Pitching	1,264,657 (cft)	Chilya	754,380 (cft)	Chilya quarry	548,730 (cft)	Khanote Chilya
(ii) Apron	-	-		Chilya quarry		Khanote Chilya
(iii) Gabion	466,072	Chilya	4,318,222		3,213,753	
Gabion Cages	466,072	From Karachi	-	-	-	-

3.8. Construction Schedule

The works on each sub-project are schedule to be completed in six months period. The works in these sub-projects will be carried when flows in river are low.

3.9. 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 ESIA, ESMP and RAP implementation are described below.

Project Implementation Agencies (IAs). The overall responsibility for SRP implementation will rest with the IAs, ie, SID and PDMA. The IAs will designate Project Directors (PDs) to lead the 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 persons within its organization to manage safegjuards aspects of the SRP.

Project Implementation Consultant (PIC). The PIC is to be engaged by the project proponents (SID and PDMA) and shall be responsible for monitoring of the ESMP and RAP implementation during execution of the Works under the SRP and shall prepare periodic reports. 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: a) carry out environmental assessment and prepare the required documents (eg, ESMPs), review and update the available documents relevant to the Project (including ESIA, ESMPs and RAP) and those to be prepared by the Contractor; and b) Monitor the implementation of ESMPs and RAP on a regular basis during execution of civil works by the Contractor.

Environmental/Social Monitoring and Evaluation (ESMEC) Consultant. The ESMEC shall be an independent body responsible for external environmental monitoring for the SRP Project on behalf of IAs. The ESMEC will have environmental and social experts and shall carryout intermittent third party monitoring of the project.

Construction Contractors. The contractor will be responsible for implementing the ESIA 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.

4 Environmental and Social Baseline

4.1. Overview of Entire SRP Area

Geography. Sindh can be divided into four distinct parts topographically: (a) Kirthar range on the west; (b) a central alluvial plain bisected by the Indus River; (c) a desert belt in the east; and (d) the Indus delta in the South. The Indus River embankment sub-projects covered in this ESMP are falling in the Indus Delta zone. This area is consisting of the distributaries of the Indus River which starts spreading out near Thatta across the deltaic flood plain in the sea. The even surface is marked by a network of flowing and abandoned channels. A coastal strip 10 to 40 kilometers wide is flooded at high tide and contains some mangrove swamps. Most of the SRP Project area is seismically falling in Zone 2A and Zone 2B5. A small portion of Thar District is falling in Zone 4 6which 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.

Floods. Floods in the Sindh province are common along the River Indus but are very uncommon in the areas away from the river. The 2010 floods in Pakistan began in late July 2010, resulting from heavy monsoon rains in the Khyber Pakhtunkhwa, province affecting the Indus River basin. Approximately one-fifth of Pakistan's total

[5] 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).

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

land area was flooded affecting about 20 million people, mostly by destruction of property, livelihood and infrastructure, with a death toll of close to 2,000. The monsoon rainfall of 2010, over the region was highest since 1994 and ranked second highest during last 50 years of period. Most of the damages in the Sindh province were limited to low lying areas along the Indus River. During August-September 2011 heavy rains in the Sindh province destroyed/damaged 73% of crops and 67% of the food stocks. Crop destruction has wiped out farmer's present and future sources of food and income, 300 people have so far reported dead and more than 7 million are affected directly and indirectly. According to different reports over five hundred thousand houses have been destroyed and another million are damaged. Crops of cotton, banana, dates, chili and sugarcane over a cultivated area of 2.8 million acres have been destroyed or affected.

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 has 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 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.

4.2. Description of Subproject Area

Land use. The detailed land use map of subproject area prepared through ArcGIS, Google Earth and field inspection is given in **Figures 4** to **7**.

The sub-project area is used by three main groups: herdsmen, fishermen and cultivators. Goats, sheep, water buffalo and some cattle roam widely over the area. Settled agriculture is the most important land use and the chief driver of the economy of Sindh. The main agricultural crops are banana, betel leaf, wheat, cotton, rice, sunflower and sugar cane together with vegetables grown for local consumption. There are two main cropping seasons; *Kharif* (summer) and *Rabi* (winter). The Kharif season starts from April-May and ends in October-November while the Rabi starts from November-December and ends in April-May. The banana is major fruit in the area while mango is also produced on small scale in the project areas.

Most trees have a wide range of economic uses such as timber, fodder and for building and boat making purposes. Important species include Acacia nilotica, Eucalyptus sp, Melia indica, Zizyphus jujube, Ficus religiose, Syzygiun, Cumini, Cordia dicotoma, Megnifera indica and Phoenix dectylifere.

Indus River occupies most of the project area of activities. It consists of active channels and other creeks in which water flows during high flow periods.

Land use in the sub-project area can be broadly categorized as: a) Indus River (active channel and creeks); b) Riverine scrublands and agriculture; c) Agriculture land; d) River Banks; e) Stagnant water bodies; f) Settlements including villages and associated structures such as agricultural sheds, places of worship, graveyard, government offices and other community buildings; g) Irrigation and drainage network; h) Roads (unsealed tracks and paved road); and j) Uncultivated/Wasteland that includes areas which have been rendered unusable for agriculture due to water logging, salinity, or due to other causes.

Air quality. The project area consists of a band of wetland parallel to the Indus River embankment surrounded by a very large area cultivated area in the east and west. The existing embankments do not pass through any large built up or major industrial areas and there are no major road networks nearby. Therefore the air quality is well within national and international standards. The only problem is the occasional summer dust storms which increase the concentration of dust particles in the air.

Noise. The ambient noise level was recorded in the sub-project area and found within permissible limit of NEQS and WHO standards. The details are given in **Table 3**.

Table 3: Ambient Noise Levels in the Project Area

Name of Bund	Location-I		Location-II		Location-III	
	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)
MS Bund	N 24°44'49.0" E 68°02'50.7"	39	N 24°36'58.0" E 68°01'40.9"	41		
SH Bund	N 24°56.654' E 68°06.812'	41	N 24°57.396' E 68°07.364'	42	N 24°57'39.6" E 68°07'32.7"	40
BU Bund	N 24°32'16.0" E 67°55'46.1"	34	N 24°26'45.9" E 67°50'59.9"	36		
Indo Bund	N 24°17'18.4" E 67°45'09.4"	35	N 24°13'52.6" E 67°45'51.1"	38	N 24°21'13.2" E 67°45'16.4"	36

Soils. The soil textures in the sub-project area are generally clay loam while clay and silt loam also exist. These sands are found in river bed. The test reveals that all the parameters are within permissible limit except Sodium Adsorption Ratio (SAR) that is exceeding the standards.

