GOVERNMENT OF SINDH

Irrigation Department

DISASTER AND CLIMATE RESILIENCE ENHANCEMENT PROJECT (DACREP)

ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT (ESIA) OF SH, BU, INDO, AND MS EMBANKMENTS OF INDUS RIVER

January 2016

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ISO 9001 Certified

DOCUMENT ISSUE AND REVISION RECORD

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DOCUMENT HISTORY:

Job Number:	JB 083-S-EM
Project:	Environment and Social Assessment of Disaster and Climate Resilience Enhancement Project (DACREP)
Client:	Government of Sindh, Irrigation Department
Consultants:	Associated Consulting Engineers–ACE (Pvt) Ltd
Document Ref:	02
Document Title:	**Environmental and Social Impacts Assessment (ESIA) of MS, SH, BU and Indo Embankments of Indus River**

Revision	Purpose Description	Originated	Checked	Review	Authorized	Date
0	Draft for Client Review	S.M. Kakar	M. Ibrahim Samoon	M. Ibrahim Samoon	M. Ibrahim Samoon	16-12-15
1	Revised in the light of WB Comments	S.M. Kakar	M. Ibrahim Samoon	M. Ibrahim Samoon	M. Ibrahim Samoon	09-01-16
2	Revised in the light of WB Comments	S.M. Kakar	M. Ibrahim Samoon	M. Ibrahim Samoon	M. Ibrahim Samoon	19-01-16
3	• Document title has been changed • Text revised at some places in light WB comments • Material on RAP has been excluded	S.M. Kakar	M. Ibrahim Samoon	M. Ibrahim Samoon	M. Ibrahim Samoon	23-01-16

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List of Acronyms

ACE	Associated Consulting Engineers (Pvt) Ltd
BP	Bank Policy
BU	Bughar Ucheto
COI	Corridor of Impacts
DACREP	Disaster and Climate Resilience Enhancement Project
DC	Deputy Commissioner
EC	Electrical Conductivity
EIA	Environmental Impacts Assessment
ESIA	Environmental and Social Impacts Assessment
ESA	Environmental and Social Assessment
ESMECs	Environmental/Social Monitoring and Evaluation Consultants
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESMU	Environmental and Social Management Unit
ESU	Environmental and Social Unit
GoS	Government of Sindh
GRC	Grievance Redress Committee
GRF	Grievance Redress Focal Point
GRM	Grievance Redress Mechanism
HSE	Health, Safety and Environment
IBIS	Indus Basin Irrigation System
IEE	Initial Environmental Examination
ISDS	Integrated Safeguards Data Sheet
IUCN	International Union for Conservation of Nature
MS	Mulchand Shah Bunder
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 Centre
PCRWR	Pakistan Council for Research in Water Resources

PD	Project Director
pH	Power of Hydrogen
PIC	Project Implementation Consultants
P&D	Planning and Development Department
PID	Project Information Document
PKR	Pakistani Rupee
PDMA	Provincial Disaster Management Authority
PMU	Project Management Unit
PSC	Project Steering Committee
RAP	Resettlement Action Plan
RFP	Request for Proposal
SAR	Sodium Adsorption Ratio
SEPA	Sindh Environmental Protection Agency
SH	Sunda Hilaya Bund
SID	Sindh Irrigation Department
SIDA	Sindh Irrigation and Drainage Authority
WB	World Bank
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

The Government of Sindh through the Sindh Irrigation Department intends to undertake rehabilitation and improvement of Mulchand-Shah Bunder (MS), Sunda Hilaya (SH), Bughar-Ucheto (BU) and Indo embankments along Indus River under the World Bank financed Disaster and Climate Resilience Enhancement Project (DACREP). The present Environmental and Social Impacts Assessment (ESIA) has been prepared to address the potentially negative environmental and or social impacts of the proposed embankment rehabilitation works in compliance with the national/provincial regulatory requirements and World Bank safeguard policies.

The MS embankment (bund) is located in District Sajawal while SH, BU, and Indo embankments are located in Thatta District. The main activities involved in the rehabilitation works include obtaining soil from borrow area and transporting it to the embankments, strengthening the existing embankments with the soil, soil compaction, and stone pitching on slopes. The contractor will also need to establish some temporary facilities as well including material yard and construction camp for workforce.

Environmental and Social Management Framework (ESMF)

The DACREP project envisages a number of interventions including improving / rehabilitating the degraded reaches of embankments / levees of Indus River, construction of small detention dams in water scarce districts of the province, and construction of office buildings. As the list of sub-projects and locations is not finalized, therefore a framework approach has been adopted. 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 project, propose mitigation measures to address these potential impacts, and finally, to provide basic screening criteria for selecting the subprojects to be undertaken under DACREP.

Subproject Categorization

The sub-project is likely to cause low to moderate level of environmental and/or social impacts therefore, this sub-project falls under category B in accordance with characterization criteria as specified in the ESMF. The present Environmental and Social Impacts Assessment (ESIA) has been prepared accordingly to meet the Category “B” project requirements.

Environmental Baseline

The area along the embankments is dominated by barren land, flood plains, stagnant water and a mixture of reeds, tree thickets and grass/shrub land interrupted by occasional cultivated areas. Tree thickets are present on the outer and inner slopes of the embankments. 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. These trees are common in the project area.

Water Resources. River Indus is the major water source in the subproject area while some hand pumps are also installed by the communities along the strip of embankments to get water for drinking purpose. The water analysis carried out during the study reveals that the pH, Hardness, Nitrate and Arsenic were within permissible limit of NEQS and WHO standards while the Calcium, Potassium and Nitrite were exceeding the permissible limit. The results pertinent to the ground water reveals that the pH, Carbonate, Hardness, Calcium, Nitrate, EC, TDS and Arsenic were within possible limit of NEQS and WHO standards while the Turbidity and Nitrite were exceeding the permissible limit The micro-biological parameters were within the permissible limit except in one sample of BU Bund.

Biological Resources. During baseline survey, seven large mammal species i.e. Asiatic jackal, Jungle cat, Small Indian mongoose, Grey mongoose, Bengal fox, Indian otter and Indian wild boar were observed in the project area. Ten species of small mammals were observed including Sindh rice rat, Palm squirrel, Indian crested porcupine, Little Indian field mouse, house mouse, Indian hedgehog, Kuhls bat, Common rate, House shrew and Indian garbill. About 46 species of avifauna were reported and observed in the project area.

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. In the project area, these forests are located along both the banks of River Indus in Thatta and have been declared as “Reserved Forests” under Forests Act, 1927. The baseline survey identified 19 riverine forest areas and some were declared as Game Reserves and wildlife sanctuaries in the vicinity of each sub-project area. These areas are distributed in the poor farmers (tenants) of the area for agriculture. Therefore; most of the forest areas as well as Wildlife Sanctuaries are converted into agriculture land. The forest/game reserve areas are located away from the sub-project areas at a distance of 1km to 7km and none of the forest/game reserve/wildlife sanctuaries are falling within primary impact zone of the embankment sub-projects covered in this ESIA.

Social Baseline

Villages and smaller hamlets are present within the agricultural land, housing fishermen and farm labourers who work on the agricultural land (which is generally owned by larger land lords) as well as their families. The level of both education and income of those living within the project area is low, with 80% of the affected families earning below the official poverty line and therefore considered vulnerable. Cultivation and fishing are the dominant livelihoods within the subproject area. Agriculture is commonly practiced in the project area, with a number of small farmers working on owned or rented land growing sugarcane, rice, cotton and vegetables as well as grazing livestock. Women and girls are commonly involved in all aspects of agriculture.
Access to social amenities in the subproject area is low. Electricity supply is available however access to gas supply, drinking water (other than from ground water pumps installed by communities), sewerage, and drainage and health care facilities is very limited. A number of schools are available in the subproject area but are generally lacking staff and/or resources.

Following flooding in the River Indus in 2010 and 2011, some of the villages (Saeedpur, Kot Saleh Muhammad Khoso and Wadera Ghulam Muhammad Tinga) along the Indus River embankments (bunds) lost their homes and constructed temporary shelters on the flood bunds within the project area. Some of the communities still remain on or close to these bunds. These families typically have very low incomes and have no recognizable land rights. Those communities settled within flood plain of the Indus River are settled on temporary basis when they feel threat of the flood evacuate immediately outside the flood plains.

Archaeological Sites. The archaeological survey was conducted by the Culture and Tourism Department, GoS in 1993 and 1996. There are a total of eight archaeological sites situated in the vicinity of subproject area. All the sites are situated on the distance of more than 12km from the sub-project area except one, i.e., Sonda Graveyard which is situated at the distance of 1km from the subproject area.

Potential Impacts during Construction Works

The main Engineering intervention proposed to rehabilitate the sub-projects are stone pitching, raising and widening of the existing Indus River embankments. Once complete, the subproject will provide enhanced protection against floods in the River Indus. The potentially negative environmental and social impacts will be associated with development of borrow areas, clearance of vegetation from the existing embankments, earth work and stone pitching to rehabilitate embankments, setting up of contractor's camps, movement of construction machinery and vehicles, material transportation, waste disposal from camps and working areas. The potential impacts of the proposed works include reduced value of the land caused by obtaining soil from borrow areas, loss of natural vegetation and tress, dust and noise generation, traffic congestion on local routes and roads, water contamination caused by slipping of soil and stone in the river and by release of waste effluents from construction camps and work areas, and safety risks for construction workers as well as for the communities.

The clearance beyond the existing toes is required to prepare the area for formation of the embankments and disposal of material excavated from the embankments. The site clearance shall result in the felling of an estimated 120 trees. The rehabilitation of the embankments and disposal of surplus material may result in the limited loss of wetland where this exists beyond the embankments.

Mitigation and Monitoring Plans

As part of the present ESIA, appropriate mitigation measures have been identified. These include: proper disposal of excavated earth; water sprinkling at access roads and construction areas to avoid/minimize dust pollution; use of silencers for the machinery and vehicles; use of ear protection gears and other personal protective equipment by construction workers; provision of septic tanks in camps and offices, treatment of wastewater and other pollution control measures in construction camps; location of borrow pits to be at safe distances from structures and to be properly restored; not selecting productive land for borrow area or for establishing camps/construction areas, no damage to cultivated areas; avoiding unnecessary clearing of natural vegetation; avoiding archaeological or culturally important sites; avoiding and controlling

toxic materials; implementing erosion control measures, and adhering to safety and occupational health precautions.

A Grievance Redress Mechanism (GRM) has also been prepared in order to address the complaints and grievances received by the project proponent (i.e., Irrigation Department) at the project level.

Safeguard monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be carried out at three levels. At the PMU level, the environment and social specialists will carry out safeguard monitoring to ensure that the mitigation plans are being effectively implemented, and will conduct field visits on a regular basis. At the field level, more frequent safeguard monitoring will be carried out by the relevant staff of Project Implementation Consultants (PIC). The PIC and ESMU of PMU will produce monthly, quarterly and annual reports for ESIA implementation.

Resettlement Planning

Some of the structures are falling within RoW and these structures are to be dislocated to complete the proposed rehabilitation works on embankments. The structures which will need to be dislocated for construction include six wooden huts, two wooden mosques, 13 wooden shops, and two wooden animal sheds - owned by 18 households. To mitigate these impacts, an Abbreviated Resettlement Action Plan (ARAP) for the subproject has been prepared as a standalone document in accordance with the procedures described in the Resettlement Policy Framework and an Abbreviated Resettlement Action Plan (ESMF/RPF). The affected households will be fully compensated in accordance with the ESMF/RPF before their vacating the embankment. The entire resettlement process will be carried out in a transparent manner, in accordance with the government legislation and World Bank resettlement policies.

ESMP Implementation Arrangements

The overall responsibility for implementing the DACREP project as well as the present ESMP rests with the Project Management Unit (PMU), Irrigation Department, to be headed by the Project Director. The PMU will be supported by Environmental and Social Management Unit (ESMU) to be established within the Unit. PMU will engage Project Implementation Consultants (PIC), responsible for construction supervision. PIC will also have environmental and social specialists to supervise and monitor ESIA implementation. Finally, the construction contractor will also have environmental and social inspectors/officers to implement mitigation measures and other requirements defined in the present ESMP. Appropriate clauses will be included in the construction contracts for this purpose. PMU will also engage Environmental/Social Monitoring and Evaluation Consultants (ESMEC) to carry out external monitoring or third party validation of the sub-project activities.

ESMP Implementation Budget

A budget of about **PKR 5.6 million** has been estimated for the implementation of the ESMP.

1 INTRODUCTION

The Government of Sindh through the Sindh Irrigation Department intends to undertake rehabilitation and improvement of Mulchand-Shah Bunder (MS), Sunda Hilaya (SH), Bughar-Ucheto (BU) and Indo embankments along Indus River under the World Bank financed Disaster and Climate Resilience Enhancement Project (DACREP). The present Environmental and Social Impacts Assessment (ESIA) has been prepared to address the potentially negative environmental and or social impacts of the proposed embankment rehabilitation works in compliance with the national/provincial regulatory requirements and World Bank safeguard policies.

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1.1. Background

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

The 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 project designated as Disaster and Climate Resilience Enhancement Project (DACREP) Sindh will be financed by World Bank and will be completed in five year period. The location plan of DACREP project is shown in **Figure 1.1**.

DACREP Components
DACREP will be implemented through the Provincial Disaster Management Authority and Sindh Irrigation Department and will have the following components:

[1] Sourced from the World Bank DACREP PID/ISDS.

Component 1- *Strengthening Institutions and Systems for Resilience*: The component will focus strengthening operational systems and capacities of two key institutions: the Provincial Disaster Management Agency (PDMA) Sindh and the Sindh Irrigation Department (SID).

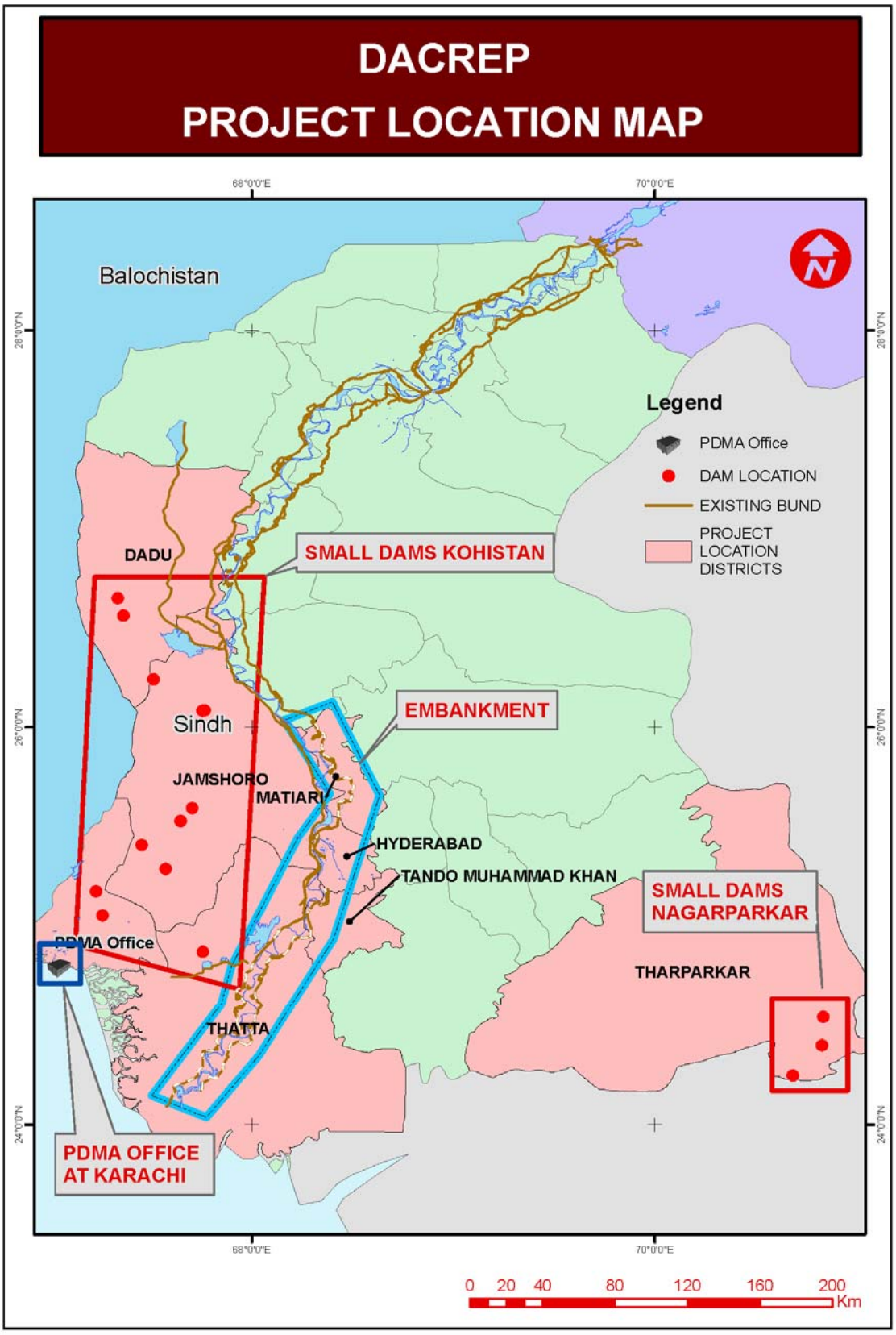


Figure 1.1: Location of the DACREP Project Area

Component 2- *Structural Investments*: This component of the project is covering two sub-components i.e. structural investments through flood protection and construction of small dams to address the drought risk.