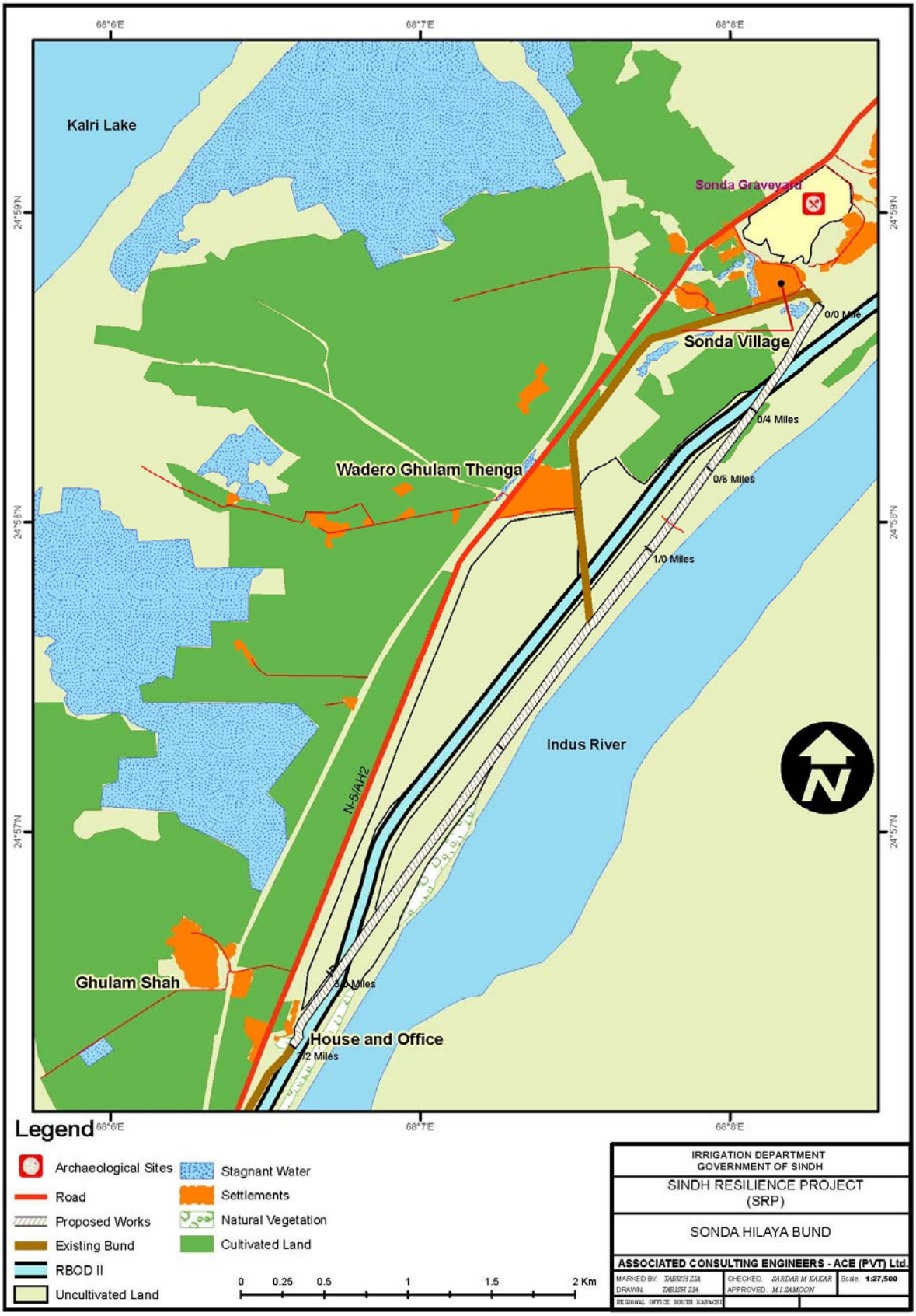

Figure 4: Land Use Map of Sonda-Hilaya (SH) Bund

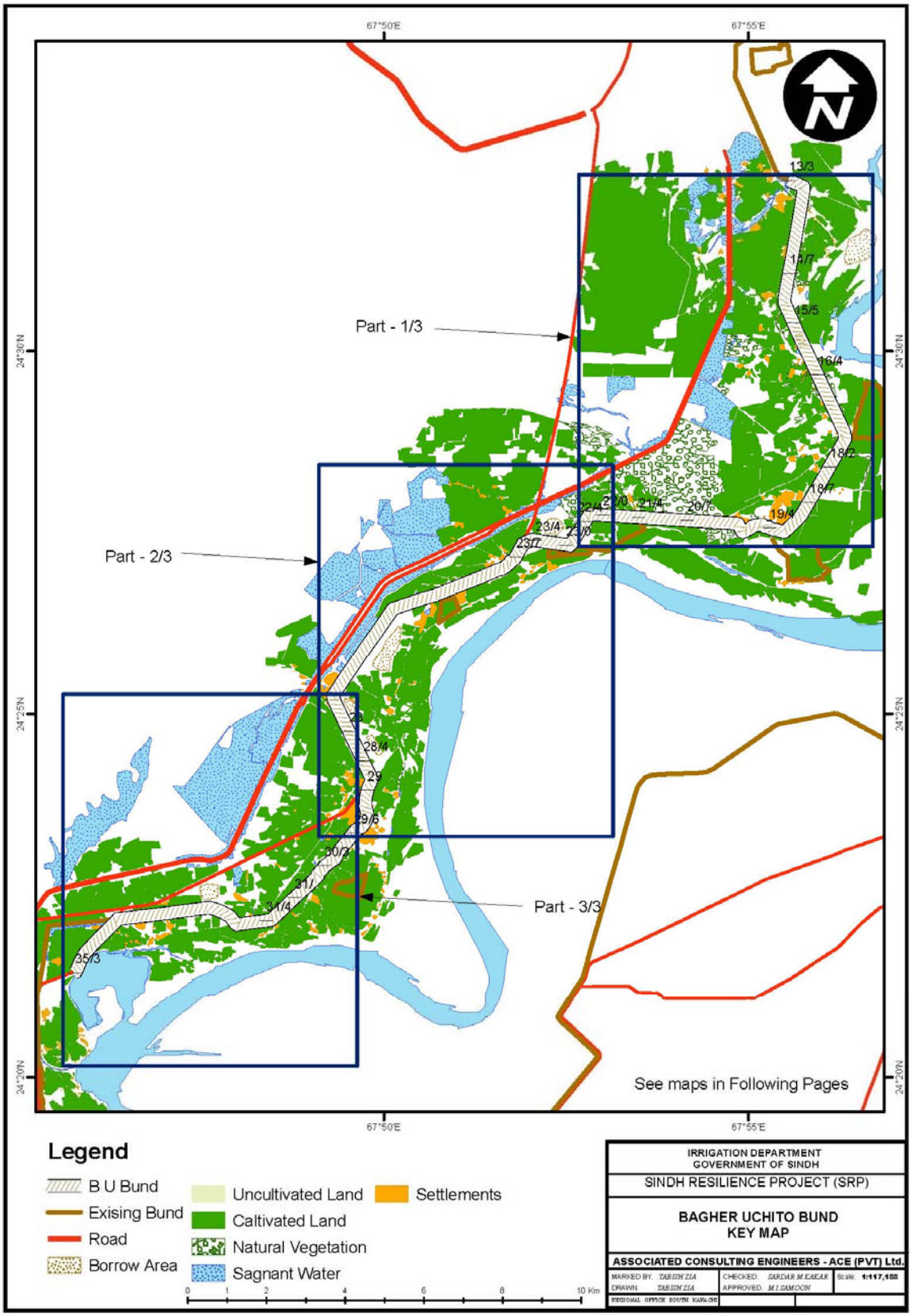

Figure 5: Land Use Map of Baghar Uchito (BU) Bund

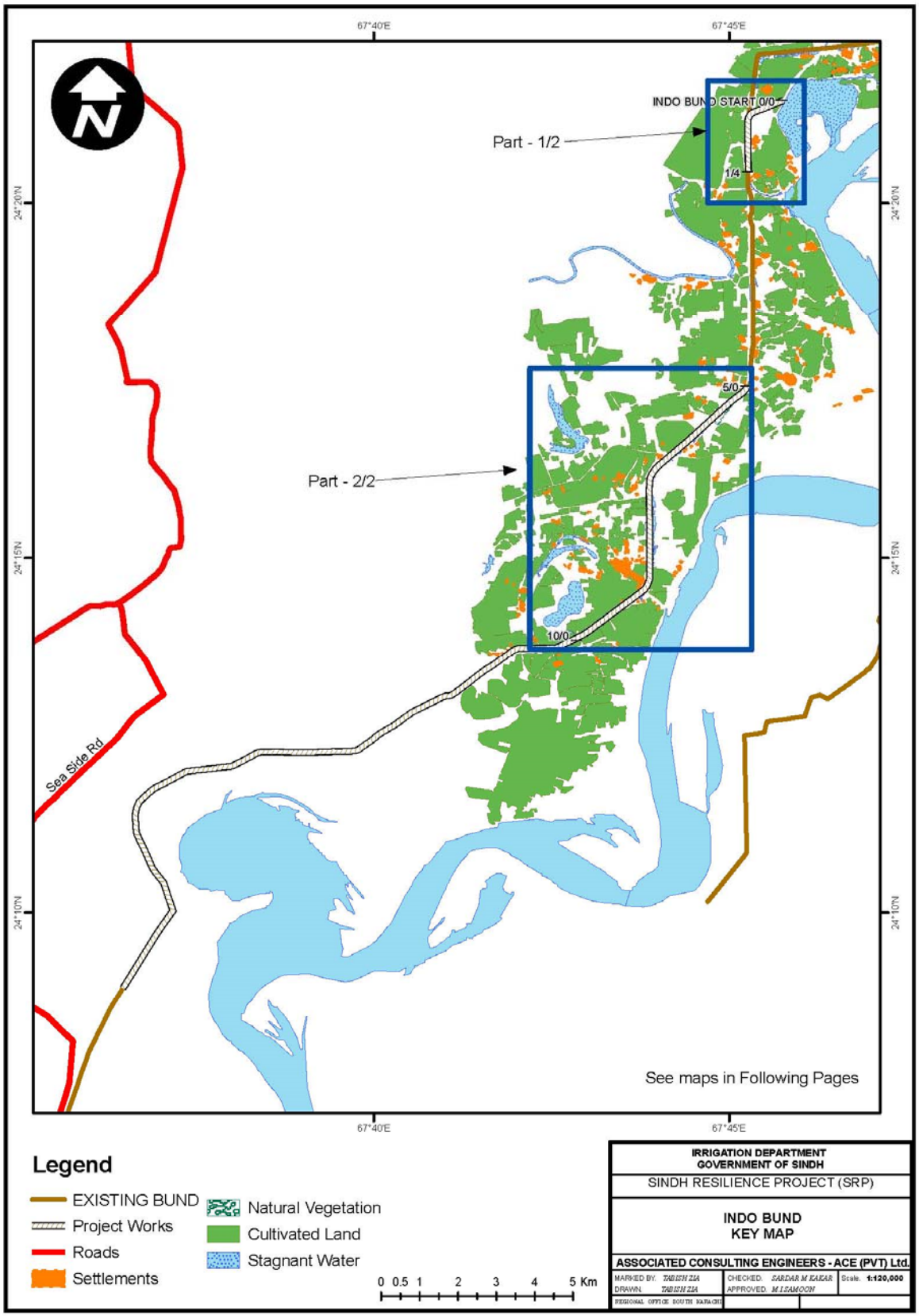

Figure 6: Land Use Map of Indo Bund

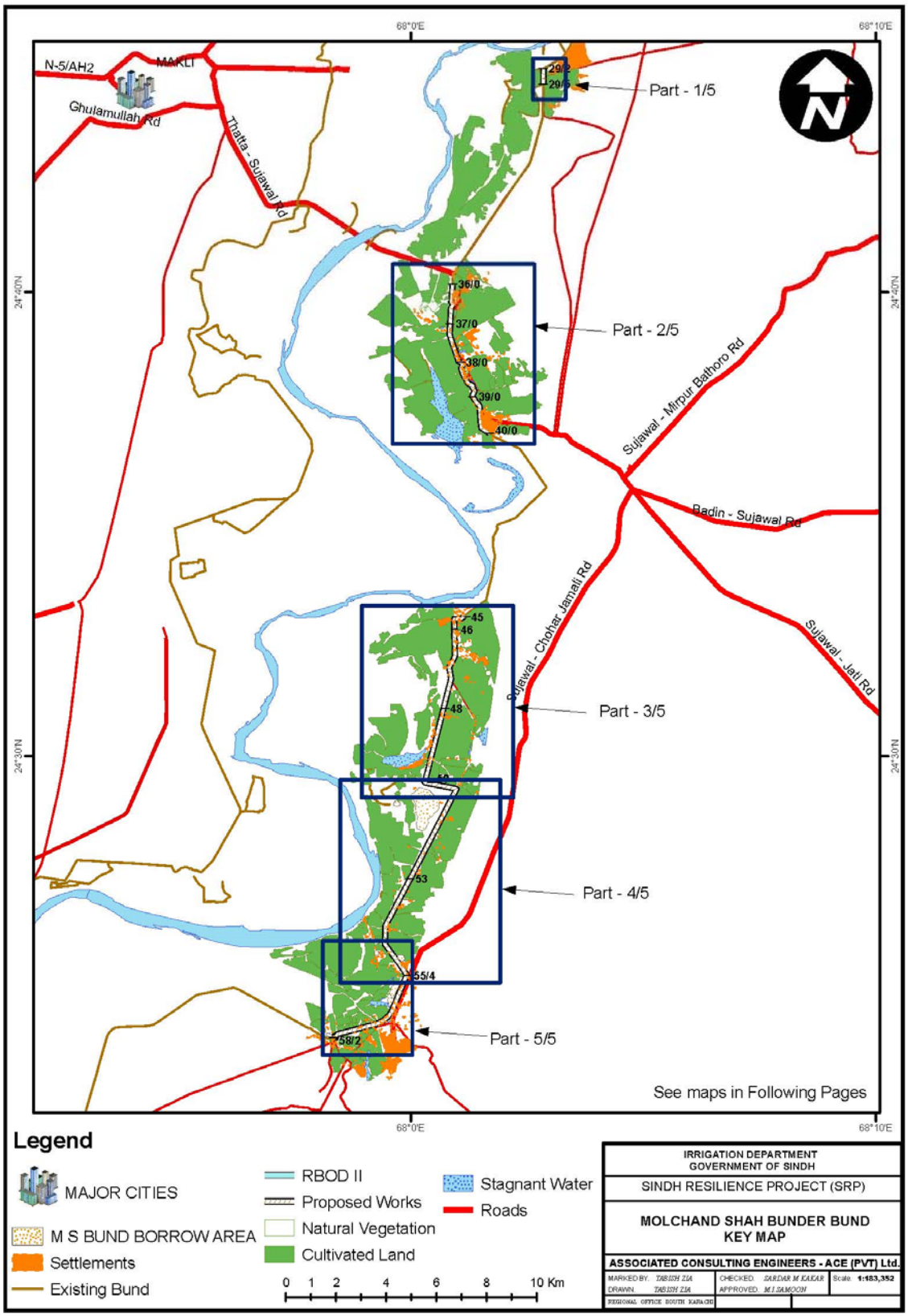

Figure 7: Land Use Map of Mulchand Shah Bunder Bund (to be replaced)

Water resources. The Indus River is the only source of surface water in sub-project. The Kotri Barrage constructed in 1955 diverts flows to canals in this part of the province. Four feeder canals, three on the left and one on the right bank of River Indus off-take from this Barrage and deliver assured Irrigation Water supplies for an area of 3.0 million acres. The feeder on the right, namely, Kalri Baghar Feeder has a unique designed where the Keenjhar Lake forms the integral Part of the canal system. The Kalri Baghar Feeder upper puts its water at the Northern end of Keenjhar Lake, whereas Kalri Baghar Feeder draws its supplies from Southern end of the Lake at Chilya. This Feeder provides irrigation supplies to an area which is partly designed to receive perennial supplies and partly seasonal supplies. It is major source of perennial water supplies for the Metropolis of Karachi. Sajawal and Thatta are located at the tail end of the Indus Irrigation System. By virtue of their geographic location, they receive the maximum level of drainage effluent and very little irrigation water. The peak flows on Kotri Barrage, showing before and after commissioning of super structures scenario is given in **Figure 8**.

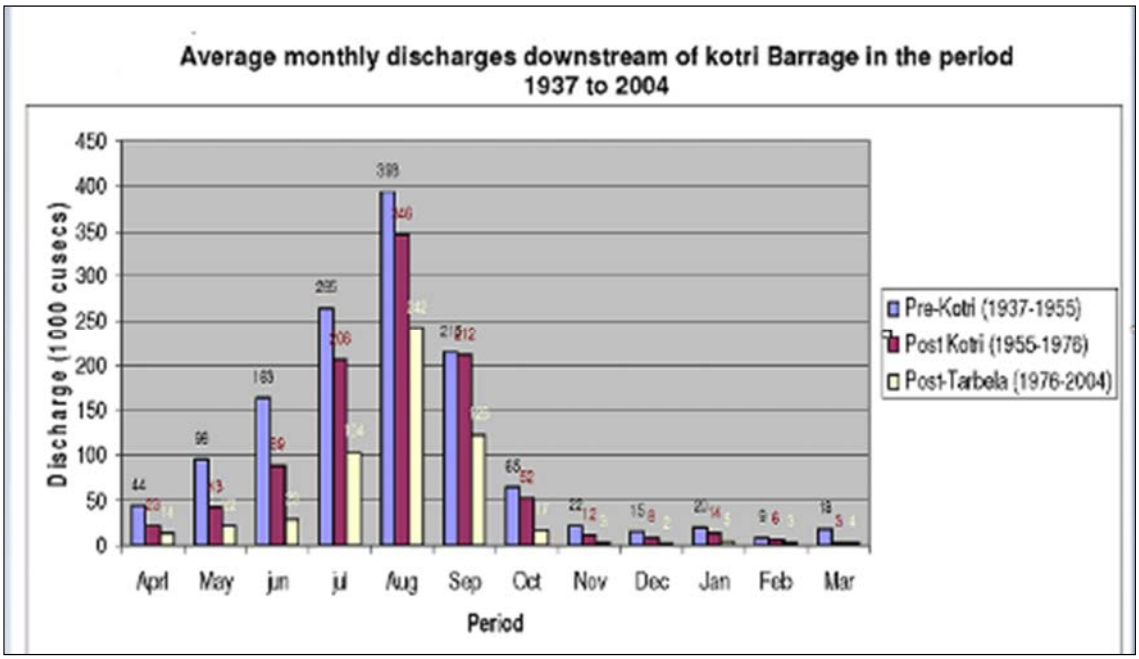

Figure 8: Monthly Discharges Downstream of Kotri Barrage

The surface water samples were collected from the point where the sub-project embankments are aligning close to the river. The physical and chemical parameters were analyzed by the Pakistan Council of Research in Water Resources (PCRWR) Karachi laboratory. The results reveal that the pH, Hardness, Nitrate and Arsenic are within permissible limits while the Calcium, Potassium and Nitrite are exceeding the permissible limits. The detailed results are given in the **Table 4**.

Table 4: Surface Water Quality Analysis Results (Physical and Chemical Parameters)

S. No.	Location	Physical Parameters						Chemical Parameters									
		Color	Odor	Taste	Conductivity (mS/cm)	pH	Turbidity (NTU)	Bicarbonate	Carbonate	Calcium	Hardness as CaCO3 (mg/L)	Potassium (mg/L)	TDS (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Arsenic (ppb)
1	Permissible Limit	Colorless	Un-objectionable	Un-objectionable	NGVS	6.5-8.5	5	NGVS	75 PSI	75 PSI	500	12 (EC)	1000	10	0.020	NG VS	50
2	Surface Water SH Bund (2/7 Miles)	Colorless	Un-objectionable	Un-objectionable	Un-objectionable	7.12	889	60	Nil	52	230	5.3	569	1.792	0.023	0.10	0
3	Surface Water SH Bund (1/7 Miles)	Colorless	Un-objectionable	Un-objectionable	Un-objectionable	7.24	881	60	Nil	40	210	5.2	564	2.075	0.031	0.12	0
4	Surface Water MS Bund (44/1 Miles)	Colorless	Un-objectionable	Un-objectionable	Un-objectionable	7.17	912	70	Nil	56	240	5.4	584	1.579	0.029	0.03	0

Ground water. More than 80% of lands in Sindh are underlain by saline groundwater unfit for irrigation that is a major constraint in irrigated agriculture. Fresh groundwater is found mostly in a strip parallel to the banks of Indus River and some pockets in other areas. The laboratory test reveals that the pH, Carbonate, Hardness, Calcium, Nitrate, EC, TDS and Arsenic are within possible limit while the Turbidity and Nitrite are exceeding the permissible limit. The micro-biological parameters were within the permissible limit except in one sample of BU Bund) 29/0 Miles. The detailed results are given in the **Table 5**. Water temperature varies seasonally. During the summer season the temperature ranges from 10 °C to 20 °C and during the winter season the temperature ranges from 04 °C to 08 °C. The summary of analysis is given in the **Table 6**.