Component 3- *Fiscal Resilience:* The fiscal resilience component would seek to inform the government on strengthening its institutional and financial response capacity in the aftermath of a disaster and reduce the economic and fiscal burdens of such events.

Component 4- *Technical Assistance for Studies and Project Implementation Support:* This component would support the Government in implementing the Project and would include support for the operation of the Project Implementation Units (PIUs) at the implementing agencies, and financing of overall project management, as well as technical assistance in such areas as detailed design / feasibility, contract administration and construction supervision, procurement, financial management, as well as management of social and environmental issues.

Component 5- Contingent Emergency Response Component: 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.

1.2. Environmental Social Management Framework (ESMF)

The DACREP 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. As the list of sub-projects and locations is not finalized, therefore a framework approach has been adopted. 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 project, propose mitigation measures to address these potential impacts, and finally, to provide basic screening criteria for selecting the subprojects to be undertaken under DACREP.

1.3. Subproject Categorization

The ESMF defines that: i) a full EIA/ESA including an ESIA and ARAP/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 ARAP/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.

The initial screening carried out per the criteria defined above has revealed that the proposed sub-project of rehabilitation and improvement of embankments is likely to cause low to moderate level of environmental and/or social impacts therefore, this sub-project falls under category B in accordance with characterization criteria described above. The present ESIA has been prepared accordingly to meet the Category B subproject requirements. In addition, an Abbreviated Resettlement Action Plan (ARAP) for the sub-projects is also prepared in line with ESMF/RPF.

1.4. Aims and Objectives of the ESIA Study

The main aims and objectives of this ESIA are to:

- Provide information for decision-making on the environmental and social consequences of proposed project interventions;
- Establish an environmental, socioeconomic baseline;
- Determine potential environmental and social impacts and assess these in terms of severity, magnitude and timescale;
- Devise mitigations to reduce 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;
- Development of an environmental and social management and monitoring plan (ESMMP) for the adverse impacts, and
- Determine tentative costs for implementation of the ESMP.

1.5. Scope of the Study

The ESIA covers the rehabilitation and improvement of MS, SH, BU, and Indo embankments along the Indus River – in accordance with the ESMF prepared for DACREP. 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.

1.6. ESIA Methodology

The initial reconnaissance and detailed environmental and social baseline surveys have been carried out by a team comprising environment specialist, ecologist, and resettlement and social expert as well as male and female sociologists during the months of November and December, 2015. The screening criteria for the sub-projects devised in the ESMF (based on the World Bank environmental screening process) have been followed and as a result, the proposed sub-project has been categorized as Category B.

The baseline data has been collected in accordance with the Sindh Environmental Protection Act -2014 and the Sindh Environmental Assessment Regulations, 2014. The approach and methodology during data gathering was a combination of qualitative and quantitative techniques.

This study has been conducted using standard environmental and social impacts assessment methodologies, the assessment process consists of a number of elements based on previous studies and incorporation of additional information gathered during site visits, discussions with officials of government departments and meetings with groups from the communities living in as well as adjacent to the sub-project area. This also formed part of the public information dissemination process.

Focus group discussions and consultative meetings have been conducted at village level. A village profile has been designed very carefully and administrated to sample the target male and female population of the area.

Similarly, the instrument for women data collection have also been prepared and applied during the consultation with the female members of communities.

1.7. 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).

1.8. Review by SEPA

As per Section-12 of the Sindh IEE (this ESIA fulfills the requirements of IEE) and EIA Regulations, 2014, the Sindh EPA shall make every effort to carry out its review of IEE with in sixty days and of the EIA within four months of issue of confirmation of completeness under regulation 9. In reviewing the IEE, the Director General may constitute a committee of

the officers from within the Agency on case to case basis in view of the jurisdiction and location of the project for the purpose to extend final recommendation about the approval or rejection of the IEE.

In reviewing of the IEE, the Director General may direct the project proponent and Firm to present the report before the committee as given under sub-regulation (4) and the Director General may also invite environmental experts from outside the Agency for the purpose of assistance.

The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1. Introduction

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.

2.2. Pakistan Institutional Framework

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

2.2.1. National Disaster Management Authority- Climate Change Division

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

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

2.2.2. Sindh Environmental Protection Council (SEPC)

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

- to frame its own Rules of Procedure, co-ordinate and supervise the enforcement of the provisions of the SEAP Act,2014 and other laws relating to the environment in the Province;

- Approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;
- provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- Coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programmes 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.

2.2.3. Pakistan Environmental Protection Agency

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

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

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

2.2.4. Non-Government Organizations

International environmental and conservation organizations, such as the International Union for the Conservation of Nature (IUCN) and the World Wide Fund for Nature (WWF) are active in Pakistan. Both these Organizations have worked closely with the Government and have played an advisory role with regard to the formulation of environmental and conservation policies.

Since the Rio Summit (1992), a number of national environmental Non-Governmental Organizations (NGOs) have also been formed, and have been engaged in advocacy and, in some cases, research. The other prominent environmental NGOs include Sustainable Development Policy Institute (SDPI), Leadership for Environment and Development (LEAD), Society for Conservation and Protection of Environment (SCOPE), Pakistan Institute for Environmental Development and Research (PIEDAR), and Shirkatgah etc.
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.

2.3. Sindh Province Institutional Framework

2.3.1. 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 & Alternate Energy Department, Government of Sindh. **In this particular case of DACREP sub-projects covered under this ESIA, Sindh EPA is the relevant agency for the review and approval of IEE and EIA reports.**

2.3.2. Sindh Irrigation Department (ID) and Sindh Irrigation and Drainage Authority

Major tasks performed by the Sindh ID 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. **The embankment sub-projects to be considered for the DACREP Project is under the Jurisdiction of the Chief Engineer Irrigation Kotri Barrage Region Hyderabad.**

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 WSIP Projector support implementation of Social and EMF/EMPs under the project and also to improve SIDA's capacity in planning, development and operation of water resources management systems with proper consideration

to environmental and social issues and participation of stakeholders in order to make water systems sustainable in the long run and generate higher benefits.

2.3.3. 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.**

2.3.4. Provincial Disaster Management Authority

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

(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.

Provincial Disaster Management Authority GoS is the project proponent in the case of all components of the DACREP except Component-2.

2.4. Federal Environmental Policies & Guidelines

2.4.1. National Conservation Strategy (1992)

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

- Maintaining soils in cropland;
- Increasing irrigation efficiency;
- Protecting watersheds;
- Supporting forestry and plantations;
- Restoring rangelands and improving livestock;
- Protecting water bodies and sustaining fisheries;
- Conserving of 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 programmes;
- Preserving the cultural heritage

2.4.2. The National Environmental Policy (2005)

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

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

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

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

2.4.3. Guidelines for Sensitive and Critical Areas (1997)

The guidelines identify officially notified protected areas in Pakistan, including critical Ecosystems, archaeological sites, etc., and present checklists for environmental assessment procedures to be carried out within or near to such sites. **Environmentally sensitive areas include archaeological sites, game reserves and natural parks, and wildlife sanctuaries, none of which are located within primary impact zones of sub-projects**.

2.4.4. The Solid Waste Management Policy (2000)

This policy was promulgated by PEPA, which aims to facilitate control on waste by providing principles of good waste management and reducing waste at source. **The Guidelines would be consulted during planning and designing the disposal of solid waste from the Contractor's camp to the construction sites.**

2.5. Sindh Provincial Environmental Laws, Policies & Guidelines

2.5.1. Sindh Strategy for Sustainable Development (2007)

The Sindh Strategy for Sustainable Development (SSSD) proposes a ten year sustainable development agenda for Sindh. Its purpose is to highlight the ecological, economic and social issues of the province and to provide recommendations and strategic actions to address them. The strategy promotes the sustainable use of natural resources to achieve the objectives of poverty alleviation and social development through the participation of the people of Sindh.

2.5.2. Sindh Environmental Protection Act (2014)

In the light of the provisions of Article 270 AA (6), as amended by section 96 of the18th Amendment, SEPA 2014 shall continue to remain in force until repealed or amended by the competent authority, which is now the Provincial Assembly in respect of the Sindh Province.

The first draft of the Sindh Environmental Protection Act 2013 was issued in October 2013 during a consultative meeting organized by the IUCN Pakistan in collaboration with the Sindh Environmental Protection Agency (SEPA). The Sindh Environmental Protection Bill, 2014 having been passed by the Provincial Assembly of Sindh on 24th February, 2014 and assented to by the Governor of Sindh on 19th March, 2014 is hereby published as an Act of the Legislature of Sindh. This act is almost the same as the existing Pakistan Environmental Protection Act 1997.

The act is applicable to environmental parameters such as air, water, soil, and noise pollution, as well as to the handling of hazardous wastes. The Act provides the framework for protection and conservation of species, wildlife habitats and biodiversity, conservation of renewable resources, establishment of standards for the quality of the ambient air, water and land, establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examination (IEE) and EIA approval. Penalties have been prescribed for those contravene the Act.

The key features of the Act have a direct bearing on the proposed sub-projects because the project requires an initial environmental examination (IEE). As the sub-projects covered under this ESMP are located in the district of Thatta and Sujawal, it falls under the jurisdiction of the Sindh Environmental Protection Agency that will accord the approval of the IEE pertaining to the project.

The following are the key features of the Act that have a direct bearing on the project area.

- Section 11 (Prohibition of Certain Discharges or Emissions) states that “Subject to the provisions of this Act and the rules and regulations made there under, no person shall discharge or emit, or allow the discharge or emission of, any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards (NEQS)”.

- Section 12 & 13 (Import & Handling of Hazardous Substances) requires that “Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle, or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement, or other Instrument to which Pakistan is a party.” Enforcement of this clause requires the EPA to issue regulations regarding licensing procedures and to define ‘hazardous substance.’

- Section 15 (Regulation of Motor Vehicles): Subject to provision of this clause of the Act and the rules and regulations made there under, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the NEQS, or where the applicable standards established under clause (g) of subsection (1) of Section-6 of the Act.
- Section 17-I (Initial Environmental Examination and Environmental Impact Assessment) requires that "No proponent of a project shall commence construction or operation unless he has filed with the SEPA an IEE or, where the project is likely to cause an adverse environmental effect, an EIA, and has obtained from the SEPA for approval in respect thereof." **This ESIA meeting the requirement of IEE has been prepared for the sub-projects covered under the report to comply with this Section of the Act.**

- Section 17-2a & b (Review of IEE and EIA): The Federal Agency shall review the Environmental Impact Assessment report and accord its approval subject to such conditions as it may deem fit to impose, or require that the EIA be re-submitted after such modifications as may be stipulated or rejected, the project as being contrary to environmental objectives.

2.5.3. Factories Act (1934)

The clauses of the Factories Act relevant to the project are those which concern health, safety and welfare of workers, disposal of solid wastes and effluents, and damage to private and public property. The Factories Act also provides regulations for handling and disposal of toxic and hazardous materials. As construction activity is classified as 'Indo try', these regulations will be applicable to the project construction contractor. **This act will be applicable to the Contractor(s) to be engaged for sub-project's construction works covered under this ESIA.**

2.5.4. Antiquity Act (1975)

The Antiquity Act ensures the protection of cultural resources in Pakistan. This act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. Antiquities have been defined in this act as "Ancient products of human activity, historical sites, sites of anthropological or cultural interest and national monuments etc."

Pakistan Antiquities Act of 1975 ensures the protection of physical cultural resources in Pakistan. The Act is designed to protect especially the notified "antiquities" from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan (Provincial Governments after the introduction of the 18th Amendment to the Constitution of Pakistan) to prohibit excavation in any area which may contain articles of archaeological significance.

The Act describes antiquity as (i) any ancient product of human activity, movable or immovable, illustrative of art, architecture, craft, custom, literature, morals, politics, religion, warfare or science or of any aspect of civilization or culture; (ii) any ancient object or site of historical, ethnographical, anthropological, military or scientific interest; (iii) any national monument; and (iv) any other object or class of such objects declared by the Federal Government, by notification in the official Gazette. The Act also defines 'ancient' as an antiquity which has been in existence for a period of not less than seventy five years.

The Antiquities Act of 1975 further provides about the fate of Chance Finds, officially termed as "Accidental discovery``. In such a case the chance find is to be reported to the Director General Provincial Archaeological Department within seven days of its being discovered or found and preserve it for the period thus specified. If, within seven days of his being informed of the discovery of movable antiquity, the Director General decides to take over the antiquity for purpose of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director General or a person authorized by him in writing. It further says that if Director General decides to take over the antiquity he may pay such amount as would be decided by the Advisory Committee.

The act prohibits new construction in the proximity of a protected antiquity and empowers the government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance.

Under this act, the proponents are obligated to ensure that no activity is under taken in the proximity of a protected antiquity, and during the course of the project if an archaeological discovery is made, it should be reported to the Department of Archaeology accordingly.

This Act will be applicable to the physical interventions such as construction activities to be carried out for the sub-projects covered under this ESMP. No protected or unprotected antiquity has been identified in the primary impact zone of the sub-project areas that may be affected by the project interventions. However a chance find procedure has been included in this ESMP in case of any, as yet, unidentified antiquity.

2.5.5. National Environmental Quality Standards (2010)

The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000 including standards for liquid effluent and gaseous emissions. The standards for ambient air, drinking water quality and noise levels were published on November, 2010 and standards for motor vehicle exhaust, diesel vehicle, and petrol vehicle published on August, 2009. The following standards are specified therein:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid Indo trial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers).

- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from Indo trial sources.
- Maximum allowable concentration of pollutants (8 parameters) in ambient air quality.
- Maximum allowable concentration of pollutants (3 parameters) in motor vehicle exhausts quality.
- Drinking water standards and
- Noise standards

The above [2]NEQS"s are available on the ministry website and only a few of these standards will be applicable to the gaseous emissions and liquid effluents discharged to the environment from the activities under the proposed project.