Table 5: Ground Water Quality Analysis Results (Physical and Chemical Parameters)

S. No.	Location	Physical Parameters						Chemical Parameters									
		Color	Odor	Taste	Conductivity (mS/cm)	pH	Turbidity (NTU)	Bicarbonate	Carbonate	Calcium	Hardness as CaCO3 (mg/L)	Potassium (mg/L)	TDS (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Arsenic (ppb)
1	Permissible Limit	Colorless	Un-objectionable	Un-objectionable	NG VS	6.5-8.5	5	NG VS	NG VS	75 PSI	500	12 (EC)	1000	10	0.020	NG VS	50
2	Groundwater (SH Bund)	Colorless	Un-objectionable	Un-objectionable	1317	7.4	-	320	Nil	48	300	6.8	843	1.60	0.017	0.62	10
3	Groundwater (BU Bund) 29/0 Miles	Colorless	Un-objectionable	Un-objectionable	1218	7.74	-	480	Nil	32	190	27	779	1.429	0.022	0.76	10
4	Groundwater (BU Bund) 16/2 Miles	Colorless	Un-objectionable	Un-objectionable	1118	7.47	-	310	Nil	60	320	11.7	715	1.529	0.125	0.24	0
5	Groundwater (Indo Bund)	Colorless	Un-objectionable	Un-objectionable	766	7.21	-	230	Nil	76	300	5.4	490	1.717	0.022	0.19	20
6	Groundwater (MS Bund)	Colorless	Un-objectionable	Un-objectionable	4270	7.24	-	450	Nil	64	490	33	2733	1.908	0.020	0.52	40

* NGVS: No Guideline Value Set

Table 6: Summary of Water Quality Analysis Results

S. No	Location	Wastewater Quality Parameters			Microbiological Parameters		
		Dissolved Oxygen (mg/L)	COD (mg/L)	TSS (mg/L)	Presumptive Coliforms/100 ml	Fecal Coliforms/100 ml	E-Coli
	Permissible Limit	No Limit Listed	150	200	0/100	0/100	0/100
1	Groundwater (SH Bund)	4.6	8	47	0	0	0
2	Groundwater (BU Bund) 29/0 Miles	4.8	0	86	7	0	0
3	Groundwater (BU Bund) 16/2 Miles	5.3	16	26	0	0	0
4	Groundwater (Indo Bund)	5.5	10	22	0	0	0
5	Groundwater (MS Bund)	4.8	8	16	0	0	0
6	Surface Water SH Bund (2/7 Miles)	5.8	0	57	-	-	-
7	Surface Water SH Bund (1/7 Miles)	6.1	0	25	-	-	-
8	Surface Water MS Bund (44/1 Miles)	6.3	22	49	-	-	-

Flora. The dominant plant communities are Pluchea, Dipterygium and Salsola and plant species are herbs/shrubs including Calligonium polygonoides, Aervajavanica and trees such as Tamarixaphylla, Prosopis, Salvadoraoleoides and Capparis Farsetiahamiltonii, Limetonindicum, Tribuluslongipetalus, Cynodondactylon and Stipagrostis plumose are common herbs and Amaranthusvirdis, Aristidaadscensionis, Brachiariaeruciformis, and Celosia argentia.

Tree cover. Tree cover is common along the embankment, either side of the embankment crest and on their outer slopes of both. Much of the denser tree cover occurs from the Mile 0 to Mile 1, 9-10 on Indo Bund, Mile 13 to 15.3 on BU Bund, Mile 40 of the BU Bund, Mile 36-38 of MS Bund. The majority of the existing trees on the

berms and embankments where stone pitching or raising/strengthening of the embankments shall be lost during the construction works and site clearance. An inventory of cut trees shall be maintained by the Contractor and PIC on site during execution of the Works in order to enforce this.

Fauna. The subproject area is quite unique regarding the state of protected forest patches and wildlife sanctuaries' during the field study seven large mammal species including four species on SH Bund, six species on MS Bund, three mammals on BU Bund and three mammals are on Indo Bund were recorded. While ten small mammals including six species on SH Bund, eight species on different habitats of MS Bund and five rodent species recorded on BU and Indo Bunds respectively. Study site is quite potential for Avifauna, within the very limited time period; the team recorded 46 bird species from four study sites. Herpeto-fauna is one of important group among faunal diversity. The site is part of Indus Eco-region which is one of the global significance site (G 200). World unique and largest Riverine-forest is also existed hare. Important forest protected sites and wildlife sanctuaries and game reserves including Deh-Jangisar, Deh-Khalifa, Mirpur Sakro, Hudero lake, Kinjhar lake, Haliji Lake, Bijoro Chach, Norung, Cut Monarki, Sadnai forest, Shah Lank forest, Halya, Majiran wetland, GullelKogri, Monarki, Kitebandar North, Kitebandar South, Ganj forest, Khirsar forest, Ali Bahr forest right from downstream from Kotri barrage. The area is important hotspot of endangered Indian Otter, Fishing cat and mangrove forest existed in delta of River Indus.

Birds. The River Indus and it riverine forest is providing excellent feeding roosting and breeding ground for local resident and migratory avian species. The team has recorded 46 bird species by interviewing and personal observation. Common babbler has become very rare from the region, while pheasant crow, Jungle Babbler, Common Myna, Bank Myna, House Sparrow, Common Crow, Indian Roller and Rose ringed Parakeet population is quite satisfactory in Indus eco-region. Chestnut-bellied sand grouse, Pied crested cuckoo, Red-vented bulbul and Red turtle dove population is declining in the region. Migratory water birds especially the water fowl visiting trend is highly declined, even the present survey has been conducted in November which is climax of migratory birds, but the trend of winter visitors were highly disappointing. However the local resident waders and other water birds like greenshank, redshank, plovers, common coot, little Grebe, common More hen, Grey Heron, Glossy Ibis were observed in water bodies along band. It has observed water fowls prefer to roost in very shallow and fresh flooding land and waders root on both brick is hand fresh water.

Reptiles and amphibians. Reptile are terrestrial animals they normally occurred in worm and dry area, S H site is potential site for Agama, Spiny tailed Lizard and some snake species. Hard and rocky sites also are favorable for Geckos Saw scaled viper and Cliff racer snake. Indian monitor lizard and spotted pond turtle are found in marshy areas. Reptiles are mostly carnivore or insectivore; insects are main food source of herpeto-fauna, therefore lizard and Toed prefer to live in prey area. Leopard gecko, Indian cobra are the very rare species, while Crocodile (Gharial) extinct form it natural habitat. During field survey three (3) amphibians and same number of fresh water turtle recorded for study sites. Brelientagam and sand boa found from near Keenjhar and Indian cobra skin found from BU site. Six (6) species of carnivore, eight (8) species of insectivore groups identified and four (4) species herbivore species identified. Varanus bengolensis Indian monitor lizard, Acanthodactylus cantoris Indian fringe-toed lizard, Lissemyspunctataandersoni Indian flap-shell turtle, Hemidacty lusbrookii Spotted Indian house gecko are the common species of this habitat. While Trapelusagilis pakistanensis Brilliant agama, Naja n. Naja Black Cobra, Ophisopsjerdonii Punjab snake-eyed Lacerta are the rarest reptiles. While Echiscarinatussochureki Sochurek's saw-scaled viper, Bufostomaticus Marbeld toad and Eucalyptus c. cyanophlyctis Skittering frog abundant in the area, but Hoplobatrachustigerinus Bull-frog is becoming rare in Sindh.

Habitat. Both Kacha (riverine) and Paka (cultivated) of river land converted in to cultivated land. The soil in the land is essentially very fine sandy loam, well drained and strongly calcareous, containing Calcium carbonate. Soil formed in red deposited loess is mainly silty-clay loam and silty-clays. In these areas where water is available (mainly through wells and tube-wells) the crops like Cotton, wheat, Potato and Sugarcane are grown. The trees like Eucalyptus and Acasianilotica are also grown in the area. Reptile species which may be found here are Varanusbangalansis. The snake species which include non-poisonous colubrids and leptotyphlopids and poisonous vipers, Cobra and Kariat may also be found in the area. Bufostomaticus and Euphlyctiscyanophlyctis, which represent amphibians, have also been found in the fresh water pools, irrigation water channels.

Lakes. Several fresh and brackish water lakes exist in Thatta district. These include the Keenjher, Haleji, Hudero lakes and Jhuddo lagoon. Haleji Lake is an artificial freshwater lake with marshes and a brackish seepage lagoon. Considered a game reserve in 1971, this lake was declared a wildlife sanctuary and in 1976, the lake proceeded to become a Ramsar site. Jubho Lagoon is a shallow, small brackish water lagoon with mudflats and marshes that

support a large concentration of migratory birds including flamingos and endangered Dalmation pelicans, a rare species in the world. This was declared a Ramsar site in 2001 because of the efforts made by IUCN Pakistan. None of the above water bodies are in the immediate vicinity of the proposed project site.

Riverine Forest. Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which are categorized as "Riverine Forests"; locally known as Kacho forests. These forests are located along both the banks of River Indus in Thatta, Hyderabad, Dadu, Larkana, Naushero Feroze, Nawabshah, Khairpur, Sukkur, Shikarpur, Ghotki and Jacobabad Districts and have been declared as “Reserved Forests” under Forests Act, 1927. Acacia nilotica (Babul), Populus euphratica (bahan), Tamarix aphylla, Tamarix dioca (Lai) and Prosopis cineraria (Kandi) are the key species found in these forests. All the forest areas are beyond the primary impact zone of the embankment sub-projects covered in this assessment.

Fish. The volume of water flowing in the Indus River area supports a complete ecosystem, the fish being the main component of the fresh water ecosystem. The commercial fish species occurring in the project area include Morakho, Sunni, Gulfam, Dahi, Torki, Rohu, Fauji Khagga, Gundan, Bachwa, Thaili, Singhari, Malli, Luhur, Chitti Mundi, Jerko, and Popri.

Socioeconomic conditions. A survey and consultation with 16 villages on MS Bund, 15 villages on BU Bund, five villages on Indo Bund within the primary and secondary impact zone was conducted from the in the months of November and December 2015 in order to establish a social baseline of the project area. All villages lying within the CoI were included within the social survey and those within the primary impact zone but beyond the CoI (within radius of 1km on both sides) were selected. The information gained will assist in the measurement and determination of the impacts (positive and negative) on social services, livelihood and cultural pattern of the population under study. To make the analysis more compelling, qualitative data through focus group discussions (FGDs) was also collected. In each village visited during the study, the female sociologist arranged meetings with women of all ages in a separate room where local males were discouraged from attending. Meetings were conducted in Sindhi languages. The details of the project were described and explained using simple language. During the meetings the gender related questions were asked in an informal way. Women were encouraged to ask questions and share their concerns related to project which were carefully noted.

Demography. According to the results of the survey, total households of sub-projects SH-bund, MS-bund, BU and Indo bund are 11,278 with a total population of 72,540. SH-bund, BU-bund and Indo bund are in Thatta district while the MS-bund is in district Sajawal. Total population of the Project area is 72,540, all belonging to the Solangi, Qazi, Khaskhely, Gandra, Syed and Tenga on SH-bund, Koso, Syed, Serho, khaskhely, Monaro, Mir Bahar and Malah are on MS-bund. While Grano, Syed, Chawan, Khaskhely, Korja, Malah, Khushk, Dal, Amro, Jakro, Jat, Mehar, Bukario,Shar, Malah, Manjro Hamti, Soomro, Lashari, and Mehar are dwelling on BU and Indo bund. Total households are 11278 in the 38 villages. Sindhi is the main language in the Sub-Project area though most men can also speak Urdu and Saraiki. The dominant ethnic group in the project area is the Khaskheli. The Solangi, Mogoro, Khoso and other tribes are also settled in the project area. Sindhi is the dominant language spoken in the project area about 95 percent of the population speaks Sindhi and Urdu are also spoken and understood by the majority of the people in the project area.

The project area consists of rural population lives in comparative isolation. There are very few villages of the conventional type. Majority of the population live in small settlements of five to twenty houses scattered all over the project area. Mud houses or huts are built without layout or plan and without any regard to blocks. Some of the houses usually have a boundary wall enclosing enough space for cattle and storage. The roof of a mud house consists of wooden beams of all shapes and sizes, cover of thick date-palm mats and a layer of mud with clay plaster at the top. It was observed that all the people were living in self-owned houses.

Women in subproject area. The status of women in the project area is classified as low. Gender specialists visited 13 villages and interviewed the women in a group form. Details of the villages visited are included in the following sections. The result of the surveys revealed that women of the project area are fully responsible for household activities and also take an active part in the field and livestock activities, and thus support the household income generation. Women within the project area are infrequently consulted and men commonly have the deciding power. Men usually make purchases on behalf of the female members of their family. Rural women mostly remain inside the home or work in the field. In many cases, a husband will not share his plans with his wife. Neither the survey nor the consultations identified any women who owned property. The result of the surveys revealed that the household and farming activities were carried out by the women in the project area as under: Women in the area are skilled at embroidery. Many women spend their free time in embroidering. There is the opportunity for women to use these skills for the source of income. The women of the project area

have no significant role in the decision making like marriage of Children, sale and purchase of property, sale and purchase of Animals, decision regarding schooling of Children and to attend social factions. It was found during the field survey that the oldest male member of the family has a power of decision making. He determines the family interests and makes decisions with regard to the family, and in some cases the mother may also take part in decision after the death of her husband. All women living within the corridor of impact were found to be illiterate. Only about 2% of the women in the project area were found to be educated, and of these none had attended school beyond middle school. Of the total educated population of the project area, only 16% are female. The health and hygiene condition of females and children are very poor. Many diseases are identified within the CoI, i.e. skin diseases, diarrhea, hepatitis, typhoid, and flue. Many women are suffering from endemic diseases.

Social setup. The majority of those in the study area live together with their extended family (parents living with married children and their families). Families believe this is a more economical way of living as they often work together on the same land and are able to share their joint incomes to support the entire family, including elderly relatives who are unable to work. It is also thought to be more efficient to share basic amenities such as water, electricity, housing and food rather than for each immediately family to purchase or source their own.

Social Cohesion and Conflict. Social organization in all villages is strongly based on Biradari (tribal) system, where each tribe has a tribal leader. The Tribe Leaders are mostly landlords and political leaders. All families belonging to the same tribe have strong interactions with one another but mostly remain separate from other tribes. This extends to marriages, where it is the preference for young tribal members to marry a member of the same tribe. Interactions between different tribes are less common. There is a large number of villages in the area. Separate villages have been established as tribes and families have grown and the land owned by one family becomes sub-divided between the brothers of successive generations. During the survey it was found that most communities had built their own mosques and maintenance of these mosques is the joint responsibility of residents.

According to the socio-economic survey, there is no major dispute among the people (inter or intra tribal conflicts) in the project area. The conflict resolution pattern in the project area is the decisions about conflict, right of vote, marriage settlements and other matters are usually resolved by the village head, while the head of a tribe shall resolve major disputes. It was found during survey that 90 percent of the conflicts were resolved at village level. Those living within communities of the project area feel obliged to accept the decision of the village or tribal leaders. In case of serious matters, local influential politicians (who are often also tribal leaders) intervene to settle the dispute. Occasionally, when parties do not agree on the decision of caste or tribal leaders, matters may go to the police and ultimately a court of law. The police and the court of law are the last options and these are rarely exercised.