2.5.6. Sindh Irrigation Act (1987) with Amendments in 2011

The Sindh Irrigation Act (1987) is the main enactment relating to irrigation in the Province of Sindh, under this Act the entire task of irrigation has been entrusted to the Provincial Government, Canal Officers the Revenue Department and Judicial Officers. The main features of the Act are as under:

a. Important policy aspects of Irrigation, like the appointment of the Canal Officers, acquisition of water for public use, payment of compensation, water rates, drainage schemes, canal crossing and framing the rules, have been entrusted to the Provincial Government.

b. Operational functions are entrusted to the Canal Officers but the Act does not specify which Canal Officers are empowered to act under any of its provisions. Therefore, a Canal Officer must by duly authorized by the Provincial Government to act under any provision of the Act.

c. The Revenue Administration helps the Irrigation Department to acquire land, determine compensation and collect water dues. Moreover, the Commissioner and Collector have substantial power to settle disputes among irrigators and can decide appeals against the decisions of the Canal Officers. Thus, the Canal Officers are substantially subservient to the Revenue Department.

d. The offences under the Act can be tried before the Magistrate.

e. As the reaches of Indus River embankment considered for rehabilitation under DACREP Project is to be implemented by the Sindh Irrigation Department, therefore; this act is applicable to the sub-projects.

[2] http://www.environment.gov.pk/eia_pdf/g_Legislation-NEQS.pdf

2.5.7. Sindh Local Government Act, 2013

The Sindh Local Government Act, 2013 empowers the Government of Sindh and Districts to establish an elected local government system to devolve political, administrative and financial responsibility and authority to the elected representatives of the local governments; to promote good governance, effective delivery of services and transparent decision making through institutionalized participation of the people at local level; and, to deal with ancillary matters. The embankments sub-project area is administratively falling under the jurisdiction of Sujawal and Thatta Districts.

2.5.8. Provincial Motor Vehicles (Amendment) Act, 2014

The Provincial Motor Vehicle Act, 2014 deals with the powers of the Motor Vehicle Licensing Authorities and empowers other related agencies to regulate traffic rules, vehicle speed and weight limits, and vehicle use, to erect traffic signs, and to prescribe special duties of drivers in case of accidents. It also prescribes powers of police officers to check and penalize traffic offenders.

2.5.9. Highway Safety Ordinance (2000)

The Highway Safety Ordinance includes provisions for licensing and registration of vehicles and construction equipment; maintenance of road vehicles; traffic control offences, penalties and procedures; and the establishment of a police force for motorways and national highways to regulate and control the traffic as well as keep the highways clear of encroachments. During transportation of the construction material, the Contractor's vehicles and machinery may need to use the national highways accessing to the sub-project locations; therefore; this ordinance is applicable to the sub-projects covered under this ESMP.

2.5.10. The Land Acquisition Act (LAA) 1894

The Land Acquisition Act (LAA) of 1894 is the key legislation that has direct relevance to resettlement and compensation in Pakistan. Each province has its own interpretation of the LAA, and some provinces have also passed provincial legislations. The LAA and its implementation rules require that before implementation of any development project the privately owned land and crops are compensated to titled landowners and/or registered tenants/users etc.

Based on the LAA, only legal owners and tenants registered with the Land Revenue Department or those possessing formal lease agreements are eligible for compensation. Under this Act, users of the Rights of Way (RoW) are not considered "affected persons" and thus not entitled to any mitigating measure, compensation, or livelihood support. Also, there is no legal obligation to provide compensation to title-less land users, unregistered tenants, squatters or

encroachers for rehabilitation. However, after independence and with the passage of time various deviations to LAA have been practiced.

The exceptions to the rule can be explained by the fact that the law is not rigid and is broadly interpreted depending on operational requirements, local needs, and socio-economic circumstances.

The key sections of the LAA, 1894 are briefly described below.

Section 3:
According to this Section, land means land along with any superstructure, fixtures, etc., thereon and benefits accruing there from. For the purposes of Act, land includes buildings, and also trees and standing crops. Land thus is a sum total of land plus benefits arising out of land plus all objects/things attached to or permanently fastened to anything attached to it.

Section 4:
Section 4 details the first step in the land acquisition process under the LAA. A preliminary notice is served by the government expressing its desire to "enter upon" broadly identified private lands for surveying and soil-testing for the specified public purposes.

Requirements of publication of the notification under LAA are mandatory, and the acquisition proceedings would stand invalid if requirements of this section are not fully satisfied. Notification of LAA is a public pronouncement by appropriate government officer, empowered to publish a notification to that effect in official gazette in order to put those who are affected or likely to be affected on due notice. Purpose of LAA is to carry out preliminary investigation/land survey with a view to find out after necessary survey whether land was suitable for purposes for which it was sought to be acquired. Section 4 puts owners of land on alert that land is going to be acquired.

Section 5:
The initial notification under the LAA is followed and confirmed by way of a second notification under the Act. Under this Section, the marking and measurement of the land and assessment of compensation is carried out. The cash compensation is assessed on the basis of five or three years average registered market rate, and is paid to the landowners for their lands being acquired.

Under section 5, the owners of land or those affected or likely to be affected, may raise objections over the intent of land acquisition or survey report to the competent authority within 30 days of notification under section 5 for the hearing of objections.

Section 6:
Once an area in the locality is fixed to be acquired, it is notified by publishing the notification. The exact purpose of acquisition of land is also mentioned in the notification, and the land may

be acquired only for the purpose thus specified. Any proposal for further acquisition in the same locality would have to be followed up by a fresh notification under the LAA.

Section 8:
Affectees are made aware of the exact measurement of their respective lands/structures and the value of land under acquisition through issuance of notification under the LAA.

Section 9:
Stating that the land is intended to be possessed and claims for compensation for all interests in the land may be made to the officer concerned and all persons interested/affected should appear before him at a given place and time not being earlier than 15 days after the publication of said notice.

Sections10, 11 and 12:
According to section 10, the Collector (defined under section 17 of the LAA) publicly declares/announces awards. Generally the award is declared at place where affectees can get together and hear the award. Affectees can either accept the award or reject the award; however, in any case the affectees have to sign the award mentioning whether they accept the award and the compensation offered therein or reject the award and sign under protest.

Section 17:
Under the this section, the Collector is authorized to acquire land on the basis of the situation declared as an "emergency situation" on behalf of the government and can avoid the formalities to be completed and to avoid any delay in proceedings. In such a situation, the Collector under section 17(4) can pass an award without looking into or addressing the objections/complaints of affectees. Proceedings under this section are independent and not subject to any restrictions and conditions.

Possession of Land:
When the Collector has made an award under section 11/12, he may take possession of the land which shall thereupon vest absolutely in the government/ or acquiring department free form all encumbrances.

Under this Act, only legal owners and tenants officially registered with the Land Revenue Department or possessing formal lease agreements are considered "eligible" for land compensation.

LAA Applicability to Sub-Projects Covered under the ESIA:

As the project is planning to rehabilitate the existing system (rehabilitate the existing embankments along the Indus River); therefore; the acquisition of land is not envisaged. However; some residential, community and commercial structures are falling in RoW and these structures are to be dislocated. An Abbreviated Resettlement Action Plan (ARAP) in line with the ESMF/RPF is prepared as a standalone document.

2.5.11. Employment of Child Act, 1991

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Employment of Child Act (ECA) 1991 disallows the child labour in the country. The ECA defines a child to mean a person who has not completed his/her fourteenth year of age. The ECA states that no child shall be employed or permitted to work in any of the occupation set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out.

The contractor will be bound by this Act to disallow any child labour at the project sites or camp sites.

2.5.12. Sindh Wildlife Protection Ordinance (2001)

The Sindh Wildlife Protection Ordinance of 1972, as amended in 2001, 2010 provides for the preservation, protection, and conservation of wildlife by the formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance. The project activities will have to be carried out in accordance with this Act. In particular, no activities of the DACREP Project will be carried out inside any protected areas defined under the Act. The ordinance also specifies three broad classifications of the protected areas:

- **National Parks**

Hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. There is no national park in the embankment sub-project areas.

- **Wildlife Sanctuaries**

Wildlife sanctuaries are areas which are left as undisturbed breeding grounds for wildlife. Cultivation, grazing and residing is prohibited in the demarcated areas. Special permission is required for entrance of general public. However, in exceptional circumstances, these restrictions are relaxed for scientific purpose or betterment of the respective area on the discretion of the authority. There are three game reserves and wildlife sanctuaries in the embankment sub-project areas which have now been converted into agriculture land and do not exist anymore. These protected areas are Deh Khalifa which is situated 1.03km away from the Indo Bund, Mirpur Sakro situated 25.68km away from the BU Bund and Deh Jengisar (reported by SWLD) but the location is not confirmed. No impacts of the sub-projects are anticipated; however mitigation measures devised to avoid any adverse impact of the proposed sub-projects.

o **Game Reserves**

Game reserves are designated as areas where hunting or shooting is not allowed except under special permits. **No game reserve is falling within primary impact zone of the sub-projects**.

2.5.13. Sindh Forest Act, 2012

The Act authorizes Provincial Forest Departments to establish forest reserves and protected forests. The Act empowers the department to protect, conserve, and manage sustainable development of forest and biodiversity. The act prohibits any person to set fire in the forest, quarry stone, remove any forest-produce or cause any damage to the forest by cutting trees or clearing up area for cultivation or any other purpose.

The project activities will have to be carried out in accordance with this Act. No activities will be carried out in any protected forests, and no unauthorized tree cutting will be carried out. There are total nine (9) reserved riverine forests areas along the reaches of Indus River. Most of the forest areas are away more than 1km from the primary impact zone of the sub-project's interventions. However; mitigation measures are devised to restrict the contractor activities in these areas. In addition, the proposed sub-project may cause cutting/uprooting of 120 trees falling in the potential RoW of the embankments. However; it is planned to plant 5 indigenous trees in place of one cut/uprooted tree.

2.5.14. Sindh Fisheries Ordinance (1980)

The Sindh Fisheries Ordinance of 1980 provides rules and regulations for marketing, handling, and transportation, storage of fish and shrimps for commercial purpose and sale of fish used for the provincial trade in the Province of Sindh. Contravention of this Ordinance leads to imprisonment up to 6 months or a fine of 10,000 rupees or both. No government or local people operated or maintained fish hatchery or production site exist in the sub-project area, however; the Indus River and some ponds along the embankment is the source of fishing for the local people. Therefore; this act is applicable to the sub-projects.

2.6. The World Bank Safeguards Policies

The World Bank is the donor of the project. Therefore it is obligatory for Irrigation Department (ID), Government of Sindh (GoS), to abide by the World Bank Safeguard polices. In the light of the World Bank OP: 4.01, the Disaster and Climate Resilience Enhancement Project (DACREP) has been categorized a Category-A project. The triggering statuses of the World Bank Operational Policies on the sub-projects covered in this ESIA are described below in Table 2.1.

Table 2-1: Applicable Provincial Laws and World Bank Safeguard Policies

	Description	Law / Policy Reference	Triggered	Not Triggered	Remarks
1	Environmental Assessment	Sindh Environmental Protection Act, 2014	✔		The environmental and social assessment carried out under the present ESIA has been carried out in accordance with this Act.
2	Environmental Assessment	OP/BP/GP 4.01	✔		The subproject is likely to cause low to moderate level of environmental and/or social impacts, temporary and are reversible; therefore, this sub-project falls under category B in accordance with characterization criteria given in OP 4.01 (and also given in ESMF). The present ESIA has been prepared accordingly to meet the Category B subproject requirements.
3	Involuntary resettlement	OP/BP 4.12	✔		The proposed subproject interventions will cause involuntary resettlement resulting in relocation of some residential and commercial structures. Therefore; this OP 4.12 is triggered and an Abbreviated Resettlement Action Plan (ARAP) has been prepared.
4	Project in International water ways	OP/BP 7.50	✔		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.

2.6.1. Environmental Assessment (OP 4.01)

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

As per PID/ISDS of the DACREP Project, the overall project is categorized as Category-A Project 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. The proposed Indus River embankment sub-projects are classified as Category B on the grounds that the potential adverse environmental impacts on human populations or environmentally important areas--including wetlands, forests, grasslands, and other natural habitats are not anticipated. The impacts anticipated are only during the construction period and

for less than one year. The sub-projects have positive impacts in the long run to reduce the probability of Indus River embankment breach and flooding of settlements, inundation of agriculture land, standing crops and other livelihoods. Therefore; an ESMP is prepared in accordance to the WB OP 4.01.

2.6.2. Cultural Property (OP 4.11)

The World Bank safeguards require full protection to physical cultural heritage on the World Bank financed project sites. By reviewing the secondary reports, there are five sites having physical and cultural value. The names of the sites and location are given in the Table: 4.30. As per initial assessment, the sites are not located within the potential working area; therefore; this OP 4.11 will not trigger. However the specific aspects of this policy are given below:

- The Bank normally declines to finance projects that will significantly damage non-replicable cultural property and will assist only those projects that are sited or designed so as to prevent such damage.

- The Bank will assist in the protection and enhancement of cultural properties encountered in the Bank financed projects, rather than leaving that protection to chance. In some cases the project is relocated so that sites and structures can be preserved, studied and restored in situ. In other cases, the structures can be relocated, preserved, studied and restored on alternate sites. Often, scientific study, selective salvage and museum preservation before destruction is all that is necessary. Most such projects should include training and strengthening of institutions entrusted with safeguarding a nations' cultural heritage. Such activities should be directly included in the scope of the project rather than being postponed for some possible future action and costs are to be internalized in overall project costs.

- Deviations from this policy may be justified only where expected project benefits are very high and any loss of cultural heritage is unavoidable, minor or otherwise acceptable. Specific details of the justification should be discussed in project documents.

Although no known areas of cultural heritage will be impacted by the project, graves may be impacted. Identification of cultural resources is included in the baseline survey, and the impact to graves, measures to reduce or remove impact, as well as a procedure to manage chance finds is included in this assessment. This OP is not triggered in the case of sub-projects covered in this ESIA.

2.6.3. Resettlement (OP 4.12)

This policy pertains to any World Bank financed project, which directly or indirectly involves partly or as a whole Resettlement (OP 4.12).

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

The overall objectives of the policy are as follows:

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

The proposed subproject interventions will cause involuntary resettlement resulting in relocation of some residential and commercial structures. Therefore; this OP 4.12 is triggered and an Abbreviated Resettlement Action Plan (ARAP) has been prepared.

2.6.4. Projects on International Waterways (OP 7.50)

OP 7.50 is relate to the types of projects falling within the ambit of international waterways like (a) any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states. This policy applies to the following types of international waterways:

- any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states, whether Bank1members or not;
- (b) any tributary or other body of surface water that is a component of any waterway described in (a) above; and
- (c) any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states--and any river flowing into such waters.

- This policy applies to the following types of projects:

- hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, Indo trial, and similar projects that involve the use or potential pollution of international waterways as described in para. 1 above; and

- detailed design and engineering studies of projects under para. 2(a) above, including those to be carried out by the Bank as executing agency or in any other capacity.

Some of the proposed interventions will be carried Waterways OP/BP 7.50 out in/along Indus River which is an international waterway as defined in the OP. However; an exception of notification would be sought by the task team.

2.7. 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.
- The Ramsar Convention (the Convention on Wetlands of International Importance)

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

3 DESCRIPTION OF SUBPROJECT

3.1. Location of the Sub-Projects

The location of three embankments to be undertaken under the proposed sub-project is shown in **Figure 3.1**. The MS embankment is located in District Sajawal while SH, BU, and Indo embankments are located in Thatta District.

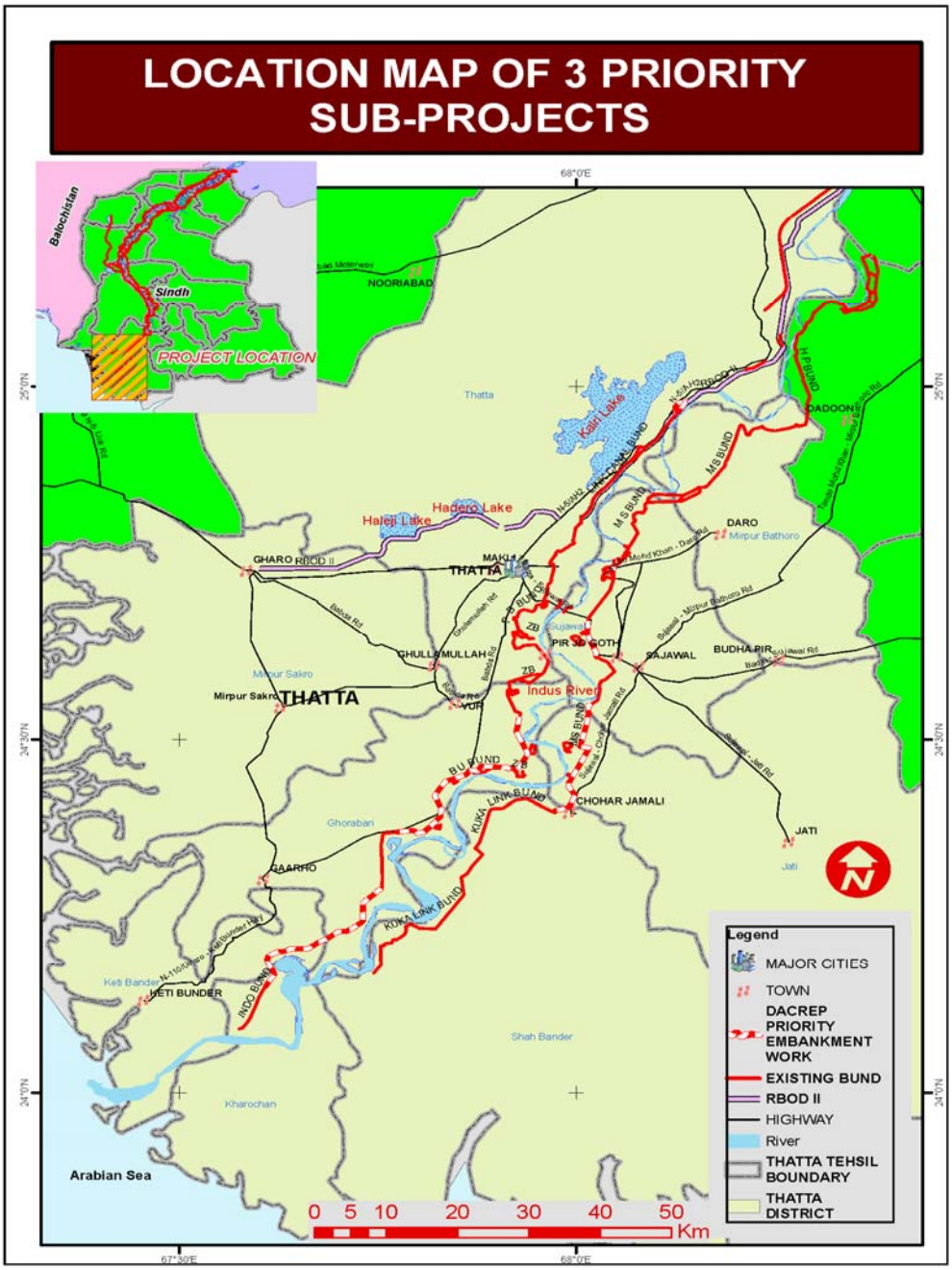


Figure 3.1: Location of the Embankments Sub-projects

3.2. Existing Condition and Problems of the Sub-Projects

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 3.2**.

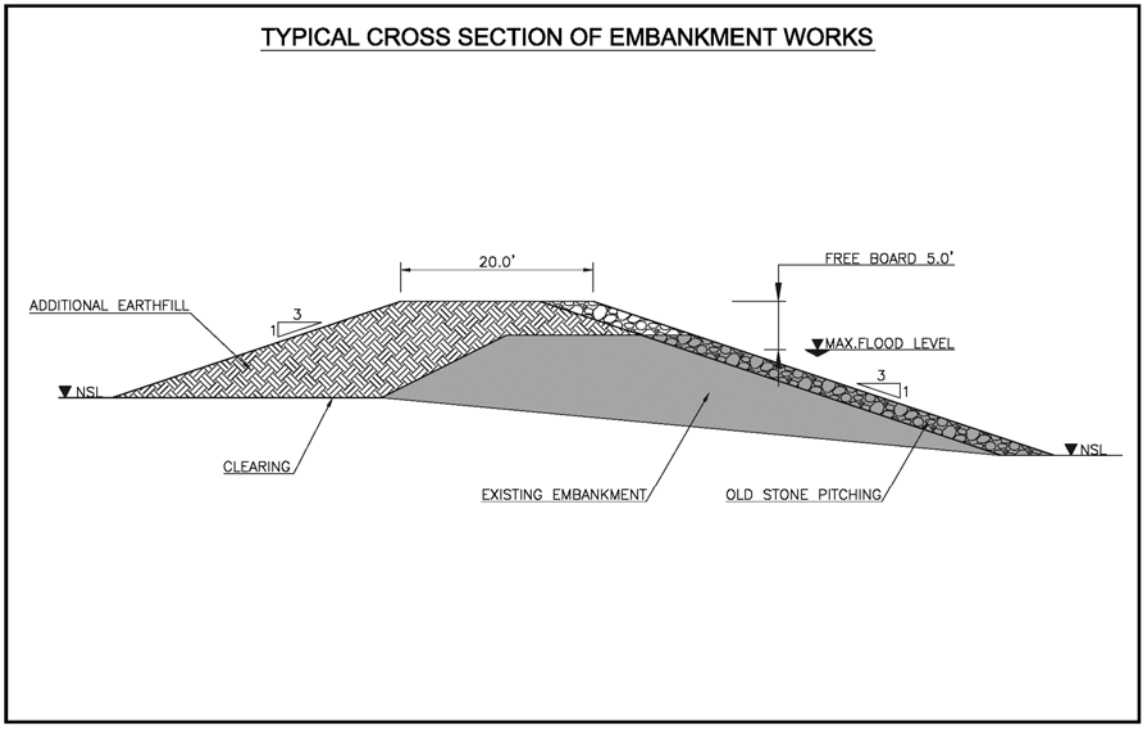


Figure 3.2: Typical Cross-Section

The condition of embankments of sub-projects is described below. Some photographs of the embankments are given in **Figure 3.3** to **3.6**.

Picture 1: View of SH bund

Picture 2: View of SH bund (River Side)

Picture 3: View of SH Bund (Land side)

Picture 4: View of SH bund (start point)

Figure 3.3: Photos of SH Bund

Picture 1: View of MS bund

Picture 2: View of MS bund (Land side)

Picture 3: View of MS bund (River Side)

Picture 4: View of MS bund (Start Point)

Figure 3.4: Photos of MS Bund

Picture 1: View of BU Bund

Picture 2: View of BU Bund (Land side)

Picture 3: View of BU Bund (River Side)

Picture 4: View of wind eroded area of BU bund

Figure 3.5: Photos of BU Bund

Picture 1: View of Indo Bund

Picture 2: View of Indo Bund (River Side)

Picture 3: View of Indo Bund (Land side)

Picture 4: View of Indo Bund (End Point)

Figure 3.6: Photos of Indo Bund

3.3. 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 labour 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.

3.4. Sonda – Hilaya (SH) Bund

The Sonda Hilaya Bund (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 defence, 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.

3.5. 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

Evan them 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

3.7. MS Bund

The PC-I of the MS Bund sub-project, prepared by Irrigation Department Government of Sindh proposes the following interventions:

- Stone Pitching on reaches from Mile 29/2 to 19/5; 36/0 to 40/0; and 45/0 to 58/2.
- Raising and strengthening of MS Bund from Mile 55/4 to 58/2.

3.8. 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.

3.9. BU and Indo Bund

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.

3.10. Construction Materials

The quantities of the main construction materials are given in the **Table 3.1** 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 3-1: 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	-	-	-	-

3.11. Construction Schedule

The works on each sub-project are schedule to be completed in 06 months period as shown in **Figures 3.7** to **3.9**. The works in these sub-projects will be carried when flows in river are low.

Recoupment of Stone Apron Along S.H. Bund Mile 1/6 to 2/1 and
Repairs to Damaged Stone Pitching Along S.H. Bund Mile 1/0 to 3/0 (Different Reaches)

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Supplying of stone boulders 9" to 12" and collection & stacking boulders from Nullah beds						
2	Dismantling stone pitching top layer and relying it after making good damaged slope						
3	Stone filling dry hand packed as filling behind retaining wall in pitching and apron						
4	Weaving wire netting for wire crates with G.I. wire 4" mesh						
5	Filling stone in wire crates and sewing						

Figure 3.7: Tentative Work Schedule for SH Bund

Providing Stone Pitching Along B.U. Bund Between Mile 13/3 to 35/3 &
Indo Bund Between Mile 0/0 to 15/6

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Engaging dozer for jungle clearance						
2	Ploughing and leveling borrowpit						
3	Earthwork excavation and rehandling						
4	Borrowpit excavation in dressed lead						
5	Formation, dressing and preparing sub-grade						
6	Earthwork compaction						
7	Stone filling dry hand packed as filling behind retaining wall in pitching and apron						
8	Stone pitching including sub-base with hammer dress stone on surface						

Figure 3.8: Tentative Work Schedule for BU and Indo Bunds

Stone Pitching Along M.S. Bund from Mile 29/2 to 29/5, 36/0 to 40/0, 45/0 to 58/2,
and Raising and Strengthning of Along M.S. Bund Mile 55/4 to 58/2

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Jungle Clearance						
2	Borrowpit excavation						
3	Earthwork compaction using sheep foot roller						
4	Earthwork excavation						
5	Stone filling dry hand packed as filling behind retaining wall in pitching and apron						
6	Formation, dressing and preparing sub-grade						
7	Stone pitching including sub-base with hammer dress stone on surface						

Figure 3.9: Tentative Work Schedule for MS Bund

3.12. Area of Influence and Corridor of Impact (CoI)

The Corridor of Impact (CoI) for the sub-projects covered under this ESIA is considered the area in which there could be a direct impact during construction phase. The CoI covers the footprint of the temporary and permanent works or the working area required to undertake the proposed works. The impacts would be due to removal or relocation of irrigation and drainage structures, impacts on access routes, agriculture land and crops relocation of inhabitants, felling of trees, and disturbance during construction period. The spatial extent of the sub-project area when preparing the ESIA has been focused keeping in view the proposed engineering interventions and broad impacts of the sub-project after completion of the embankments. The CoI shall be classified as described below.

3.13. Primary Impact Zone

The primary impact zone is the direct footprint of the sub-projects (permanent and temporary works) where there will be direct impacts, for example, construction/rehabilitation works will be carried out, borrow areas will be developed, contractor's site camps to be established and access/haulage routes to be developed. The impact receivers 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. Schematic diagram for typical primary impact zone is presented in **Figure 3.10**.

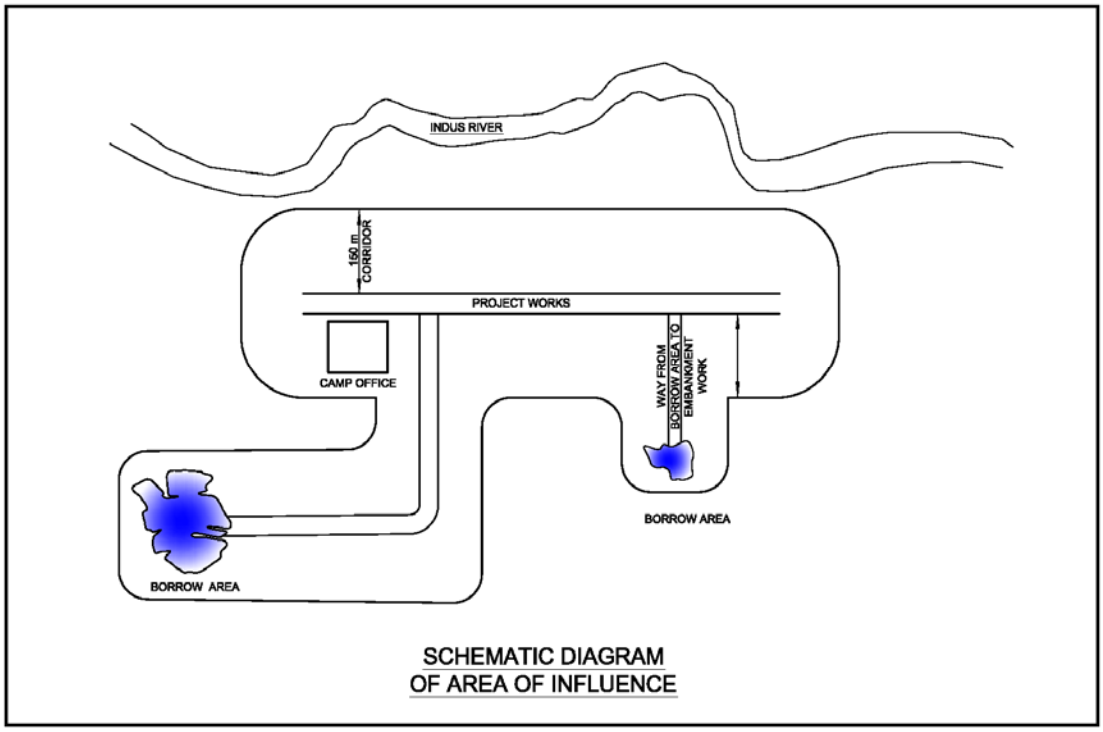


Figure 3.10: Typical Primary Impact Zone

3.14. Secondary Impact Zone

The secondary impacts zone in case of the embankments sub-project will be considered the areas prone to frequent flood damage or experienced damages in the past due to breach in the embankments. This area has been considered within the radius of 1km on each side of the embankments.

4 PROJECT ALTERNATIVES

4.1. Introduction

An analysis of alternatives has been carried out to review and assess different ways of meeting the project objectives that might have fewer environmental or socioeconomic impacts.

The consideration of alternatives is a proactive method of environmental and social assessment as it enhances the project design by examining options and ruling out options which are deemed to be too environmentally or socially damaging, instead of only focusing on mitigations to reducing adverse impacts of a single design. This calls for a systematic comparison of feasible alternatives for the proposed project site, technology and operational alternatives.

The designs for sub-project works on the MS, SH, BU and INDO embankment Bunds are a result of an iterative design approach in which alternatives have been reviewed against both their functionality and socio-environmental impacts. The alternative project activities which have been considered and the reasons for their rejection are discussed under the following headings.

4.2. Do Nothing Scenario

The no project alternative is assessed on the assumption that in the absence of the project, the Irrigation Department would continue to undertake on-going maintenance of the embankments at the current rate and nature.

In the without project scenario, the performance of the embankments is considered to be continue as has been recorded since commissioning of the embankments, as such the following issues are expected to continue:

- Catastrophic breaches of the embankments during high floods;
- Piping (or leaks) through the embankments during high flood events – such leaks may weaken the bunds (levees) and increase the risk of a breach occurring during high floods in the future;
- Depressions in embankment crests are developing at local crossing points, and would be expected to continue to lower reducing the level of freeboard provided and increasing the risk of failure of the bunds due to overtopping during a high flood.
- Erosion of the embankments due to wave washes during high flood.

In all the abovmentioed cases, there is a threat of breach of the embankment during high flood in Indus River and resultantly this will devastate the standing crops, agriculture land, houses, population and their livelihood. The risk has increased due to frequent occurrence high of and supper floods due to climate change and deteriorating condition of levee embankments. Therefore; this option has been dropped.