Archaeological Sites and Cultural Heritage (physical cultural resources – PCR). There are a total of eight archaeological sites situated in the area: Makli Graveyard (14 km from proposed sites); Sonda graveyard (1 km away); Kalan Kot (14 km away); Nawab Amir Khan's mosque 15 km away); Jama Masjid 915 km away); Sasian-Jo-Takar (25 km away); and Jama Masjid in Thatta City (12 km away). None of these sites are likely to be affected by the proposed activities.

5 Environmental and Social Impacts and Mitigations

The environmental impacts of the Indus River embankment sub-project principally relate to loss of habitat resulting from vegetation clearance and tree felling on the berms (outer and inner slopes) during stone pitching and embankment raising/strengthening. There could also be impacts to the communities within project area, due to disturbance resulting from the movement of contractor machinery, establishment of borrow areas in the agriculture or wetlands having ecological significance. All potential negative impacts along with mitigation measures are set out in this Chapter.

Impacts on Air Quality. Exhaust emissions from construction machinery and vehicles as well as dust emissions from construction activities are the potential impacts of the project on air quality. The major dust generation would be during construction phase in undertaking the earthworks, transportation of borrow and other construction materials along the embankments. As contracts/works are estimated to last between six months and the dust raising potential is high, the impact magnitude is judged to be major during this period.

Mitigation. Water sprinkling will be carried out to suppress the dust on the access routes, especially on the top of the embankments which will be used frequently. Water sprinkling should be focused to access routes in the vicinity of the villages where the receptors are more sensitive. The contractor will submit a traffic management

plan before commencement of the physical works. The movement of the contractor machinery shall be restricted beyond the routs identified in the traffic management plan of the contractor. In addition, construction materials such as sand or aggregates (if required) should be bagged or sheeted on arrival and during storage. No construction should take place during dust storms. No vehicles emitting black smoke from their exhaust should be permitted on site (this shall be linked to the NEQS for the Contract and burning should generally be avoided wherever possible.

Impacts on water quality. During raising/widening of embankment and stone pitching, the Indus River water quality may be impacted. During the embankments rehabilitation, the dissolved solids and sediment load in the river flow will increase and is likely to affect local people who extract water from the river and to a lesser extent fish and other aquatic wildlife. However this is temporary impact and the effect shall be reversed naturally following construction. Another adverse impact is potential spillage of chemicals, hydro-carbons and other pollutants as part of the construction process as well as contamination arising from the improper disposal of wastes (organic and inorganic) from the camp and work sites. The most significant impact is to the aquatic ecosystem from the potential spillage of chemicals, hydrocarbons (such as oil) and other pollutants during construction activities either directly into watercourses or reaching watercourses through surface runoff. The groundwater which is used as drinking water in some areas may be potentially contaminated by the release of untreated sewage from construction camps and office.

Mitigation. The most important mitigation is to ensure that local drinking water supplies are not in any way contaminated during the life of the contract. The local villages source their water from hand pumps, so drinking water will not be affected by an increased sediment load in the Indus River. The Contractor shall also make his own arrangements for supply of water for the purposes of Works. Key mitigation measures include: a) All hydro-carbons and other chemicals will be properly stored. Oils and fuels if stored at site will have secondary containment embankments. Appropriate arrangements will be made to mitigate/control spillage/leakage of fuels, oils and chemicals; b) Sewage from camps and offices will be treated through appropriate means (eg, septic tanks and soaking pits); c) Equipment and vehicles will not be repaired at the site. Washing and maintenance areas will be established at the camps and will be lined. Waste water and other effluents from such areas will be released in a settling tank. Collection drains and oil interceptors will be installed/built at such maintenance areas; d) Protection measures such as temporary embankments will be adopted to ensure that soil and stones do not slip into the river; and e) Regular monitoring of water quality shall be carried out by the PIC and ESMU of IAs.

Impacts on cultural heritage. The construction activities can potentially affect a few prayer platforms, mosques and graves that exist within the CoI of the sub-project. No damage is likely to take place to the known and documented PCRs that exist near the sub-project area and described in Chapter 4. Similarly, it is highly unlikely that any new PCRs are discovered (ie, chance find) since most of the works will be carried out on existing structures.

Mitigation. To protect the graves identified during the field investigations, all works (including haulage) shall be excluded from the areas. Similarly, no project activity will be carried out at or in the immediate vicinity of the known and documented PCRs described in Chapter 4; maps showing the location of these PCRs will be prepared and displayed at the construction sites. Prayer platforms and mosques will be protected from the damage. In case of relocation, the cost is included in the overall resettlement budget (discussed later in the Chapter). In the event of a discovery of an unidentified graveyard, artefact, burial site or other sensitive area, the Contractor shall notify the Engineer who will make the required design changes. The contractor activities shall be restricted from the Sonda Hilaya graveyard and the graveyard identified along the BU Bund.

Chance Find Procedure. The Contractor will adopt the following procedure in case of any Chance Find:

- In the event of discovery of any PCR, 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 the above report, the Archeological Department will be notified and their site visit will be facilitated. Further works will be carried out on such sites only after obtaining clearance from the Archeological Department.

Impacts on biological resources and biodiversity. The direct impacts to species is not as critical as habitat impacts as species are highly mobile and if their habitat is restored within the project area they are likely to return after a period of temporary disturbance. As a result, mitigations emphasize reduction in habitat loss and habitat protection rather than species capture and translocation. The primary potential impact to the existing habitat will be through the felling of trees along the embankments (about 120 trees will need to be felled), clearing vegetation

on the embankment slopes, disposal of excavated material, and habitat change through the establishment of borrow pits.

Mitigation: Most of the trees that will need to be felled to carry out construction works include Acacia nilotica, Malia indica, Eucalyptus Sp, Ziziphus jujube, Ficus religiosa, Corida dicotom, Tamariz indica, Syzyjium cumini, Magnifera indica and Phoenix dactlypfera. These trees are common in the project area. An inventory tree felling will be maintained during construction period. For each tree felled, five new saplings will be planted. The contractor will be responsible to provide after-care of these saplings for a duration of one year from construction completion. Felling of trees for the establishment of borrow areas shall not be allowed. The contractor shall leave a 3m wide strip unexcavated at 300m intervals in order to maintain access across the borrow areas. The loss of reed swamp as a result of disposal of excavated or surplus material shall be limited by placing disposal material in stockpiles against the embankment (not spreading the material over the entire reed swamp) and by prohibiting the establishment of borrow areas within existing reed swamps. Finally there shall be a ban on hunting built into each contract and with specific instructions for avoiding the clearance of nesting areas of mammals, reptiles and amphibians. The mitigation measures for impacts from borrow pits which may cause negative impacts on biodiversity are discussed below.

Impacts from borrow areas and quarries: A bout 20,165,800 cft of earth material will be required for raising and widening of embankments. In addition, about 11,497,958 cft stones will be required for slope pitching, horizontal aprons and gabions. The stones will be obtained from commercial limestone quarries at Chilya and Khanote located in hilly areas in Thatta and Jamshoro districts at a distance of about 30 km. These commercial quarries are source of stone and gravel for projects in Sindh. However, the borrowing of earth material if not carried out properly may create problems of deep permanent ponds, potentially with stagnant water, that may generate negative health effects. If borrow pits are very close to embankments, these may create structural problems for structures. Similarly if cultivated areas are used as borrow areas; value of the land may be reduced.

Mitigation. The borrow pits would be located in the existing uncultivated land and shall not be in the areas that are permanently flooded. The borrow material shall be obtained from the riverine/flood plain (owned by SID) areas which are currently uncultivable due to salinity and waterlogging. As the area is flood prone, therefore; there are few settlements in the area. The borrow areas will not be selected within or in the immediate vicinity of any settlements. The location of borrow areas will be at least 150m away from the existing embankments and will not jeopardize the stability of the embankments, any other structures, settlements, civil works or natural habitats. As the borrow areas will only be up to 1.2m deep, the areas will become vegetated and of value in particular for fish, invertebrates and water birds. This will increase the biodiversity of the area. The formation of borrow areas adjacent to existing ponds along the Indus River embankments in a manner which removes an existing vegetated margin of a pond shall not be allowed. The Contractor will be responsible to backfill the borrow pit, if required, with rejected /surplus excavated/cut material and will be given a vegetative cover. While quarrying the stones, the existing blacktop roads will be used during transportation. In addition, the contractor will submit and implement a traffic management plan.

Resettlement impacts. The proposed activities will not require any land to be permanently acquired because all works will be carried out on the land that is already owned by the government. Temporary facilities to be established by the contractor will also preferably be located on government-owned land. The works will however cause dislocation of six wooden (thatched) huts, two wooden mosques, 13 wooden shops and two wooden animal sheds owned by 18 household. These structures have been built on the embankment.

Mitigation. To address the resettlement impacts, an Abbreviated Resettlement Action Plan (ARAP) has been prepared in accordance with the government regulations and WB OP 4.12. ARAP includes the entitlement matrix, list of the affectees, compensation amount, payment procedures, institutional arrangements for ARAP implementation, and monitoring arrangements. The compensation amount for the above-described resettlement impacts has been estimated to be about PKR 1.7 million. A grievance redress mechanism (GRM) will be established to address community complaints relating resettlement issues.

Impacts on agriculture land. As stated above, no land will need to be acquired for the proposed works. Furthermore, establishment of borrow areas within agricultural land will not be allowed therefore there shall be no loss of agricultural land due to the establishment of borrow areas. However, during movement of the contractor's machinery and vehicles, the cultivated land and standing crops may potentially be damaged.

Mitigation. The main mitigation will be the prohibition of additional access routes development and following the existing available access routes in accordance to the traffic management plan to be prepared by the

Contractor. In case of any such damages caused by the construction works, the Contractor will compensate the affectees. A GRM will be established to address community complaints relating to any impacts on agriculture land or crops caused by the construction activities.

Impacts on fish production. During baseline survey, it was observed that the local women were fishing in the ponds along the Indus River embankments which exist within or close to the CoI. These ponds can potentially be impacted in case borrow areas are established, material is stacked, or surplus material is disposed at these locations.

Mitigation. The contractor will ensure that the existing fishing ponds are not affected by the construction activities. The contractor will not dispose wastes, excavated material, or any other effluent in these ponds. Fishing by the contractor crew shall be strictly prohibited. Regular monitoring shall be carried out by the PIC and IAs of the stagnant water bodies located along the embankments. In addition, the contractor will prepare and implement a code of conduct to interact with the local communities. A GRM will be established to address community complaints relating to any impacts on fishing caused by the construction activities.

Impacts on communities. Some villages and settlements exist adjacent to the CoI (see land use maps in Chapter 4). The nature of construction works in the proximity of settlements may have some potential impacts on the community (eg, noise and air pollution) and agriculture. In addition, impacts will arise in the form of in-migration of the workforce to the area and their interaction with the community. As the majority of the workforce shall be recruited from the local community, respect for cultural norms shall be inherent. However the increased population in the area by workforce from outside the local community may result in a 'squeeze' on local resources and services and behavior which is not considered appropriate by the community resulting in conflicts between the local community and contractor's staff. This impact can be reduced by the provision of the contractor's camp with services for food and recreation within the camp. Community disturbance shall also be caused by an increased volume of traffic that should be expected within the each sub-project area, resulting in traffic congestion. The Contractor shall utilize existing routes which are all used as transportation/communication links by the local communities.

Mitigation. The contractor will prepare and implement a code of conduct for its site staff and workers. The contractors will prepare and implement a traffic management plan to minimize impact on the local communities, reduce stress on the transport system, and to minimize traffic congestion and associated impacts/risks. The construction vehicles will follow a maximum speed limit of 30 km per hour. The contractor will also provide adequate camps for local laborers to prevent the need for them to depend on accommodation in nearby settlements. Regular water sprinkling will be carried out the contractor on haulage routes and construction sites. The contractor will engage a Community Liaison Officer to interact with the communities. A GRM will be established to address community complaints relating to disturbance caused by the construction activities.

Noise. Noise will be generated by operation of construction machinery, generators, and vehicles. The main impact will be from traffic along haulage routes and the operation of plant and excavators. The most significant impacts shall be on the settlements within or close to the embankments.

Mitigation. Working hours will be carried out between 6am and 6pm, six days a week. The camp sites shall be situated at least 500m from any settlement. Liaison with the communities will be maintained and a GRM will be established to address community complaints relating to noise generated by the construction activities.

Health and safety Impacts. The construction works will pose health and safety risks both for the workforce and the local community. The potential impacts to the local communities shall be direct, such as being struck by moving plant or vehicles within and outside the project area, and indirect through the decrease in air quality surrounding the project area. Air quality will be impacted as a result of increased dust generated from construction and on transport routes, as well as due to emissions from plant and vehicles - as described earlier. Due to the proximity of houses and farm land within the CoI and the risk from moving plant within the borrow areas, the magnitude of this impact is judged to be major adverse.

Mitigation. The mitigation measures to address air quality deterioration have already been described earlier in the Chapter. To address the safety risks to the local communities, the following measure will be implemented:

- The contractor will prepare an Occupational Health and Safety (OHS) plan in line with the ECoPs given in the ESMF/RPF; submit to the PIC and IAs for review and approval. When approved, the contractor will implement the OHS plan during construction period. The contractor will also impart trainings to his crew about the OHS.

- The contactor will ensure the use of Personal Protective Equipment (PPE) for his laborers during construction period;
- Appropriate precautions will be observed while working on heights and near/in the water.
- contractor shall fence the working area and unauthorized shall not be allowed to enter in the area;
- Contractor will display sign boards and banners about traffic diversion at places on detour routes;
- Contractor will provide a traffic man at appropriate places particularly near settlements to control traffic;
- Provision of speed breakers at appropriate places in consultation with/approval of the Engineer which should be removed after completion of the project;
- All drivers will be required to obey speed limits;
- Contractor will arrange a rescue team and first-aid facility in case of any accident;
- Drivers will fix net on containers while transporting stones and soil.
- Community liaison will be maintained and a GRM will be established to address community complaints relating to safety aspects.