4.3. Structure Rehabilitation versus Replacement

In this option two aspects are considered one is to construct a new embankment and the other is to rehabilitate the existing embankments. The environmental and social impacts associated with the construction of new embankments are clearance of vegetation, removal/uptoodirooting of trees, disturbing water bodies, defacing the landscape, land acquisition and relocating the settlements, requiring additional areas and cost. In order to reduce the environmental and social impacts and capital cost of the project, it is preferable to rehabilitate the existing structures rather than replacing.

4.4. Site Selection

The work will be done on existing embankment without shifting .The existing bunds (levees) were constructed on the riverine bank limits of river Indus in 1940s to save adjacent lands from inundation in events of high floods. On the outer side there are cropped land and populated areas. Inside river are active river paths. The embankment shifting is therefore technically undesirable. The relocating of embankments will create serious social and environmental impacts such as relocation of population, acquiring of lands, disturbance of crops and vegetation.

4.5. New Design Configurations

There are some alternate flood protection systems which are sometimes adopted in place of embankments, such as flood protection retaining walls, anchored sheet piles, etc. These options are normally utilized in restricted areas where river passed through urban developments. The embankment levees are most common way of containing the floods and do not require special technology of construction and supply of special materials. The construction / rehabilitation of embankment can be carried out using locally available earth and rock. In given situation this is the best option from technical as well as environmental and social viewpoint.

4.6. Reduced Width and Height of the Embankments

In the PC-I of the proposed sub-projects, the width and height condition on some reaches of the embankments is shown not satisfactory and it is proposed to widen the embankments and reinstate the berms. As a result, the proposed embankments of the Indus River are slightly set back beyond the existing embankments. In order to achieve this, a large quantity of fill material is required to be won from the uncultivated land along the flood plain/inner parts of the Indus River. Development of the borrow pits, associated impact and mitigation measures are discussed in this ESIA.

4.7. Sources of Construction Materials

The rehabilitation work requires earthwork and stones for slope pitching and river side aprons. The alternate sources of these materials are discussed below.

(a) Earth Material

The earth material for embankment rehabilitation can be obtained either (i) from river bed side or (ii) from area beyond river banks. At both sides suitable material is available. The material to be obtained outside river bed poses issues of acquiring of land, affecting existing crops and vegetation and development of depression on populated areas. The borrow areas on river side will not require land acquisition as it is property of state and disturbance to vegetation crops and population will be minimum. Thus most of the earth material is planned to be obtained from uncultivated riverine areas.

(b) Earth Material

The stones shall be obtained from nearby commercial limestone quarries at Chilya and Khanote which are operated by privately owned companies. The exploitation of new quarries will require land acquisition, licenses for blasting, disturbance of new areas etc.

4.8. Strip Borrow Areas versus Deep Pits

In order to reduce haulage costs that shall be incurred in transporting borrow material from borrow areas to the embankments and to minimize development of depressions, strip borrow areas with depth not more than 4ft (1.2m) from river side at a distance more than 150ft from embankments is proposed. Deep borrow pits shall be avoided.

Guidelines / mitigation measures relevant to the development and rehabilitation of borrow areas is prepared in the ESIA and ESMP.

5 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter examines the existing environmental conditions of the project area to provide a baseline against which the project impacts can be measured. The chapter also identifies sensitive flora and fauna receptors in the project area.

The information provided in this section is both quantitative and qualitative and is based on secondary and primary sources collected through field surveys conducted specifically for this study and desk studies related to the project area.

The baseline information is required for scoping potential social and environmental issues associated with the implementation of the project. On the basis of baseline information, the project interventions are addressed and mitigation measures are proposed. The baseline information also helps to indicate the specific issues to be monitored during project execution as well as during the operational phase.

5.1. Physical Environment

Topography

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 ESIA 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 kilometres wide is flooded at high tide and contains some mangrove swamps.

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 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, chilli and sugarcane over a cultivated area of 2.8 million acres have been destroyed or affected.

Land use

This 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" and "Rabi". 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, and 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:

- Indus River (active channel and creeks)
- Riverine scrublands and agriculture;
- Agriculture land;
- River Banks;
- Stagnant water bodies;
- Settlements including villages and associated structures such as agricultural sheds, places of worship, graveyard, government offices and other community buildings;
- Irrigation and drainage network
- Roads (unsealed tracks and paved road);
- Uncultivated/Wasteland that includes areas which have been rendered unusable for agriculture due to water logging, salinity, or due to other causes.

The detailed land use map of subproject area prepared through ArcGIS, Google Earth and field inspection is given **Figures 5.1** to **5.14**.

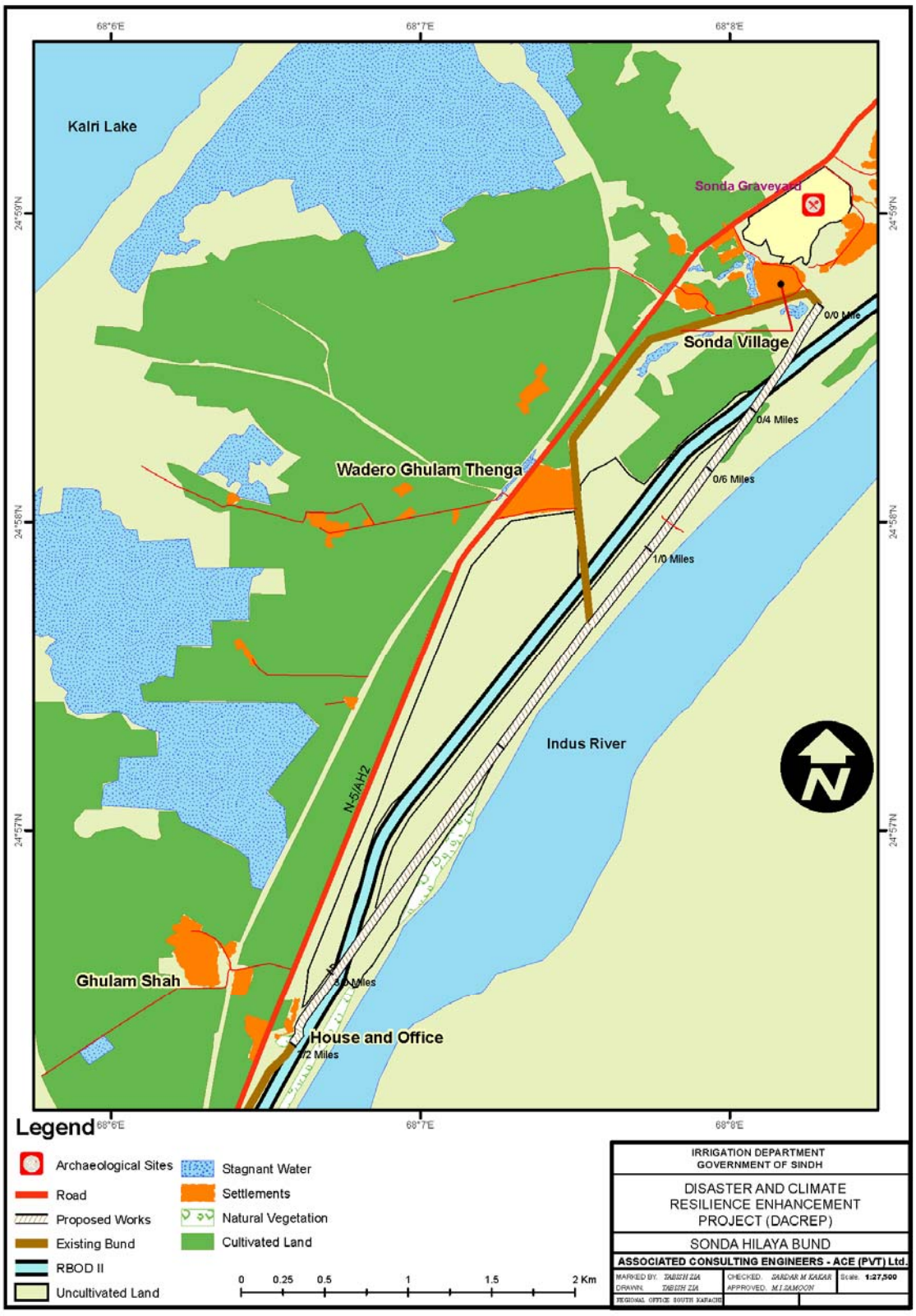


Figure 5.1: Land Use Map of Sonda-Hilaya (SH) Bund

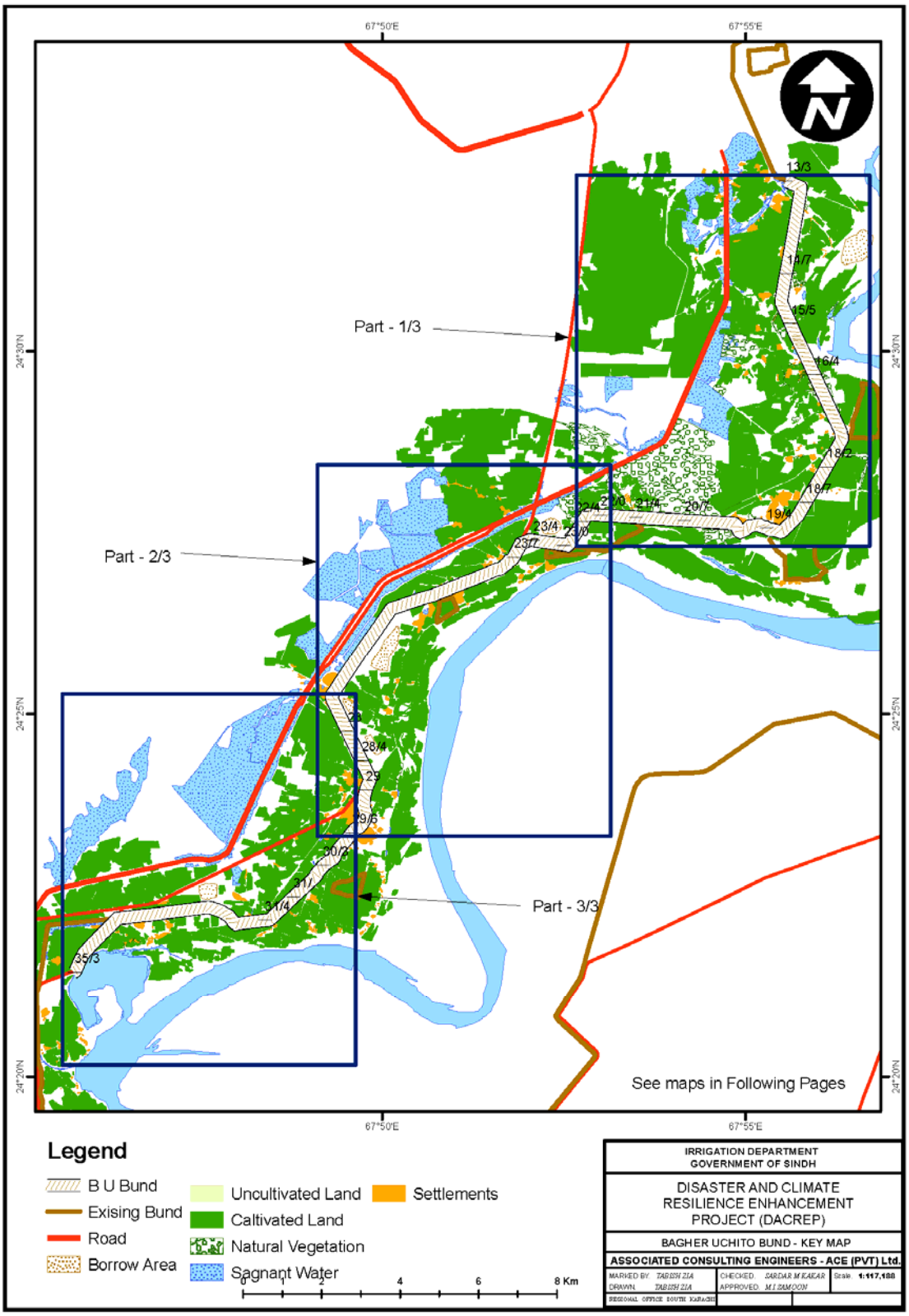


Figure 5.2: Land Use Map of Baghar Uchito (BU) Bund (Key Map)

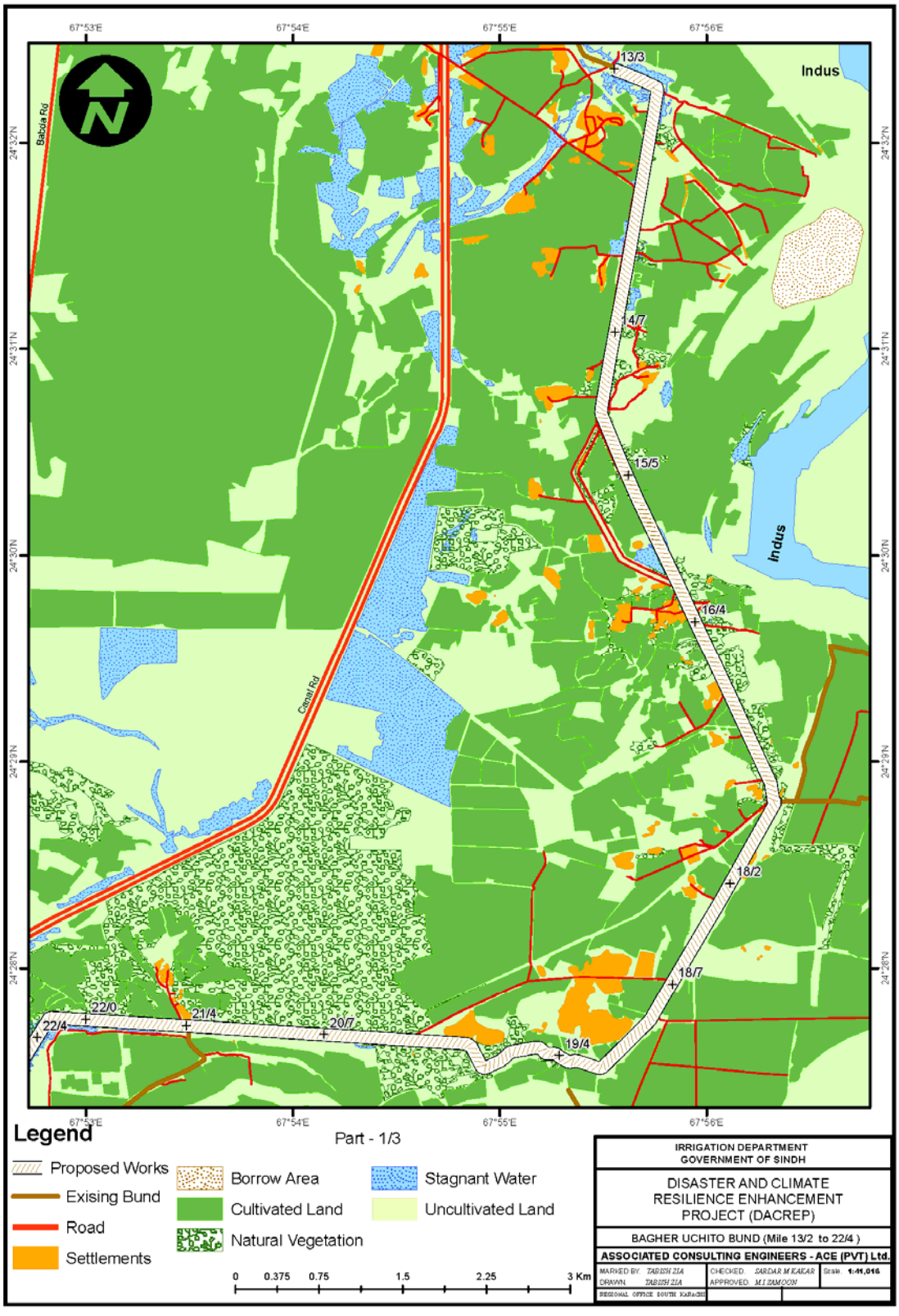


Figure 5.3: Land Use Map of Baghar Uchito (BU) Bund (Mile 13/2 to 22/4)