Employment opportunities. It is expected that a sizeable number of the workforce will be engaged in a range of activities. Employment opportunities shall be offered to the local population to be sourced from the surrounding communities. Approximately 75% of the workforce (semi-skilled and unskilled) will be from the local areas.

Reduction in flood damages. The proposed rehabilitation works will improve the strength of the Indus Rive embankments and effectiveness in withstanding the super flood during monsoon without any breach. The improved embankments will protect the communities settled along both sides of the Indus River, their agriculture land, standing crops, livestock and other livelihoods, public infrastructures and available water resources in the area.

6 Environmental and Social Management Plan

6.1. Project Management Responsibilities

Implementing Agencies

The overall responsibility for the supervision of ESIA, ESMP and RAP will rest with the SID and PDMA that will act as apex bodies of the SRP to take care of Social/Gender and environmental issues and to take policy decisions at project level. An Environmental and Social Management Unit (ESMU) shall be established within each IA. Key positions within the ESMU of SID shall include: Environment Specialist; Social and Resettlement Specialist; Gender Specialist; and Ecological specialists. For PDMA ESMU, a smaller team of one environment specialist and one social/gender specialist will be engaged.

The ESMU shall be responsible for supervision of implementing and monitoring the ESIA, ESMP and RAP. The Staff of ESMU shall be answerable to the Project Director (PD) of each IA. The ESMU shall be responsible for the monitoring defined in the ESIA, ESMP and RAP as part of their overall responsibilities.

Project Implementation Consultant (PIC)

The PIC is to be engaged by the project proponent and shall be responsible for day to day monitoring of the ESMP and RAP on behalf of the Client during execution of the sub-projects under the SRP and shall submit periodic reports to the IAs regarding the ESMP and RAP implementation status. The ESMPs prepared or to be prepared shall be part of the Contract documents. In general the PIC has the following responsibilities pertaining to the environmental aspects of the project: a) carry out environmental and social assessment and prepare the required documents, review and update the available documents relevant to the Project (including ESA, ESMPs and RAP) and those to be prepared by the Contractor; and b) Monitor the implementation of ESMPs and RAP on a regular basis during execution of civil works by the Contractor. PIC will include the following key positions: Environmental Specialist; Environmental Inspector(s); Social and Resettlement Specialist; Gender Specialist; Assistant Sociologist(s).

The PIC shall be responsible for monitoring the contractor's compliance with the ESMPs. The role of the PIC shall be day to day monitoring of the provisions of the ESMP with the assistance of social and environmental staff of the Contractor and reporting any non-compliances to the PIC Chief Engineering and Resident Engineer as well as to the respective IA.

Environmental/Social Monitoring and Evaluation (ESMEC) Consultant

The ESMEC shall be an independent body responsible for external safeguard monitoring for the SRP Project on behalf of IA. The ESMEC will have environmental and social experts and will carry out intermittent third party monitoring of the project.

The Contractor

The Contractor will be responsible for the on-field implementation of the ESMP as well as maintaining responsibility for environmental protection liabilities under Sindh Environmental Protection Act (SEPA), 2014, World Bank safeguard policies, and other applicable national as well as provincial policies and regulations. The Contractor will also be responsible for training his crews in all aspects and implementation of the ESMP. The bid should include an environmental and social mitigation budget as part of the engineering costs of the respective works. The key positions to be filled within the contractor's staff for implementation of the ESMP include: Environmental Coordinator(s); Occupational Health and Safety (OHS) Officer; and Community Liaison Officer.

6.2. Contractor's Plans

This ESMP has been prepared prior to Contract award, and therefore, certain mitigations which are dependent upon the methodology chosen by any Contractor to deliver the project, could not be specified in it. For example, haulage routes are dependent upon the exact camp site locations chosen by the Contractor. Therefore, it is required that the Contractor shall produce and implement the following plans. Once approved by the Engineer and Environment Specialist of PIC, these documents will become part of the ESMP for the Contract.

Plan	Description
Pollution (Air, land and water) Control Plan	The plan will include details of the principal pollution control facilities proposed and of contingency plans in the event of failure of these facilities. The plan shall include the details of the designated and licensed tip, oil treatment facilities and hazardous waste disposal sites which shall be used to dispose of waste.
Waste Management and Disposal Plan	The Contractor shall include details of the procedures for the collection and disposal of all waste streams generated from works areas, office, camps, and other temporary facilities. The Plan shall deal with each waste stream separately.
Traffic Management Plan	The Traffic Management Plan will include details of the proposed access routes to the project area as well as haulage and access routes throughout the project area (including access to and from borrow pits)
Plan for Handling Hazardous Material	The Contractor shall identify appropriate procedures to handle and store hazardous materials. The Plan will describe control measures to ensure no environmental or health impacts from the handling of hazardous materials and the collection and safe disposal of hazardous materials.
Occupational Health and Safety Plan	The Plan will describe the appropriate procedures and precautions to address the occupational health and safety risks both for communities as well as site personnel including construction workers. In producing their Health and Safety Plan, the Contractor should make reference to the General Specification and the Safety, Health and Environment Guidelines of the World Bank
Environmental Awareness Training Plan	This shall include details of the Contractor's environmental awareness training program proposed for the workforce.
Reforestation/ Tree plantation and maintenance plan	The plan will identify the procedure for tree felling, planting the saplings, recommended species to be planted, plantation procedure, and after-care requirements.

6.3. Mitigation and Monitoring

Mitigation measures for reduction of environmental degradation and social impacts especially relating to air quality, soil contamination, pollution of water resources, loss of habitat and disruption to wildlife will need to be implemented and monitored. Monitoring tasks will vary over the construction and operation stages of the sub-projects. Physical, biological and socio-cultural parameters will be measured/monitored to determine compliance with national and international standards and compliance with the ESMP itself. Monitoring during the construction phase will largely consist of compliance with mitigations identified in **Chapter 5**. **Table 7** presents the mitigation and monitoring plan.

Table 7: Environmental and Social Mitigation and Monitoring Plan

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
A. DESIGN PHASE										
A.1	Design / pre-construction considerations	A.1.1	Slope Instability	Excavated Material Disposal Plan to include siting and detailed assessment of the suitability of the proposed excavated materials disposal site	SID	SID	All excavated surplus materials to be disposed of in designated sites.	Once at the end of design stage	SID Divisional Office	Design Stage
		A.1.2	Geology and seismology	Stone pitching of the degraded reaches	SID	SID	Emergency Preparedness Plan in place prior to commencement of construction.	Once at the end of design stage	SID Divisional Office	Before Construction
		A.1.3	Erosion and Breach of the embankment	Raising and strengthening of the embankments	SID	SID	Emergency plan is in place	Once at the end of design stage	SID Divisional Office	Before Construction
		A.1.4	Loss of flora and disturbance of fauna within COI	Tree inventory has been prepared and avoidance of trees cutting to the possible extent is recommended	Consultants	SID	Tree inventory prepared	Once at the end of design stage	SID Divisional Office	Design Stage
B. CONSTRUCTION PHASE										
B.1. EMBANKMENT SITE PREPARATION and CLEARANCE										
B.1.1	Vegetation clearance	B.1.1.1	Loss of faunal habitat at the location of Embankments and access routes	Vegetation clearance shall be limited to the area required for works	Contractor	ESMU and PIC	Vegetation clearance shall be limited to the extent required for execution of the works	Weekly	Along the embankments	Site preparation
				use of existing accessing tracks	Contractor	ESMU and PIC			Along the embankments	Construction Period
				Photographs of pre-construction state of camps	Contractor	ESMU and PIC	Photographs taken	Once	Along the embankments	Construction Period
				Biodiversity monitoring	PIC	ESMU and PIC	Status of terrestrial and avifauna	Quarterly	Along the embankments	Construction Period
B.1.2	Trees cutting	B.1.2.1	Loss of habitats	Trees cutting to be marked in advance and approved by PIC and IA	Contractor	ESMU and PIC	Written approval for cutting of marked trees prior to cutting	Weekly	Along the embankments	Construction Period
				Cutting only of trees approved by PIC Engineer, Environmentalist and IA	Contractor	ESMU and PIC	Cutting only of marked trees	Weekly	Along the embankments	Construction Period
				Trees cutting and clearance of dense vegetation for establishment of temporary haul routes prohibited	Contractor	ESMU and PIC	No tree cutting on temporary haul routes	Monthly	Along the embankments	Construction Period
				Contractor shall prepare an inventory of cut trees including detail of girth, specie and height	Contractor	ESMU and PIC	Maintenance of inventory	Monthly	Along the embankments	Construction Period
				Compensatory planting and aftercare of saplings of native trees at a ratio of 5 trees for each 1 tree cut	Contractor	ESMU and PIC	Planting of 5 times the number of trees cut and survival rate of trees	Monthly	Along the embankments	Construction Period
				Biodiversity monitoring of impacts on	PIC	ESMU and	Status of terrestrial and	Quarterly	Along the	Construction

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				fauna		PIC	avifauna		embankments	Period
				Areas having thick/dense vegetation will be avoided as far as possible.	Contractor	ESMU and PIC	Vegetation are avoided	Monthly	Along the embankments	Construction Period
		B.1.2.2	Loss of habitats due to Sitting of new haul routes	use of existing accessing tracks	Contractor	ESMU and PIC	Use of existing access tracks and width of new access tracks not more than 3m	Monthly	Haul routes	Construction Period
				Construction of haul routes through forest is prohibited		ESMU and PIC	Use of existing access tracks and width of new access tracks not more than 3m	Monthly	Haul routes	Construction Period
B.1.3	Disposal of excavated material	B.1.3.1	Identification of re-use of excavated material on site, to reduce off site effects	All excavated materials to be disposed of in designated sites.	Contractor	ESMU and PIC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
		B.1.3.2	Community Disturbance	As above	Contractor	ESMU and PIC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
		B.1.3.3	Disturbance of marsh and swamps	No disposal in the marsh and swamps	Contractor	ESMU and PIC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
	B.2. CONSTRUCTION and LABORER CAMPS									
B.2.1	Locating Camp	B.2.1.1	Community disturbance	Locate camp at least 300m away from the communities	Contractor	ESMU and PIC	Review of Camp layout plan	Once	Camp site	Before camp construction
				Employment of Community Liaison Officer	Contractor	ESMU and PIC	Community Liaison Officer Employed	Once	Camp site	After mobilization of Contractor
				Compensation for loss of land and standing crops	IA	ESMEC	The landowner is compensated	Once	Camp site	
			Loss of flora and fauna	Submit layout plans for each camp to the approval of the Engineer before construction of camp		ESMU and PIC				
			Surface water pollution	Locate camps away from the embankments of drainage line, watercourses and Indus River		ESMU and PIC				
B.2.2	Supply of drinking water	B.2.2.1	Depletion of local drinking water resources	Contractor shall make his own arrangements for supply of water ensuring water supply and availability to local communities is unaffected	Contractor	ESMU and PIC	Contractor is not using public water resources	Monthly	Contractor and Engineer's Offices	Throughout construction phase
		B.2.2.2	Spread of disease through unsuitable water supply	provision of safe drinking water and annual testing according to the NEQS	Contractor	ESMU and PIC	Water Supply provided at Camp and test results are within the permissible limit of NEQS	Annually	Contractor and Engineer's Offices	Following the camp construction
B.2.3	Construction of Impermeable	B.2.3.1	Flood risk within Camp	Drainage provided and maintained to convey storm water away from camp	Contractor	ESMU and PIC	Drainage provided in camps	Monthly	Construction Camp	Following the camp

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
	Areas			and settlement						construction
				Camp shall be located above or beyond the river/tributary	Contractor	ESMU and PIC	Review of Camp layout plan	Once	Contractor and Engineer's Offices	Before camp construction
		B.2.3.2	Surface run-off through camp and pollution to surface water	Drainage provided to divert surface run-off from surrounding	Contractor	ESMU and PIC	Drainage provided in camps	Monthly	Construction Camp	Throughout construction phase
				Camp shall be located above or beyond the river/tributary	Contractor	ESMU and PIC	Review of Camp layout plan	Once		Before camp construction
				Hazardous material storage area shall be covered	Contractor	ESMU and PIC	Covered storage of hazardous materials	Once	Construction Camp	Following the camp construction
				Run-off from refueling and wash down areas collected from treatment	Contractor	ESMU and PIC	Measures are in place to collect the run-off from refueling and wash down areas	Once	Construction Camp	Following the camp construction
		B.2.3.3	Spread of disease due to unhygienic looking/cooking/eating / sanitary quarters	Provision of solid flooring and work surfaces which are easily to clean	Contractor	ESMU and PIC	Solid flooring and surfaces are provided	Once	Construction Camp	Following the camp construction
				Contractor shall regularly clean camps	Contractor	ESMU and PIC	Regular cleaning in all areas of camps	Monthly	Construction Camp	Throughout construction phase
				Suitable latrines and washing facilities provided in vicinity of camps	Contractor	ESMU and PIC	Latrines are provided at each camp	Once	Construction Camp	Following the camp construction
				Lined washing facilities including shower, available near each latrine , including clean running water, soap and drying facilities	Contractor	ESMU and PIC	Suitable washing facilities provided at each camp	Once	Construction Camp	Following the camp construction
		B.2.3.4	Wellbeing of staff	Provision of electricity and lighting	Contractor	ESMU and PIC	Lighting and electrical supply provided with generator back-up	Monthly	Construction Camp	Throughout construction phase
				Provision of sheltered kitchens, separated from living quarters with raised washable preparation surfaces	Contractor	ESMU and PIC	Provision of adequate kitchen	Once	Construction Camp	Following the camp construction
				Provision of Doctor	Contractor	ESMU and PIC	Doctor visiting camp site regularly	Monthly	Construction Camp	Throughout construction phase
				Adequately stocked dispensary shall be provided	Contractor	ESMU and PIC	Adequately stocked dispensary available to all site staff	Monthly	Construction Camp	Throughout construction phase
		B.2.3.5	Trees cutting	Contractor shall supply staff with cooking fuel	Contractor	ESMU and PIC	Tree wood not used in kitchen	Monthly	Construction Camp	Throughout construction phase
						-ESMU and	Code of conduct signed	Monthly	Constructio	Throughout

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						PIC	by all staff		n Camp	construction phase
				Include awareness raising on HIV/AIDS and sexually transmitted disease and prevention and treatment of vector borne disease in Contractor training plan	Contractor	ESMU and PIC	Approval of Contractor training plan	Once		At mobilization
						ESMU and PIC	Training as per approved plan	Monthly	Constructio n Camp	Throughout construction phase
		B.2.3.6	Community Conflicts	Set up a complaint register at Contractor and Engineer office	Contractor	ESMU and PIC	Complaint register maintained	Monthly	Contractor and Engineer's Offices	Throughout construction phase
				Contractor shall develop a code of conduct to govern behavior of workers and all staff shall sign	Contractor	ESMU and PIC	Code of conduct approved by Engineer	Once	Contractor and Engineer's Offices	At mobilization
				Contractor shall deliver training on cultural sensitivity to international workforce during induction	Contractor	ESMU and PIC	Code of conduct signed by all staff	Monthly	Contractor and Engineer's Offices	Throughout construction phase
				Contractor's Community Liaison Officer to consult local communities and focus on impacts to women and girls	Contractor	ESMU and PIC	No complaint received regarding mobility of women and girls	Monthly		Throughout construction phase
				Migrant staff prohibited to from entering local villages	Contractor	ESMU and PIC	No complaint received regarding migrant staff entering the local villages	Monthly		Throughout construction phase
		B.2.3.7	Hunting and loss of Fauna	Ban on hunting, poaching and trapping of all fauna by all project personnel's	Contractor	ESMU and PIC	No hunting reported/observed	Monthly	Project area	Throughout construction phase
				Biodiversity monitoring of impacts of fauna	Contractor	ESMU and PIC	Status and behavior of terrestrial and avi-fauna	Quarterly	Project office	Throughout construction phase
		B.2.3.8	Loss of life	Contractor shall prepare a shutdown procedure and evacuation plan	Contractor	ESMU and PIC	Plan submitted to Engineer			
						ESMU and PIC	Annual evacuation drill	Annually	Constructio n Camp	Throughout construction phase
				Emergency access routes shall be signed and maintained	Contractor	ESMU and PIC	Emergency access routes clear and signed	Monthly	Constructio n Camp	Throughout construction phase
				Fire extinguishers to be provided through out camp	Contractor	ESMU and PIC	Fire extinguishers provided	Monthly	Constructio n Camp	Throughout construction phase
				Public areas at risk from fire in camp identified in emergency plan with	Contractor	ESMU and PIC	Plan submitted to Engineer include	Once		At mobilization

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				evacuation measures			evacuation procedure of public in event of major fire			
B.2.4	Camp Planning	B.2.4.1	All of the above issues	Camp layout plan to be submitted to Engineer	Contractor	ESMU and PIC	Review of Camp layout plan	Once		Before camp construction
							Commencement of works not before approval of plan	Daily	Construction Camp	Before camp construction
					Contractor	ESMU and PIC	Construction of camp as per plan		Construction Camp	During construction
B.2.5	Security	B.2.5.1	Conflict with local communities, attack on staff	Security for avoiding any conflict with local communities	Contractor	ESMU and PIC	Fencing and security shall be provided by Contractor at all camps. Entrance to camp shall be monitored and restricted	Monthly	Construction Camp	Throughout construction phase
				Preparation and Implementation of communication strategy	Contractor	ESMU and PIC	Approval of Contractor's Communication Strategy	Once		At mobilization
						ESMU and PIC	Implementation of Contractor's Communication Strategy	Monthly	Project area	Throughout construction period
				Contractor shall provide all staff with Identity Cards showing their association with the project	Contractor	ESMU and PIC	All staff issued with identity cards	Monthly	Project area	
				Sindh speaking staff to be available to all active work sites to communicate with local community	Contractor	ESMU and PIC	Sindhi staff available at all active work sites	Monthly	All active work sites	
				The Contractor shall include in the Emergency Plan, a procedure for emergency evacuation of camp and practice this procedure	Contractor	ESMU and PIC	Plan submitted and approved	Once		At mobilization
							Annual evacuation drill	Annual	Construction camps	Throughout construction period
		B.2.5.2	Change in Landscape after closure of works	All temporary facilities shall be removed by Contractor after completion of the works	Contractor	CSC, EMECs and ESMU	Temporary facilities are removed on completion of works	Once	Construction camps	at completion of works
	B.3. STORAGE OF MATERIAL									
B.3.1	Stockpile storage of materials	B.3.1.1	Increase in particulate matter	Proper covered storage. Water sprinkling of any uncovered stockpile where dust is generated	Contractor	ESMU and PIC	No dust generated from stockpiles	Monthly	Stockpiles	Throughout construction period
				Reduce distance between storage of aggregates, cement and sand to batching plant	Contractor	ESMU and PIC	Review of camp layout plan	Once		Before camp construction
		B.3.1.2	Ground, ground and surface water pollution	Locate storage area away from water courses, drain and transport routes	Contractor	ESMU and PIC	Review of camp layout plan	Once		Before camp construction

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Locate storage area above or beyond the flood plain	Contractor	ESMU and PIC	Review of camp layout plan	Once		Before camp construction
				Use only designated storage areas	Contractor	ESMU and PIC	Stockpile only in storage areas identified in Camp layout plan	Monthly	Project area	Throughout construction period
B.3.2	Storage of hazardous materials	B.3.2.1	Health and safety due to improper use of hazardous material	fuel tanks and other hazardous material storage containers will be properly marked to highlight their contents	Contractor	ESMU and PIC	Hazardous material storage containers adequately labeled	Monthly	Hazardous material storage areas	Throughout construction period
				Hazardous areas to be secure and access limited to trained personnel only	Contractor	ESMU and PIC	Untrained personnel's are not accessing hazardous storage areas	Monthly	Hazardous material storage areas	Throughout construction period
				Hazardous material sites identified on site	Contractor	ESMU and PIC	Signs provided to identify hazardous material storage area	Once	Hazardous material storage areas	Following camp construction
				Provide fire extinguishers	Contractor	ESMU and PIC	Fire extinguishers are provided	Monthly	Hazardous material storage areas	Throughout construction period
				Provide and enforce use of PPEs as per Contractor Health and Safety Plan	Contractor	ESMU and PIC	PPEs used	Monthly	Hazardous material storage areas	Throughout construction period
		B.3.2.2	Ground or surface water pollution	Fuels storage areas shall have masonry or concrete secondary containment bund with 120% capacity of fuel stored	Contractor	ESMU and PIC	Bunding provided at fuel bowsers	Once	Fuel tanks	Following camp construction
				Hazardous material storage areas shall be covered and provided with concrete floor	Contractor	ESMU and PIC	Concrete flood and cover to hazardous material storage areas and generators	Once	Hazardous material storage areas	Following camp construction
				Concrete or masonry bunding provided at perimeter of hazardous material storage area	Contractor	ESMU and PIC	Bunding provided to hazardous material areas and generators	Once	Hazardous material storage areas and generators	Following camp construction
				Daily check of fuel tanks and immediate plugging of leaks	Contractor	ESMU and PIC	No leakage observed at fuel tanks	Weekly	Fuel tanks	Throughout construction period
				Shovels, plastic bags and sand provided at fuel tanks and hazardous material storage area	Contractor	ESMU and PIC	Spill kits provided	Monthly	Hazardous material storage areas and fuel tanks	Throughout construction period
				Spill prevention and contingency plan prepared by Contractor	Contractor	ESMU and PIC	Approval of Plan	Once		At mobilization

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Hazardous material storage area or fuel tank not be situated adjacent to watercourse	Contractor	ESMU and PIC	Review of camp layout plan	Once		Before construction camp
				Space maintained between containers to allow inspection	Contractor	ESMU and PIC	Containers spaced to allow inspection	Monthly	Hazardous material storage area	Throughout construction period
				Select access roads to avoid run-off to river.	Contractor	ESMU and PIC				
		B.3.2.3	Health and safety and Pollution	Oil designated storage area used	Contractor	ESMU and PIC	Stockpiles only in storage areas identified in camp layout plan	Monthly	Project area	Throughout construction period
				Training on handling, use and disposal of hazardous material must be given to all those with access to hazardous material area	Contractor	ESMU and PIC	Training as per Contractor's approved training plan	Monthly	Hazardous material storage area	Throughout construction period
				Covered transportation of hazardous material	Contractor	ESMU and PIC	Hazardous material covered during transport to site	Monthly	Project area	at completion of works
		B.3.2.4	Ground and surface water pollution after closure of works	All excess materials (other than earth stockpiles) shall be removed on completion of works	Contractor	ESMU and PIC	Excess construction material removed	Once	Project area	at completion of works
B.4. WASTE MANAGEMENT										
B.4.1	Generation of Sanitary Wastes	B.4.1.2	Surface and groundwater pollution and health of staff	All excess materials (other than earth stockpiles) shall be removed on completion of works	Contractor	ESMU and PIC	Excess construction material removed	Once	Project area	at completion of works
B.4.2	Disposal of sanitary wastes using municipal system (if available)	B.4.2.1	Introduction of inappropriate contaminants or waste volume to municipal system	Annual testing of wastes and submission of results to Engineer	Contractor	ESMU and PIC	Test results show wastes is within NEQS limit for pre-treatment	Annual	Construction camps	Throughout construction period
				Written consent from the operator of the municipal system submitted to Engineer	Contractor	ESMU and PIC	Consent submitted	Once		At mobilization
		B.4.2.2	Use of municipal system which falls below NEQS standards	Only government approved system to be approved	Contractor	ESMU and PIC	Government approved system used	Once	Construction camps	At mobilization
B.4.3	Treatment of sanitary wastes using septic tank	B.4.3.1	Introduction of inappropriate contaminants septic system	Only sanitary wastes treated in septic tank	Contractor	ESMU and PIC	No construction waste water entering septic tank	Monthly	Construction camps	
		B.4.3.2	Ineffective treatment of waste leading to ground or surface water pollution	Regular maintenance of the system by Contractor	Contractor	ESMU and PIC	Monitoring of effluents against NEQS	Quarterly	septic tanks	Throughout construction period
				Submit pollution plan to Engineer including design or specifications of	Contractor	ESMU and PIC	Plan submitted and approved	Once		Throughout construction

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				system to show treatment rate exceeds loading rate and include plan for treatment/disposal of sludge						period
							treatment as per approved plan	Monthly	Construction camps	
		B.4.3.3	Surcharge of septic system surface	Location of system to ensure surcharge shall not reach surface water bodies	Contractor	ESMU and PIC	Review of camp layout plan	Once	Construction camps	Before construction camp
B.4.4	Collection of domestic wastes	B.4.4.1	Surface and groundwater pollution	Provide garbage bins within all camps for domestic wastes	Contractor	ESMU and PIC	Provision of bins	Monthly	Construction camps	Throughout construction period
		B.4.4.2	Regular collection and disposal of wastes	Regular and disposal of wastes	Contractor	ESMU and PIC	Bins are not full	Monthly	Construction camps	Throughout construction period
B.4.5	Generation of wastes	B.4.5.1	Air, ground and surface water pollution	Return excess construction material to supplier	Contractor	ESMU and PIC	Used construction material not disposed of	Monthly	Landfills and burns sites	Throughout construction period
				Use of recycling Contractor	Contractor	ESMU and PIC	Recyclable material not disposed of	Monthly	Landfills and burns sites	Throughout construction period
				Sell steel of the old gates to contractor through auction as per procedure prescribed by the Government of Sindh		ESMU and PIC		Monthly	Landfills and burns sites	Throughout construction period
				Reuse of domestic wastes (if applicable)	Contractor	ESMU and PIC	Demolition wastes not disposed of where use available elsewhere	Monthly	Landfills and burns sites	Throughout construction period
B.4.6	Landfill of domestic wastes	B.4.6.1	Ground and groundwater pollution, spread of disease	Landfill shall be located where groundwater is low. If base of landfill is permeable, clay/geotextile lining is required	Contractor	ESMU and PIC	Groundwater should not be observed in landfill	Monthly	Landfills	Throughout construction period
				Inert wastes only to be disposed of in landfills	Contractor	ESMU and PIC	No hazardous waste, medical waste or sanitary in landfills	Monthly	Landfills	Throughout construction period
		B.4.6.2	Health and safety of community and fauna	Fencing around landfill	Contractor	ESMU and PIC	Fencing provided	Monthly	Landfills	Throughout construction period
		B.4.6.3	Landscape change	Landfill shall be covered with top soil to original ground level following use	Contractor	ESMU and PIC	Landfill capped	Once	Landfills	Decommissioning
		B.4.6.4	Social conflicts, odor, community health and safety	Landfill to be situated at least 100m away from the settlement	Contractor	ESMU and PIC	Review of camp layout plan	Once		Before camp construction
B.4.7	Burning of waste	B.4.7.1	Air pollution	Burning of any material resulting in release of toxic emissions is prohibited	Contractor	ESMU and PIC	Evidence of burning of paper, cards and woods only	Monthly	Burn pits	Throughout construction period
		B.4.7.2	Fire	Contractor shall provide fire extinguishers at burn sites	Contractor	ESMU and PIC	Fire extinguishers are provided	Monthly	Burn pits	Throughout construction period
B.4.8	Disposal of	B.4.8.1	Ground, groundwater	Medical wastes stored on site and	Contractor	ESMU and	No medical wastes in	Monthly	Landfill and	Throughout