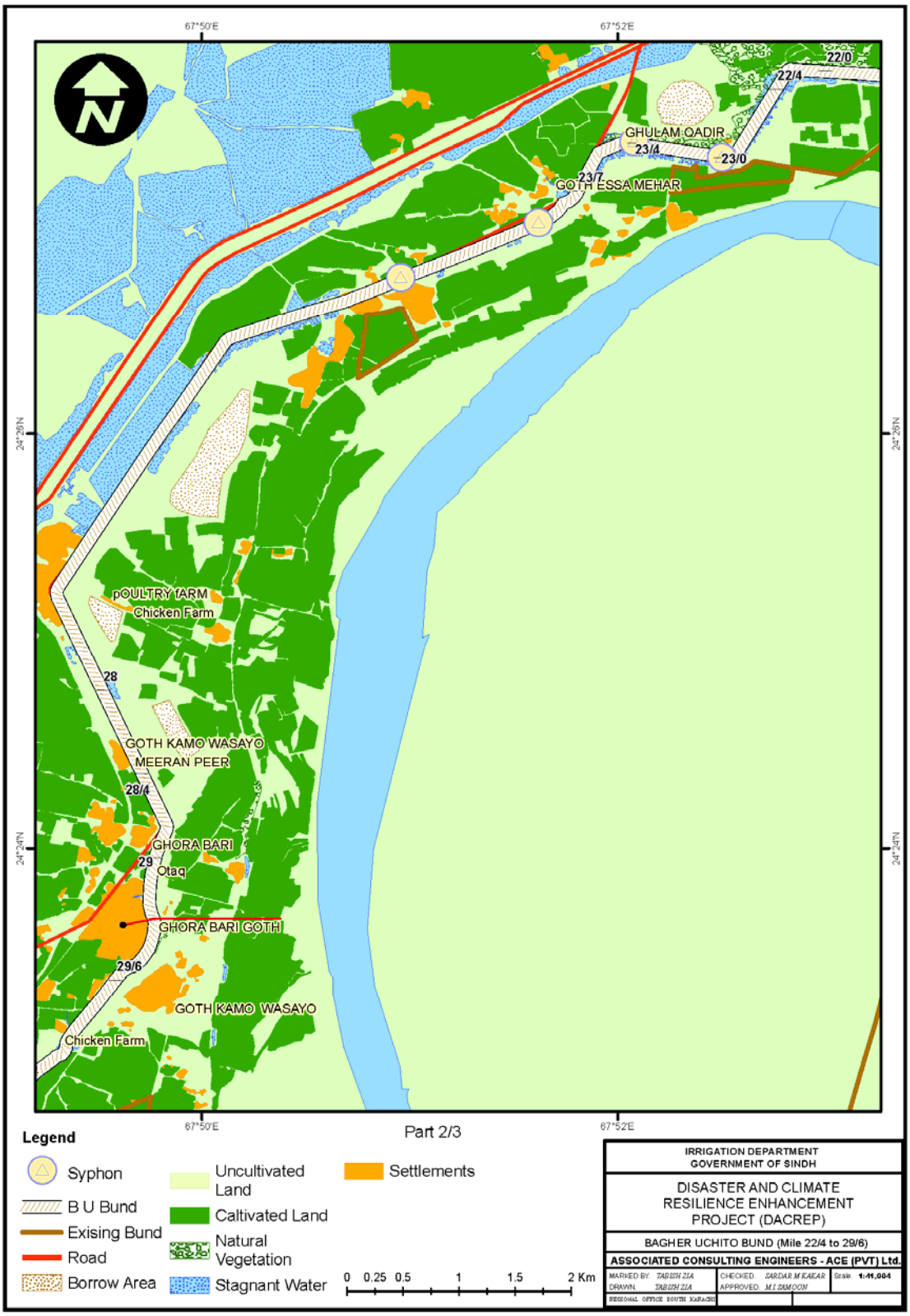


Figure 5.4: Land Use Map of Baghar Uchito (BU) Bund (Mile 22/4 to 29/6)

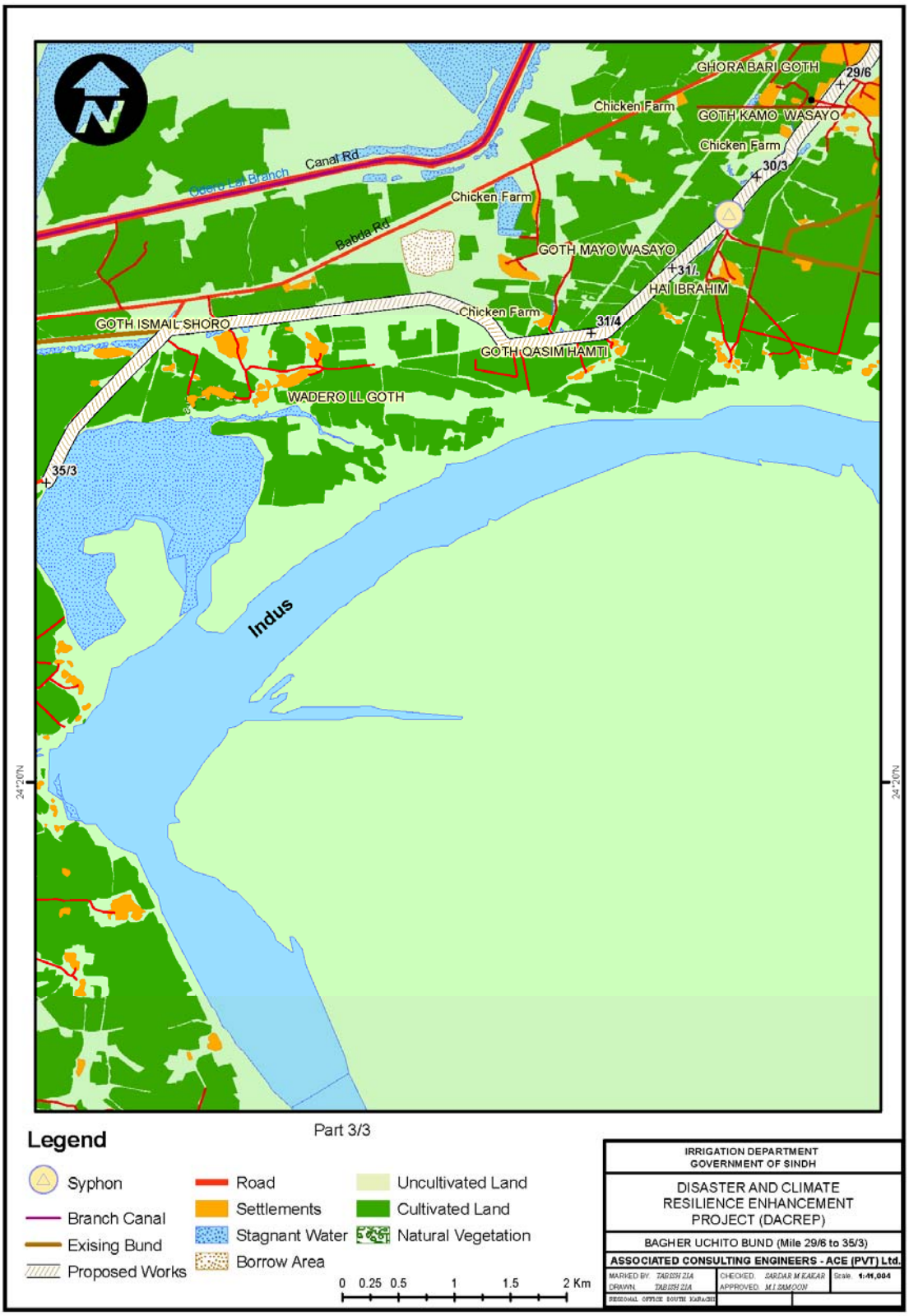


Figure 5.5: Land Use Map of Baghar Uchito (BU) Bund (Mile 29/6 to 35/3)

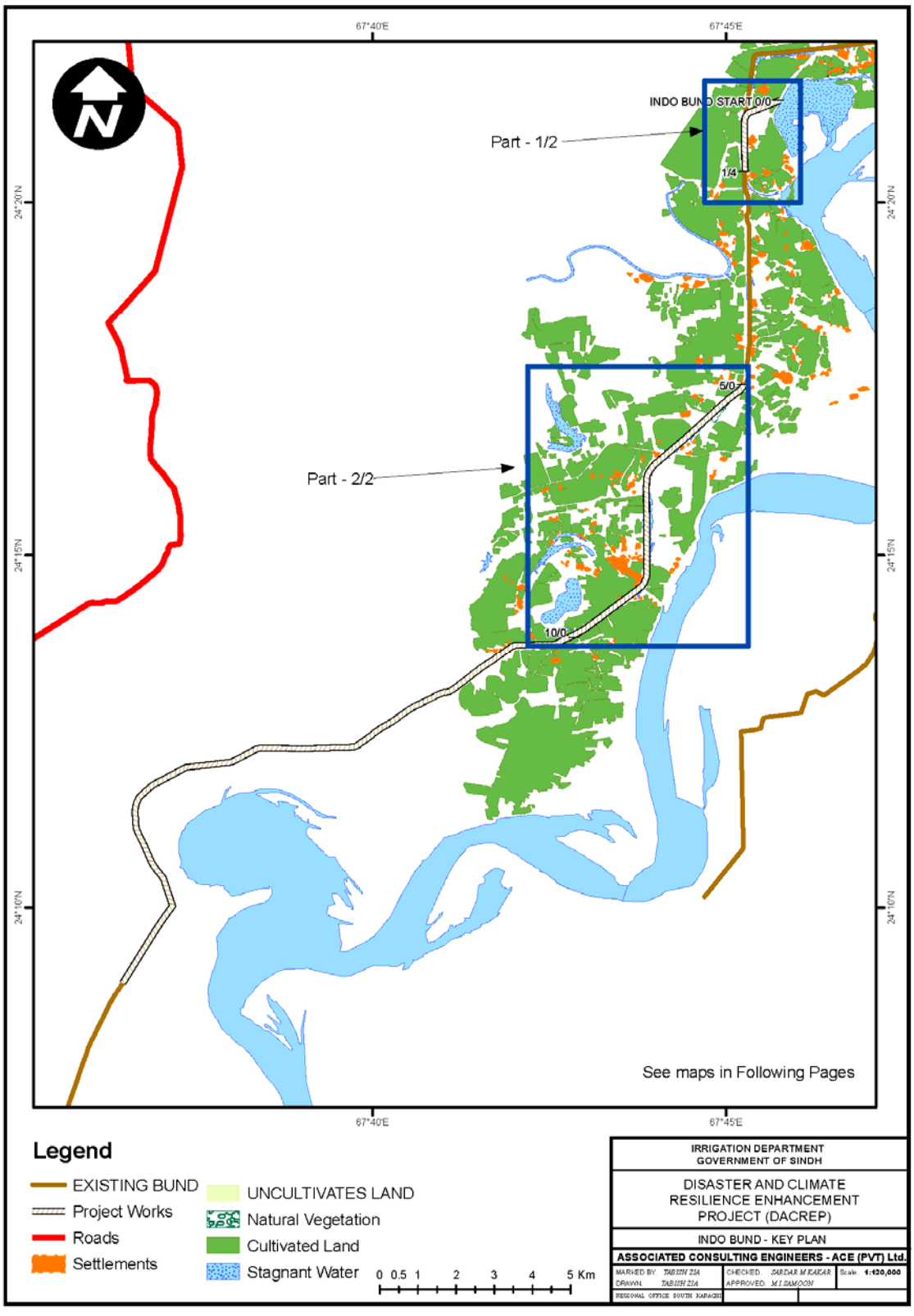


Figure 5.6: Land Use Map of Indo Bund (Key Map)

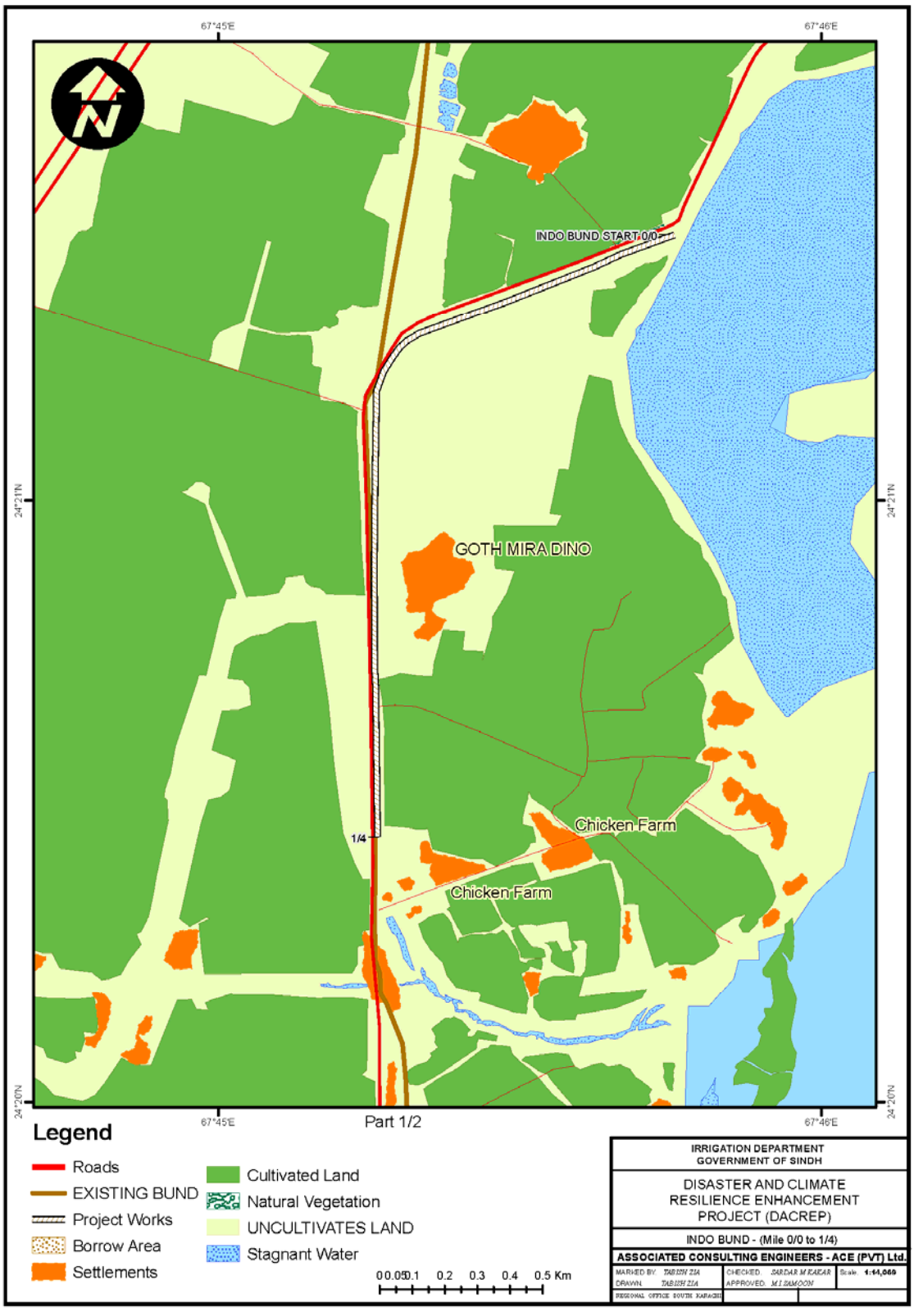


Figure 5.7: Land Use Map of Indo Bund (Mile 0/0 to 1/4)