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
	medical wastes		and surface water pollution, health and safety	ultimately disposed of at medical incinerator		PIC	landfill or burn pits		Burn pits	construction period
B.4.9	Disposal of hazardous wastes	B.4.9.1	Ground, groundwater and surface water pollution, health and safety	Hazardous wastes to be passed to licensed contractor, or wastes to be stored in long term storage facilities meeting requirement of hazardous material storage area to be taken on client following construction. Details to be provided in pollution plan to the Engineer.	Contractor	ESMU and PIC	Approval of Plan	Once		At mobilization
B.4.10	Transport of wastes	B.4.10.1	Littering, pollution	Waters shall be covered (e.g. with a tarpaulin) during transport	Contractor	ESMU and PIC	No wastes littering the project area	Monthly	Routes from camps landfill	Throughout construction period
B.4.11	Disposal of Batching Plan washout	B.4.11.1	Ground, groundwater and surface water pollution, health and safety	Treatment plan to be included in Contractor's plan to include, as necessary , flow and local equalization, pH adjustment, sedimentation using settling basins or clarifiers	Contractor	ESMU and PIC	Approval of Plan	Once		
B.4.14	Closure of works	B.4.14.1	Ground, groundwater and surface water pollution, health and safety	All solid wastes not within the landfill shall be removed from the project area on completion of works		ESMU and PIC	All solid wastes landfill or removed from the site	Once	Project area	On completion of works
B.5. CONSTRUCTION PLANT and VEHICLES										
B.5.1	Movement/operation of vehicles/plants on site	B.5.1.1	Air pollution	All plants and vehicles are regularly services as per manufacturers requirements	Contractor	ESMU and PIC	Black smoke not observed emitting from Vehicles/plant	Monthly	Project area	Throughout construction period
						ESMU and PIC	Monitoring of ambient air quality as per NEQS	Bi-annual	Project area	Throughout construction period
				Efficient driving practices included in Contractor's training plan	Contractor	ESMU and PIC	Submittal and approval of plan	Once		At mobilization
						ESMU and PIC	Training as per approved plan	Monthly	Project area	Throughout construction period
		B.5.1.2	Generation of dust	Access road to be adequately compacted or regularly sprinkled to prevent dust generation during use	Contractor	ESMU and PIC	Dust not reaching the settlements in the project area	Monthly	Settlement in the project area	Throughout construction period
				Construction traffic limited to work area and established tracks	Contractor	ESMU and PIC	Construction traffic use only established tracks	Monthly	Project area	Throughout construction period
		B.5.1.2	Soil and Groundwater pollution	Vehicles/plants will be checked daily for fuel oils and leaks and fixed as required	Contractor	ESMU and PIC	No fuel oil leaks observed form plant/vehicle	Monthly	Project area	Throughout construction period
		B.5.1.3	Community disturbance increase in traffic	Project vehicles in plant parked in designated areas as per camp layout plan	Contractor	ESMU and PIC	No vehicle observed parked outside the approved areas	Monthly	Project area	Throughout construction period

Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
				Execution	Monitoring				
			Movement of vehicles/plant restricted to work hours	Contractor	ESMU and PIC	No movement of vehicles/plant beyond works hours	Monthly	Project area	Throughout construction period
			Warning signs must be provided where access routes pass adjacent to settlements	Contractor	ESMU and PIC	Warning signs provided near settlement	Monthly	Settlement in the project area	Throughout construction period
	B.5.1.4	Safety of community, other road users, fauna and staff	Vehicles speed limited to 30km/hr	Contractor	ESMU and PIC	Submittal and approval of plan	Once		At mobilization
			Safe driving practices included in Contractor's training plan	Contractor	ESMU and PIC	Training as per approved plan	Monthly	Project area	Throughout construction period
			All Drivers hold a valid license	Contractor	ESMU and PIC	Drivers able to show valid license	Monthly	Project area	Throughout construction period
			Flag persons to be provided where plant cross/meet village road	Contractor	ESMU and PIC	Flag persons provided	Monthly	Road approaching and crossing	Throughout construction period
			Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	ESMU and PIC	No complaint received from communities	Monthly	Settlement in the project area	Throughout construction period
			Plant/vehicles with restricted rear visibility to be fitted with audible back-up alarm or provided with banksmen	Contractor	ESMU and PIC	Back-up alarms or banksmen provided	Monthly	Project area	Throughout construction period
			Mud shall be cleared from vehicle before entering public roads, or else public roads shall be cleared of mud regularly	Contractor	ESMU and PIC	No mud on public roads	Monthly	Project area	Throughout construction period
			Driving in project area after nigh fall is prohibited except on public highways	Contractor	ESMU and PIC	No driving after dark	Monthly	Haul roads and temporary access roads	Throughout construction period
		Damage to public infrastructure	Damage to roads, infrastructure and property immediately repaired/compensated by Contractor	Contractor	ESMU and PIC	No damage to roads/infrastructure	Monthly	Public roads	Throughout construction period
			Use of horns is prohibited near the settlement	Contractor	ESMU and PIC	Nor horns heard at settlement	Monthly	Settlement in the project area	Throughout construction period
			Acoustic guards, cover and doors provided on plant and vehicles shall be left in place	Contractor	ESMU and PIC	Acoustic guards, silencers, cover and doors provided on plant and vehicles left in place	Monthly	Project area	Throughout construction period
			Plants and vehicles to adhere to noise	Contractor	ESMU and	Monitor with noise	Weekly	Project area	Throughout

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				standard specified in NEQS		PIC	meter			construction period
				Plants/vehicles shall be restricted from playing radio/taps audible beyond the plant	Contractor	ESMU and PIC	Radio/taps are not audible at 50m or further from plant	Monthly	Project area	Throughout construction period
			Disturbance of Fauna	Biodiversity monitoring of impacts on fauna	Contractor	ESMU and PIC	Status and behavior of terrestrial and avi-fauna	Quarterly	Project area	Throughout construction period
			Reduction in access to women and girls	Avoid routes use by women and girls as far as possible, if unavoidable, identify alternate routes for women and girls	Contractor	ESMU and PIC	No complaint received from women and girls	Monthly		Throughout construction period
B.5.2	Deliveries to Site	B.5.2.1	Air pollution	Delivery vehicles engines should be off when queuing	Contractor	ESMU and PIC	Queuing vehicles engines are not idling	Monthly	Construction camp	Throughout construction period
		B.5.2.2	Dust	Covered transportation of loose materials	Contractor	ESMU and PIC	No dust generation from delivered materials	Monthly	Approach roads	Throughout construction period
		B.5.2.3	Community disturbance increase in traffic	Traffic management plan to be submitted to Engineer for approval and to include routes for delivery vehicles	Contractor	ESMU and PIC	Submittal and approval of plan	Once		At mobilization
							Delivery vehicles are following designated routes	Monthly	Construction camp	Throughout construction period
				Deliveries should aim to avoid peak traffic hours (9-11am and 2-5pm)	Contractor	ESMU and PIC	No deliveries between 9-11am and 2-5pm)	Monthly	Construction camp	Throughout construction period
				Delivery vehicles are prohibited form queuing on public roads	Contractor	ESMU and PIC	No queuing delivery vehicles on public roads	Monthly	Construction camp	Throughout construction period
				Vehicles to be unloaded off	Contractor	ESMU and PIC	No unloading on public roads	Monthly	Construction camp	Throughout construction period
B.5.3	Road Closure	B.5.3.1	Community disturbance increase in traffic	Flag persons to be provided where plant cross/meet village road	Contractor	ESMU and PIC	Flag persons provided	Weekly	At road partial closure	During partial road closure
				Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	ESMU and PIC	No complaint received	Monthly	Settlement in the project area	Throughout construction period
				Traffic by-pass should be provided and signed	Contractor	ESMU and PIC	By-pass provided and signed	Monthly	At road full closure	During road closure
				Request for road closure must be approved by relevant authority	Contractor	ESMU and PIC	Approval for road closure submitted to Engineer	Once for each closure		Throughout construction period
B.5.4	Refueling of vehicles and plant	B.5.4.1	Ground and surface water pollution	Refueling points to be provided with a concrete pad and bund or drip trays	Contractor	ESMU and PIC	No fuel spillage from refueling operations	Monthly	Project area	Throughout construction

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
	on land or filling of fuel drums			used. Spill fuel disposed of as hazardous waste (of reused If possible)						period
B.5.5	Wash-down of plants and vehicles	B.5.5.1	Ground and surface water pollution	Wash down of plants only in designated areas as per site layout plan	Contractor	ESMU and PIC	Vehicles not washed down outside designated area	Monthly	Project area	Throughout construction period
				Wash-down areas have concrete pad foundations	Contractor	ESMU and PIC	Concrete pad foundation provide	Monthly	Wash-down areas	Throughout construction period
				Run-off from wash down areas to be collected and treated in separation tank. Oil to be disposed of as for hazardous wastes or reused as lubricants	Contractor	ESMU and PIC	Wash-down water is treated	Monthly	Wash-down areas	Throughout construction period
		B.5.5.2	Depletion of local water resources	Contractor is prohibited from using groundwater for wash-down of plant and vehicles	Contractor	ESMU and PIC	Groundwater is not used for construction purposes	Monthly	Wash-down areas	Throughout construction period
B.6. HEALTH and SAFETY										
B.6.1	General construction works	B.6.1.1	Health and safety of staff	Contractor shall prepare and submit occupational health and safety plan	Contractor	ESMU and PIC	Submittal and approval of plan	Once		At mobilization
						ESMU and PIC	Implementation of approved plan	Monthly	Project area	Throughout contract period
				Provision and enforcement in use of all necessary PPEs as per approved health and safety plan	Contractor	ESMU and PIC	Use of all necessary PPEs by staff at work site	Monthly	Project area	Throughout contract period
				Contractor will submit accident report to the Engineer following any accident on site. Report must details actions to be taken to reduce risk of occurrence	Contractor	ESMU and PIC	Submittal of accident report	Monthly	Project area	Throughout contract period
				Qualified health and safety manager will be appointed by Contractor	Contractor	ESMU and PIC	Qualified health and safety manager present on site	Monthly	Project area	Throughout contract period
				Contractor shall engage a registered doctor on site	Contractor	ESMU and PIC	On site Presence of qualified Doctor	Monthly	Project area	Throughout contract period
				Provision of dispensary for treatment of staff. Dispensary to be stocked with appropriate medicines for likely incidents, diseases and ailments to be occurred on site. Stock to be replenished as necessary.	Contractor	ESMU and PIC	Dispensary available on site and regularly restocked	Monthly	Project area	Throughout contract period
				First aid facility shall be provided at each work site in the project area	Contractor	ESMU and PIC	First aid facilities provided at each work site	Monthly	Project area	Throughout contract period
				The Contractor shall include in the health and safety plan a procedure for the transfer of injured staff from the site	Contractor	ESMU and PIC	Submittal and approval of plan	Once		At mobilization

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				to medical facilities including transport and provision of medical treatment in en-route.						
							Provision of resources required for implementation	Monthly	Project area	Throughout contract period
B.7 Stone Pitching and Formation of Embankments										
B.7.1	Vegetation Clearance	B.7.1.1	Loss of flora	The area of clearance shall be limited to the area of work		ESMU and PIC	the area of clearance is limited to the area of work	Weekly	Project area	Throughout contract period
B.7.2	Trees Cutting	B.7.2.1	Impacts on flora and fauna	Tree inventory is prepared	Contractor and PIC	ESMU and PIC	Tree inventory prepared	Weekly	Project area	Throughout contract period
				Compensatory tree plantation is proposed	Contractor	ESMU and PIC	compensatory tree plantation is carried out	Monthly	Project area	Throughout contract period
B.7.3	Forming embankments	B.7.3.1	Flooding	Provide alternative drainage for rainwater if earthworks fill established drainage lines	Contractor	ESMU and PIC	alternative drainage is provided	Monthly	Project area	Throughout contract period
B.7.4	Formation of Borrow Areas	B.7.4.1	Habitat loss	Borrow areas shall not be established in the agriculture active land	Contractor	ESMU and PIC	Borrow areas are not established in the agriculture active lands	Weekly	Project area	Throughout contract period
		B.7.4.2	Borrowing from toes of embankments	the material shall not be borrowed from the outer and inner toe of the embankments	Contractor	ESMU and PIC	Material are not borrowed from the toe of the embankments	Weekly	Project area	Throughout contract period
		B.7..4. 3	Borrow area in environmental sensitive sites	Borrow areas shall not be established in the wetlands, forest and any other environmental and social sensitive areas	Contractor	ESMU and PIC	Borrow areas are not established in the environmental and social sensitive sites	Weekly	Project area	Throughout contract period
		B.7..4. 4	Restoration/rehabilitation of borrow areas	Restoration of borrow areas	Contractor	ESMU and PIC	Borrow areas are restored to its original condition if situated in the private land	Monthly	Project area	Throughout contract period
		B.7.4.5	Loss of wetlands	Borrow areas within wetlands is prohibited	Contractor	ESMU and PIC	Borrow areas are not located in wetlands/marsh lands and swamps	Weekly	Project area	Throughout contract period
		B.7.4.6	Loss of topsoil	Remove and stockpile topsoil which is unsuitable for use in embankment formation	Contractor	ESMU and PIC	top soil is removed	Weekly	Project area	Throughout contract period
		B.7.4.7	Loss of access to Indus River	Access across borrow areas to the embankments shall be maintained by ensuring a 3m (10ft) wide strip remains unexcavated at 300m	Contractor	ESMU and PIC	access routes are maintained	Weekly	Project area	Throughout contract period
		B.7..4. 8	Increased seepage losses from Indus River	A clearance of 5m (16ft) must be maintained between proposed embankment toe and borrow areas	Contractor	ESMU and PIC	A clearance of 5m is maintained	Weekly	Project area	Throughout contract period
B.7.5	Access to borrow	B.7.5.1	Impacts on flora and	available/existing access routes shall	Contractor	ESMU and	existing access routes	Weekly	Project area	Throughout

	Project Activities		Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
	areas		fauna	be followed		PIC	are followed			contract period
		B.7.5.2	Impacts on agriculture land and crops	access routes in agriculture land shall be avoided			Same as above	Weekly	Project area	Throughout contract period
		B.7.5.3	if access rout in the agriculture land is unavoidable, the owner of the land and crop shall be compensated	Compensation to the affected person shall be paid			the affected person is compensated	Weekly	Project area	Throughout contract period
B.7.6	Loading lorries/dump trucks	B.7.6.1	Disturbance of ambient air	Minimize height between loader (excavator) and bed of lorry/dump truck	Contractor	ESMU and PIC	minimum height is maintained	Weekly	Project area	Throughout contract period
B.7.7	Restoration of borrow areas	B.7.7.1	Loss of habitat and landscape change	Potential for shallow wetland creation shall be maximized by limited restored depth of borrow area to 0.3m	Contractor	ESMU and PIC		Monthly	Project area	Throughout contract period
		B.7.7.2	Loss of topsoil	Spread stockpiled topsoil (where topsoil is unsuitable for formation of embankment) over borrow areas	Contractor	ESMU and PIC		Weekly	Project area	Throughout contract period
		B.7.7.3	Landscape change	Grade sides of borrow areas to 1:3	Contractor	ESMU and PIC		Weekly	Project area	Throughout contract period
B.8 Archaeology and Cultural Sites										
B.8.1	Construction near cultural sites	B.8.1.1	Community disturbance	Exclude all works (including transport and haulage) from vicinity of community structures Identified in Socio-Environmental Map	Contractor	ESMU and PIC	All works excluded from within 6m (20ft) of community structures	Weekly	Project Area	Throughout contract period
B.8.2	Construction near religious sites	B.8.2.1	Community disturbance	All works excluded from mosque at MS Bund Mile 36/2 and Mir Pir (Spiritual Place for local people) at BU Bund at Mile 28.4	Contractor	ESMU and PIC	All works excluded from the identified locations			Throughout contract period
				Works do not block access to sites	Contractor	ESMU and PIC	access to the sites is not blocked			
B.8.3	Discovery of unidentified cultural or religious site	B.8.3.1	Community disturbance	Contractor shall not trespass into the site, shall exclude all works and immediately inform Site Engineer	Contractor	ESMU and PIC	Engineer informed of discovery of unidentified cultural or religious sites	Monthly	Project Area	Throughout contract period
C. OPERATION PHASE										
C.1	Spoil heaps	C.1.1	Change in landscape	Use of surplus excavated material in agricultural fields or for construction of homes by the farmers to increase fertility and raising of low lying fields	SID	SID	Spoil heaps are used by the farmers	Continues	Entire project area	Continuous
C.2	Care of newly planted trees	C.2.1	Mortality of newly planted saplings	The Contractor shall be responsible for after care of the newly planted trees for the first year, after which trees will become responsibility of SID	Contractor and SID	SID	Survival of trees	Once	Entire project area	Continuous

6.4. Compliance and Effects Monitoring

PIC shall carry out monitoring within the subproject area using the monitoring checklists to be prepared on the basis of this mitigation and monitoring plan provided in **Table 7**. To aid the monitoring process, the Contractor will complete the following:

- Submit the plans detailed earlier in this Chapter.
- Train construction staff for the implementation of the ESMP and safety measures.
- Submit various progress reports to the Environmental and Social Specialists of PIC and ESMEC.
- Explain Implementation of various environmental aspects to visiting national and international agencies and representatives of donor.
- Receive monitoring reports/notes issued by ESMU and PIC and take action to mitigate various violations to ESMP.
- Regularly submit reports to PIC Engineer and Environment Specialists about the compliance to the ESMP and various issues related to the Occupational Health and Safety (OHS)
- OHS measures adopted (OHS statistics)
- Fuel and hazardous material consumption
- Workforce statistics (employment/deployment).

Two complementary approaches are proposed to monitor the ESMP: a) Compliance monitoring to check whether the actions proposed in the ESMP is being carried out; and b) Effects monitoring to record the impacts of mitigation measures adopted on the biophysical and social environment; as applicable, these effects are repeatedly measured. Compliance monitoring will be completed by PIC and ESMU with independent monitoring by ESMEC. The effects monitoring shall be the responsibility of PIC. Both approaches will be conducted using the monitoring parameters given in **Table 7** by visual observation, photographic documentation and measurement where necessary. A record of events and surveys will be maintained. Compliance monitoring will be facilitated using checklists included to be prepared by PIC and ESMU during the project implementation.

6.5. Reporting and Documentation

The Contractor and Project Implementation Consultants (PIC) environmental and social teams will produce monthly, quarterly and works completion reports of the sub-projects based on the social and environmental issues. The distribution of the reports shall be to IA, ESMEC and World Bank. A photographic record of the project area shall be kept. Photographs shall be taken at key locations using digital camera of the project area in walk through survey by contractor, PIC and ESMU. The photographic record shall be incorporated into the monthly reports. Completed monitoring checklists to be prepared separately during the implementation of the project by PIC, ESMU and ESMEC shall be appended to the monthly reports.

6.6. 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.

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 Public Complaint Center (PCC) by themselves or through GRM entry points (the CFP, SID, PIC,

and 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 working days to the complainant, IA 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 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 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 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.

6.7. Environmental Social Management Framework and Resettlement Policy Framework (ESMF/RPF) for Later Year Sub-projects

As mentioned in Chapter 1, the SRP project envisages a number of interventions under its Component 2 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. An ESIA has been prepared for the sub-project to be implemented during the first year of SRP implementation. As the list of remaining sub-projects and their locations is not finalized, therefore a framework approach has been adopted for the subprojects to be implemented during the later years of SRP implementation. Under this approach, an Environmental and Social Management Framework (ESMF) along with a Resettlement Policy Framework (RPF) has been prepared to identify the potential but generic adverse environmental and social impacts of the subprojects to be implemented during the later years of SRP implementation, propose mitigation measures to address these potential impacts, and finally, to provide basic screening criteria for selecting the subprojects to be undertaken during later years.

The ESMF/RPF defines that: i) a full EIA/ESA including an ESMP and RAP will be carried out for subprojects requiring new construction or having significant irreversible and widespread impacts or involving significant degradation of forests of sensitive areas, requiring land acquisition or dam height more than 15m; ii) an ESMP (and a RAP if needed) will be prepared for medium-sized sub-projects involving rehabilitation of existing structures, potentially causing low to moderate level of negative but reversible and localized impacts; and iii) Environmental and Social Checklists will be filled for smaller subprojects resulting in low / negligible impacts.

6.8. ESMP Implementation Cost

The estimates for the key ESMP components are summarized in the **Table 8** below. A budget of about **PKR 7.7 million** has been estimated for the implementation of the ESMP. The resettlement cost of about PKR 2.47 million shall be paid from the counterpart fund to be provided by the Government of Sindh. Appropriate clauses will be added to the Construction Contract(s) to ensure a mechanism for compliance and payment.

Table 8: Environmental and Social Management and Monitoring Cost

Component	Activity/Basis	Cost (PKR)
Effects Monitoring Cost		1,000,000
Training Cost		1,000,000
Compensatory Tree Plantation Cost	1000*5*600	3,000,000
Traffic Management		200,000
Resettlement Cost	For structure along inner slope of embankments	2,470,434
Total Cost		**7,670,434**

7 Stakeholders Consultations

7.1. 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. The consultations with various stakeholders were carried out in accordance with the World Bank Operational Policy (OP4.01).

7.2. 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. In the case of the embankment sub-projects, the stakeholders are people settled adjacent to the embankments of the Indus River and 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:

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 the embankment sub-projects covered under this ESMP are;

- Potential project-affected persons (PAPs) i.e. squatters located within Corridor of Influence (Col).
- The general population / residents, as well as any institutions, Government departments, within primary impact zone who may be subject to direct or indirect impact on their residences 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.

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 the embankment sub-projects are:

- People settled in the area frequently damaged due to breach of the embankments in the past or the people prone to flooding in future due to degradation of the existing embankments. These people will be potentially impacted by this project, positively in the long term through protection of their houses, livelihood, agriculture land, crops and livestock.
- The Project Proponent i.e. Irrigation Department, Government of Sindh
- The WWF Sindh and Forest and Wildlife Department Government of Sindh.

7.3. Community Consultations

The conduct of the community consultations involved a program of structured discussions in communities in the vicinity of primary impact as well as secondary zone (the villages settled in the radius of 1km on both sides) of the embankment sub-projects was carried out. In all, consultations were conducted in 2 villages involving 98 community members.

Findings of Public Consultation with Male Community Members

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

MS Bund-Wadero Ghulam Thenga Goth

- The villagers were happy about the widening, raising and stone pitching of Bunds. They think that proposed rehabilitation works is necessary for the safety of their villages, agriculture land and crops.
- They understood that they will not face any loss or problem after the project work.
- They reported that they face lake of potable water and health facilities.

MS BUND- Saeedpur Village

- The villagers were very happy with the project.
- They believed that project will protect village from flood.

- They demanded that since there is availability of local labor in the area, they should be given priority in doing unskilled work during project works.

MS Bund- Goth Saleh M. Khoso

- Laborers and farmers of village think that project impacts would be positive for them and project will safeguard them during flood seasons.
- They expect that project will also provide them job opportunities.

MS Bund- Goth Malik M. Sharif

- Villagers think that project impacts are positive for them; project will safeguard them from the floods during monsoon seasons.
- They expect the employment opportunities for them from project.

MS Bund- Goth Muhammad Hassan

- They told that project is most important for their safety and it will protect village from flood.
- They told that project must be started as soon as possible because currently Indus river bund is away from the reach of water and it will be easy to work.
- They demanded that many employment opportunities of project must be provided to unskilled villagers.

MS Bund- Rod Mori

- The villagers told that project will leave positive impacts on village and agricultural land.
- They expected that project will create many employment opportunities for unskilled villagers.

MS Bund- Chohar Jamali Town

- The People of town are very happy with the project.
- They believed that project will protect town from flood.
- The person of town shown their willingness for the volunteer works on the project.
- They demanded that since there is availability of local labor in the area, they should be given priority in doing unskilled work during project works.

SH Bund- Village Ghulam Shah

- The villagers were happy that finally their demand has been accepted by the government and the bund widening and pitching is being approved.
- They reported that they were at very risk in 2010 and 2015 flood.
- They told that project will protect village and our property.
- The villagers expressed their willingness to work as laborers during the project works.

BU Bund- Goth Yar Mohammad Girano

- The villagers told that this project will give protection to their houses and agricultural land.
- They demanded that during project work, labor jobs must be given to villagers.

BU Bund: Gora Bari Town

- The people of town appreciated project and shown their willingness for the project.
- They believed that project will protect villages of town and main city from flood.
- The peoples of town had shown their willingness for the volunteer works of the project.
- They demanded that since there is availability of local labor in the area, they should be given priority in doing unskilled work during project works.

BU Bund-Qasim Khan Khushk

- Villagers told that this project will leave positive impacts in the area. Project will provide safety to their village and property.
- They also offered their volunteer services for the project.
- They demand that labor jobs from project for unemployed villagers.

BU Bund: Goth Abdullah Khan Hamro

- The villagers told that project has positive impacts; it will protect our village and agricultural land.
- They demanded that during project work, labor jobs must be given to villagers.

BU Bund- Goth Essa Mehar

- The villagers told that this project will provide protection to their houses and agricultural land.
- They told that they appreciate this project and they don't have any concern with this project.
- They demanded that during project work, labor jobs must be given to villagers.

BU Bund- Goth M.SumarShoro

- Villagers told that this project will leave positive impacts in the area. Project will provide safety to their village.
- They also offered their volunteer services for the project.
- They demanded that labor jobs from project must be given to unemployed villagers.

BU Bund: Goth haji Ibrahim

- Villagers were happy about the project. They think that project will safeguard them from flood.
- They also offered their volunteer services for the project.

Indo Bund- Goth Muhammad Sumar Jonejo

- The villagers were happy about the project.
- They believed that project will protect their village from flood.
- They demanded that since there is availability of local labor in the area, they should be given priority in doing unskilled work during project implementation.

Indo Bund- Goth Noor Mohammad Junejo

- The villagers told that project has positive impacts. It will provide safety to their village and agricultural land.
- They expected that project will create many employment opportunities for unskilled villagers.

Indo Bund- Dandari

- The villagers told that their village and agricultural land will be protected due to the project intervention.
- They told that they appreciate this project and they don't have any concern about this project.
- They think that their business will also be improved.
- They demanded that during project work, labor jobs must be given to villagers.

7.4. Findings of Public Consultation with Female Community Members

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

- During the consultation with the female community members, most of the women were in favor of the sub-project and also having 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.

7.5. Consultation Workshop

Second round of public consultation was carried out when the draft ESMF and ESMP was prepared. A Disclosure/Consultative Workshop on ESMF SRP and for this ESMP was organized in the Irrigation office in Thatta on 30th December, 2015. The executive summaries of the draft ESMF 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 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/XENs. A total of 65 participants attended the consultation workshop.

Findings of Consultation Workshop

Khuda Bux (Social Mobilizer): He expressed concern 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. 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. He pointed out that without community participation development can never be sustainable. He questioned whether people residing near proposed dam sites have been consulted by the consultant team. He inquired that how it will be ensured that mitigation measures mentioned in the environment assessment reports are implemented by the Contractor. He proposed that stone pitching be carried out along PB bund so that people residing in nearby villages are protected from the flood.

Response of SRP Consultant and SID: The SRP Consultant team has carried out detailed primary stakeholder consultation at SH, BU, Indo and MS bund the details of which are provided in the ESMP document. Detailed environmental and social survey for proposed small dams has not been started by the team as yet. Along with other members the 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 an institutional arrangement is proposed in the ESMF for transparent and effective implementation of the ESMF and ESMP. Different institutions will be involved in the implementation of the ESMP 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. The SID 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. Contractor staff will be strictly prohibited from entering forests and causing cutting of trees there. The proponent is well aware of the need to carry out pitching work along PB bund in view of its vulnerability to floods and it has been included in the scope of works under SRP.

Abdul Khalique Soomro (Landlord): 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. He also 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. He suggested that additional landhis be constructed along bunds. He raised the concern that Keenjhar Lake is being contaminated by discharge of untreated wastewater. He proposed to take measures to prevent discharge of untreated wastewater into Keenjhar Lake.

Response of SRP Consultant and SID: The Superintendent Engineer explained in detail 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 flood monitoring stations will be rehabilitated and more flood monitoring stations will be established along Indus River bunds. His 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.

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?

Response of SRP Consultant and SID: 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.

Ali Muhammad Hingoro (Landlord): 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. The purpose of this project is to enhance the environmental resistance to climatic disasters. Will tree plantation be carried out in this project to achieve this objective?

Response of SRP Consultant and SID: In reaches of the bunds where stone pitching/ widening works are proposed your proposal for repair/maintenance of access ramp will also be included. Tree plantation has been proposed in the ESMP. For every cut down tree five trees will be planted by the contractor.

Ghulam Rasool Dal (Teacher): He proposed that repair/maintenance of access routes along bund is included in the scope of works.

Response of SRP Consultant and SID: In reaches of the bunds where stone pitching/ widening works, the SID ensured that this proposal for repair/maintenance of access ramp will also be included.

7.6. Information Disclosure

The Irrigation Department will disclose the ESIA and ESMF to the local communities in the subproject area. This will ensure that local communities are aware of project key impacts, mitigation measures and project implementation mechanism. The executive summary of the ESMP will be translated in Sindhi language and made available to the local communities. ESIA, ESMF and Sindhi version of their executive summaries will be placed at the SID official website and will be made available in SID relevant offices. The ESIA and ESMF will also be disclosed at the WB InfoShop.