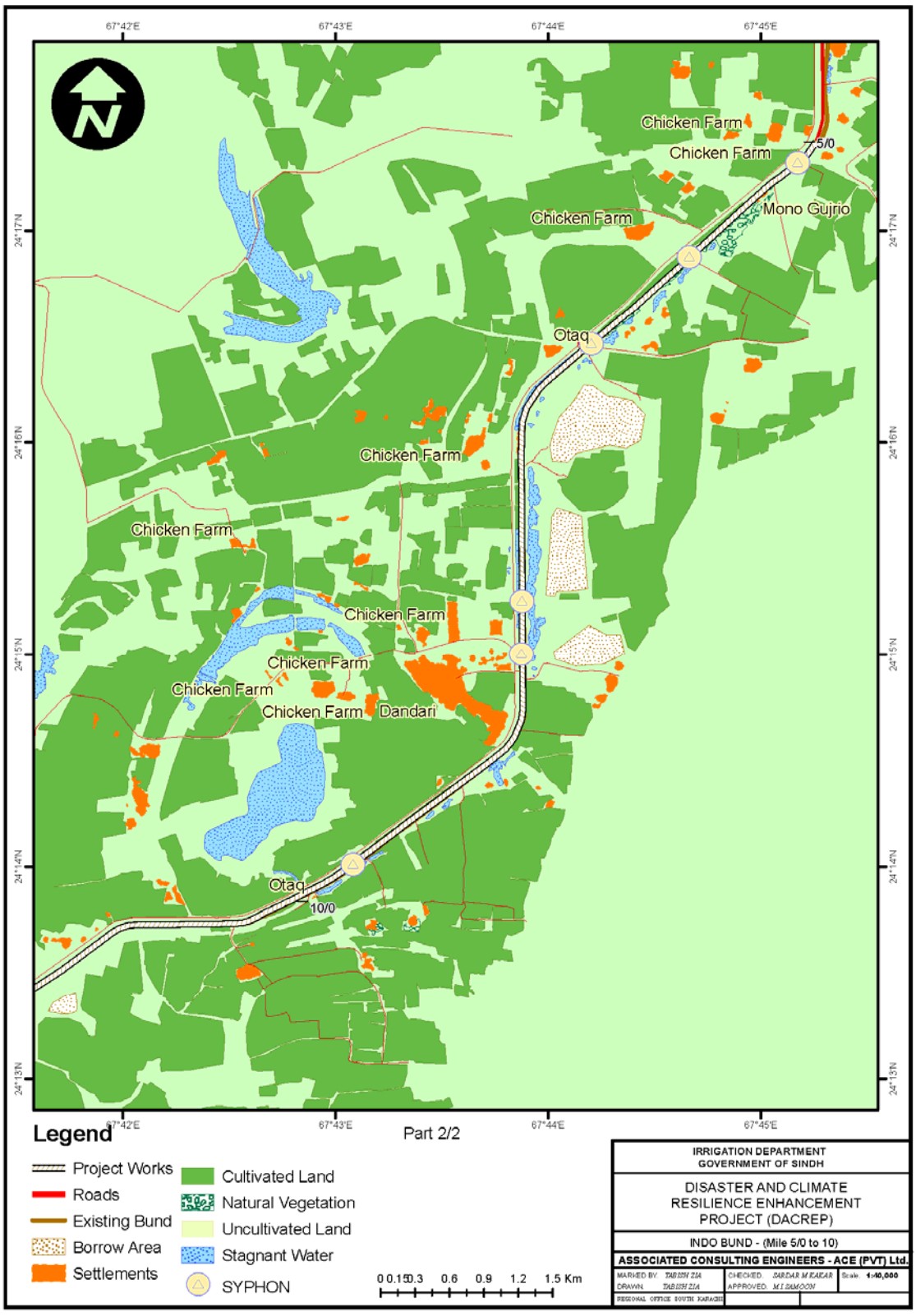


Figure 5.8: Land Use Map of Indo Bund (Mile 5/0 to 10)

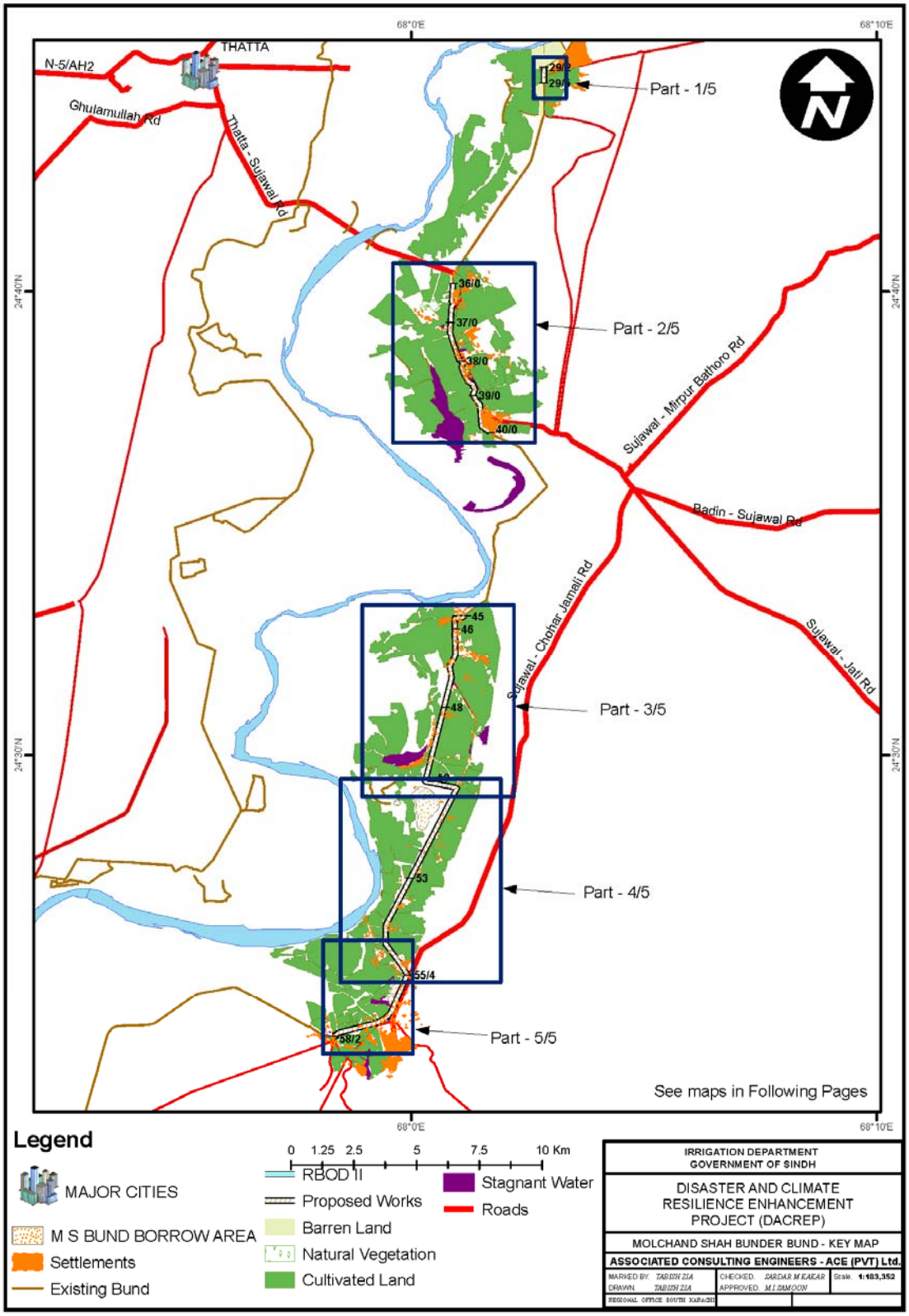


Figure 5.9: Land Use Map of Mulchand Shah Bunder Bund (Key Map)

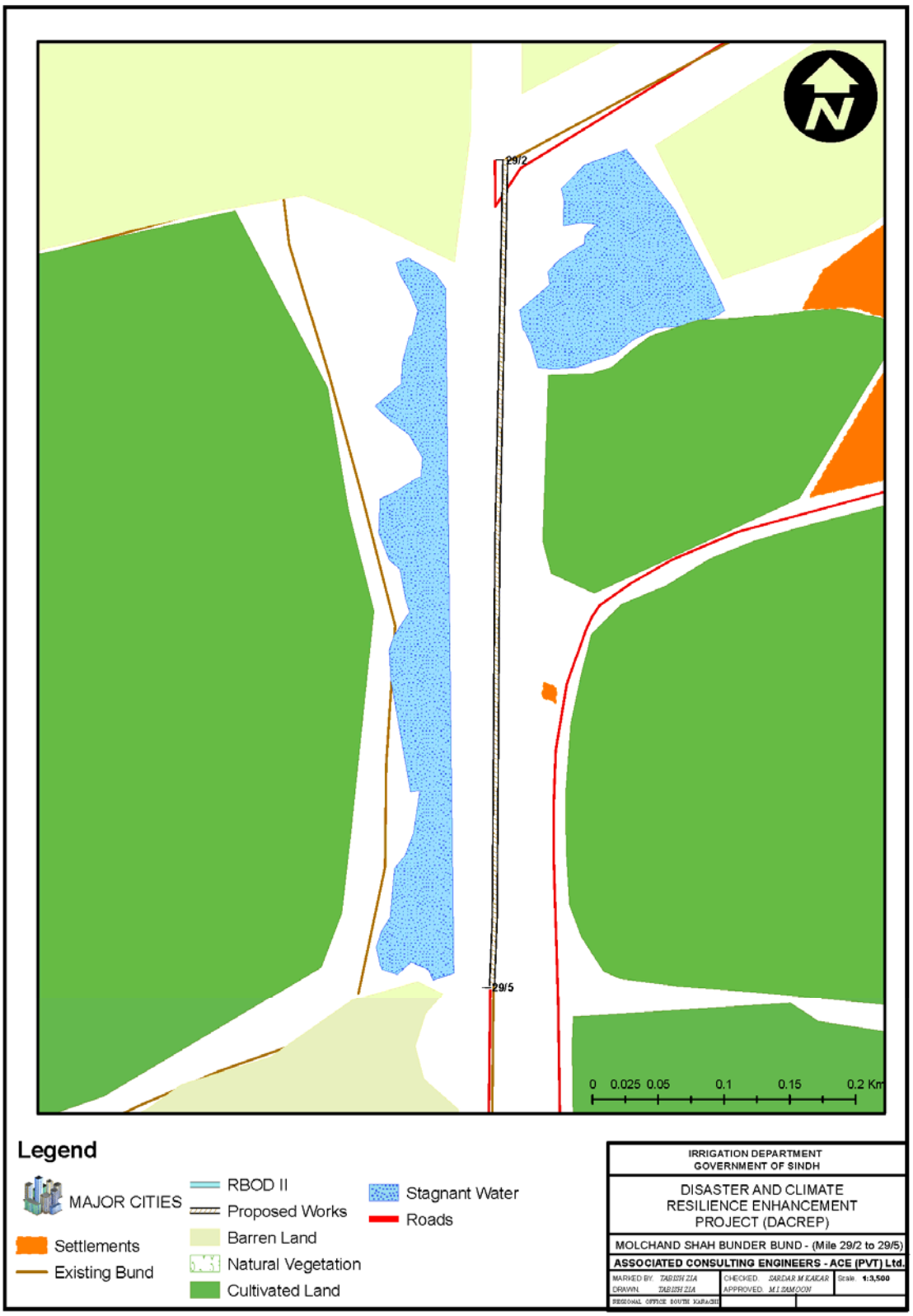


Figure 5.10: Mulchand Shah Bunder Bund (Mile 29/2 to 29/5)

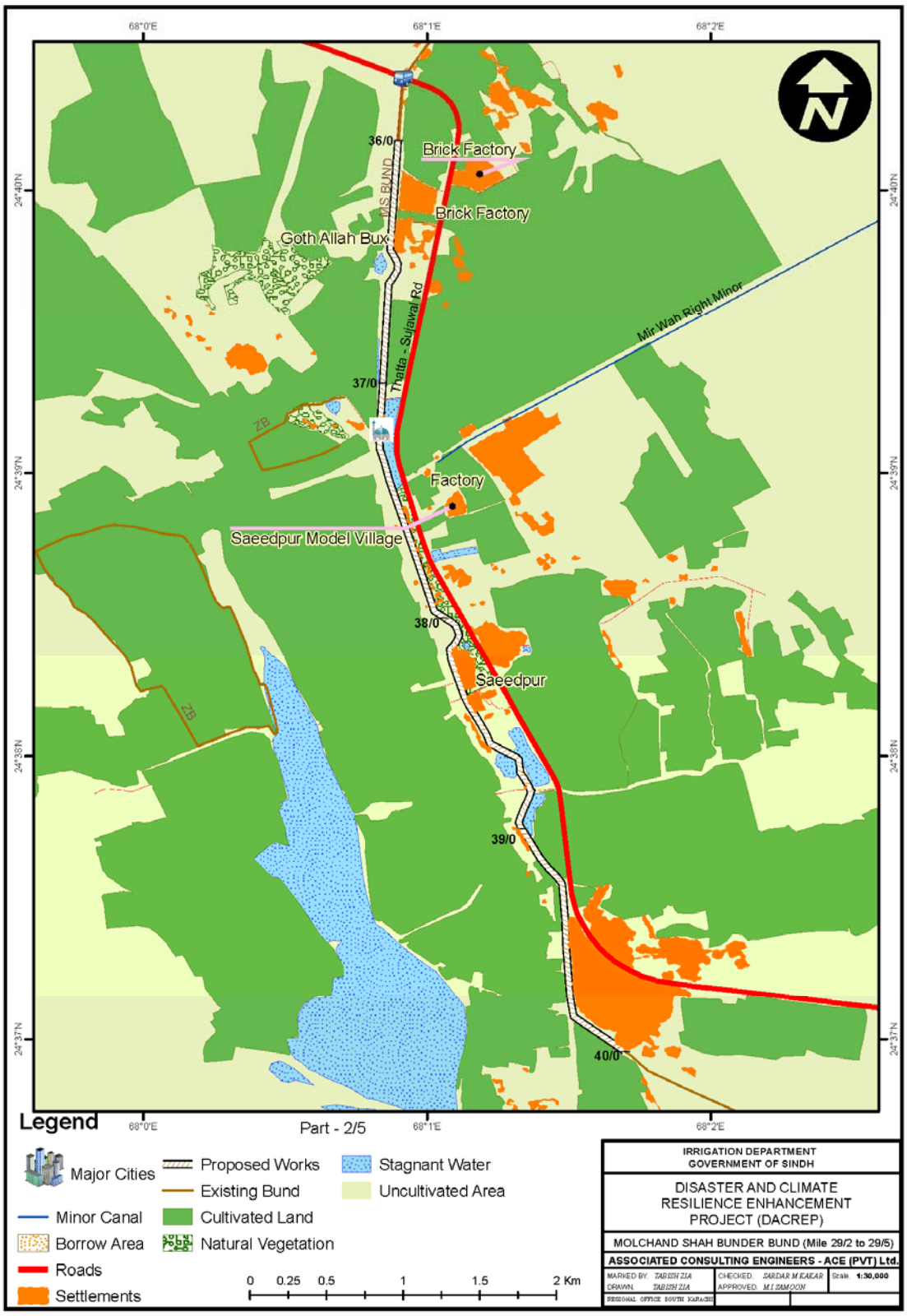


Figure 5.11: Mulchand Shah Bunder Bund (Mile 29/2 to 29/5)

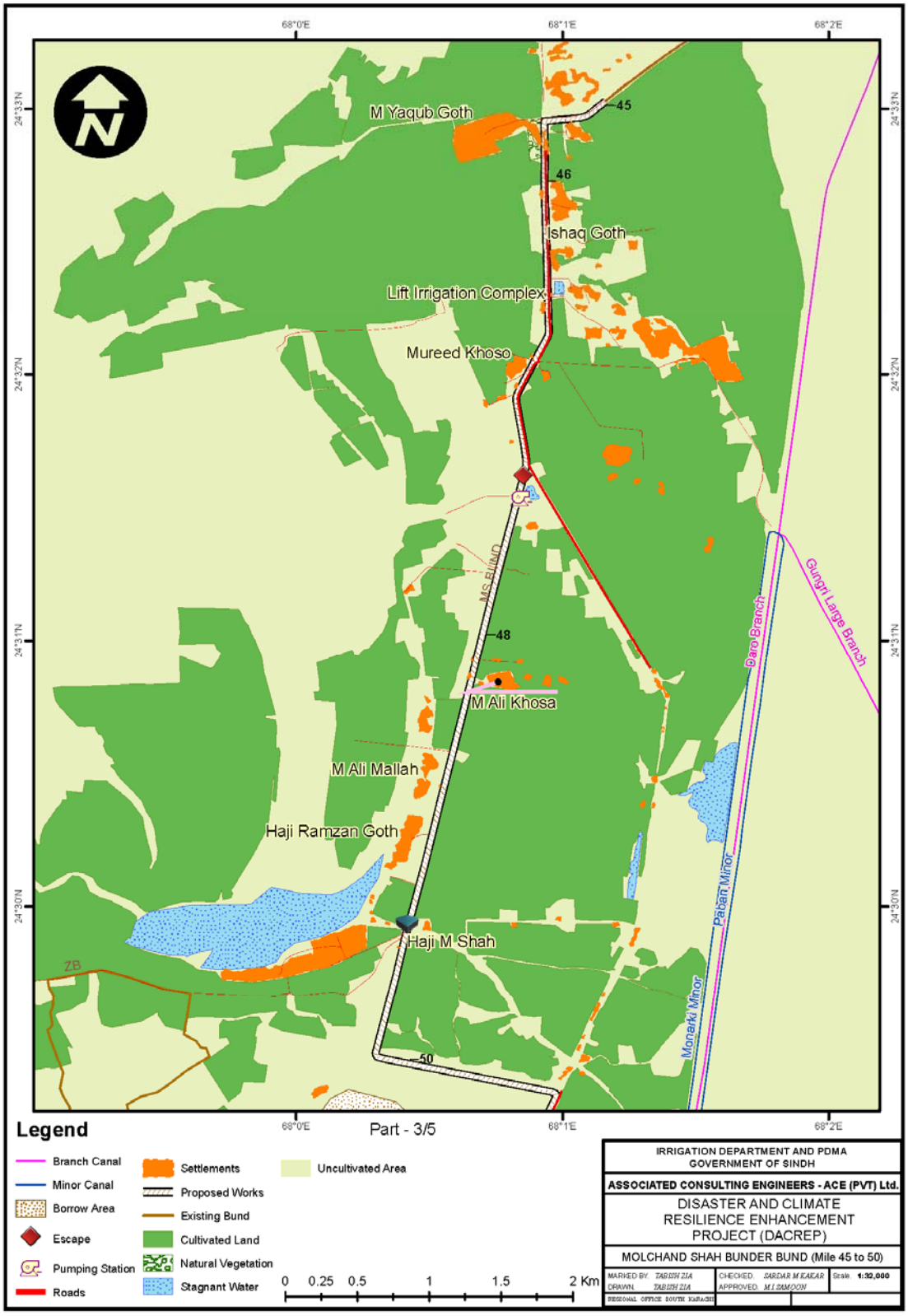


Figure 5.12: Mulchand Shah Bunder Bund (Mile 45 to 50)

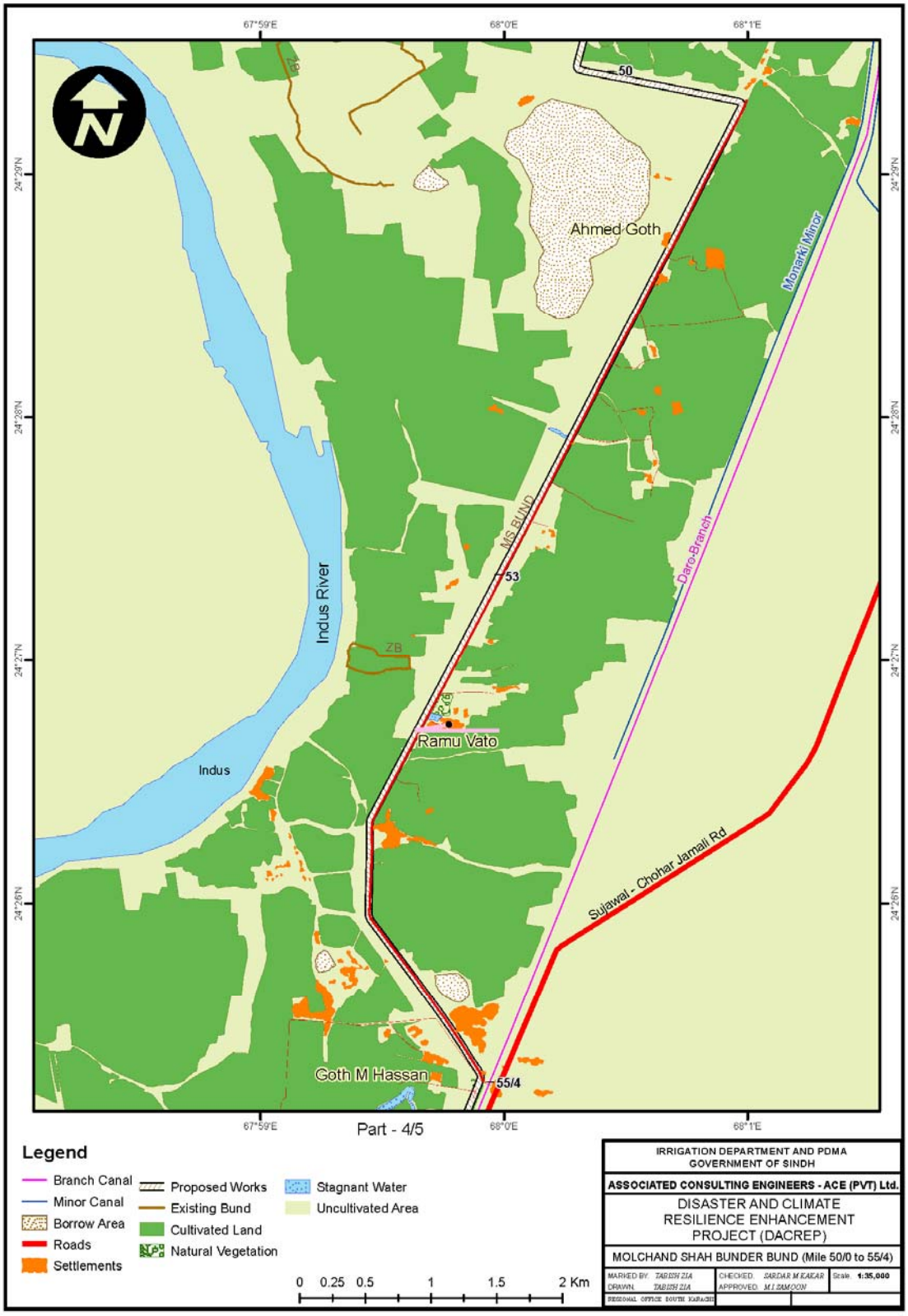


Figure 5.13: Mulchand Shah Bunder Bund (Mile 50/0 to 55/4)

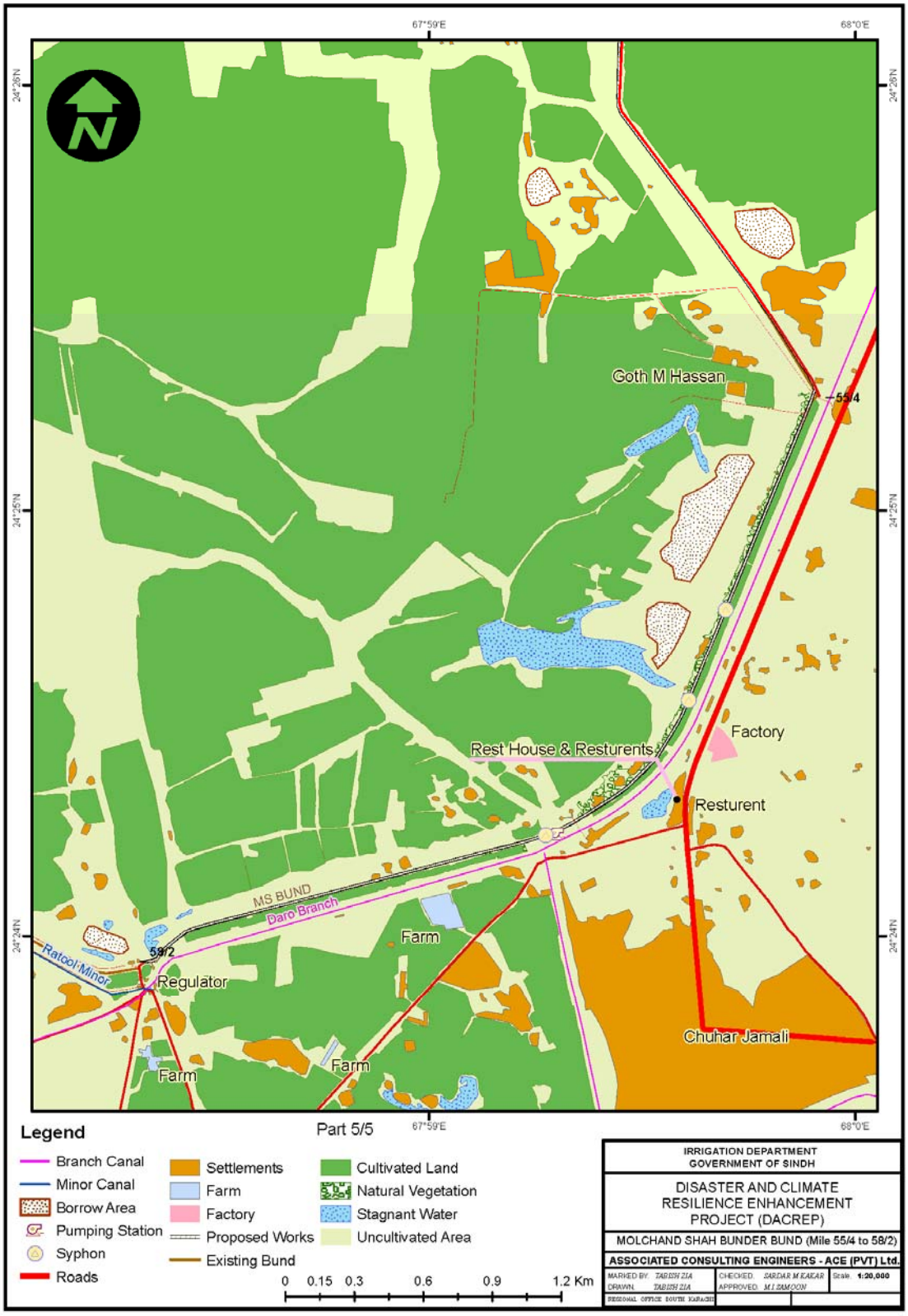


Figure 5.14: Mulchand Shah Bunder Bund (Mile 55/4 to 58/2)

Water Resources

There are two types of water resources i.e. surface water and ground water. Both sources in the project are described below.

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 5.15**.

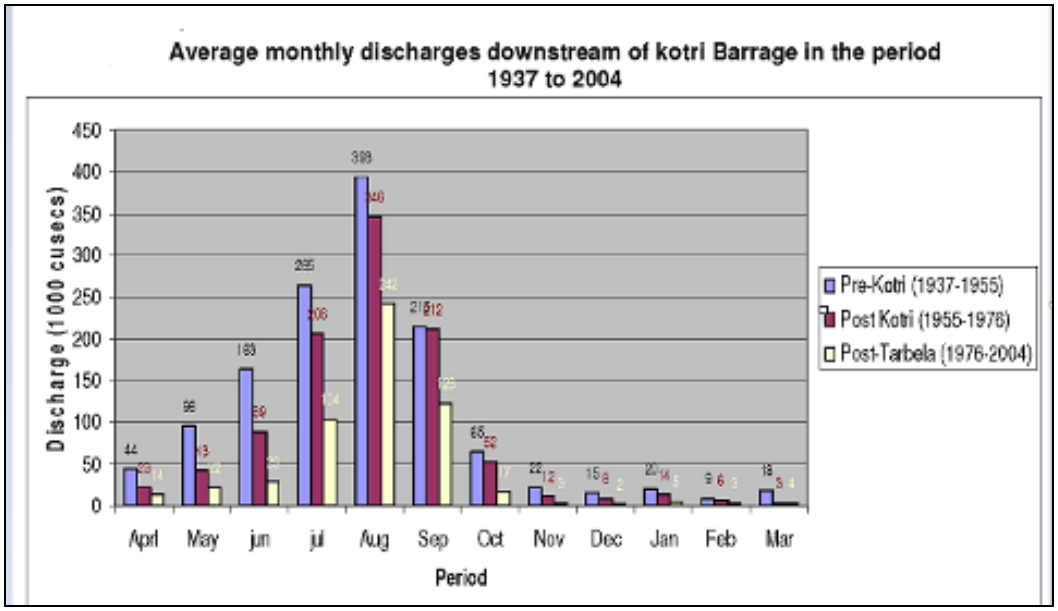


Figure 5.15: Monthly Discharges Downstream of Kotri Barrage

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 analysed 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 5.1**.

Table 5-1: 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 5.2. 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 5.3**.

[3]National Environmental Quality Standards (NEQS) for Drinking Water Quality in Pakistan are set out and available on the website of the Pakistan Environmental Protection Agency**.**

Table 5-2: 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

[3] http://www.environment.gov.pk/eia_pdf/g_Legislation-NEQS.pdf

Table 5-3: 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	-	-	-

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. The only problem is the occasional summer dust storms which increase the concentration of dust particles in the air; as a result the air quality is exceptionally high by any international standards.

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 5.4**.

Table 5.5-4: 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 SAR is exceeding the standards.

5.2. Biological Environment

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. The detailed floral profile of the project area is given in the **Table 5.5** followed by some photographs of the typical vegetation in the area (**Figure 5.16**).

Table 5-5: List of Plant Species Identified in the Sub-project Area

	Family	Plant species	Classification
1.	Arecaceae	Phoenix sylvestris	Tree
2.	Aristolochiaceae	Aristolochia bracteolata	Herb
3.	Asclepiadaceae	Calotropis procera	Shrub
4.	Asclepiadaceae	Caralluma edulis	Herb
5.	Asclepiadaceae	Glossonema varians	Herb
6.	Asclepiadaceae	Leptadenia pyrotechnica	Shrub
7.	Asparagaceae	Asparagus dumosus	Shrub
8.	Asteraceae	Grangea maderaspatana	Herb
9.	Asteraceae	Pluchea wallichiana	Shrub
10.	Asteraceae	Vernonia cinerascens	Shrub
11.	Asteraceae	Xanthium strumarium	Shrub
12.	Avicenniaceae	Avicennia marina	Tree
13.	Boraginaceae	Coldenia procumbens	Herb
14.	Boraginaceae	Cordia gharaf	Tree
15.	Boraginaceae	Heliotropium calcareum	Subshrub
16.	Boraginaceae	Heliotropium curassavicum	Subshrub
17.	Boraginaceae	Heliotropium strigosum	Herb
18.	Boraginaceae	Sericostoma pauciflorum	Subshrub
19.	Boraginaceae	Trichodesma indicum	Subshrub
20.	Brassicaceae	Farsetia hamiltonii	Herb
21.	Caesalpiniaceae	Senna italic	Subshrub
22.	Capparidaceae	Cadaba fruticosa	Shrub
23.	Capparidaceae	Capparis decidua	Large Shrub
24.	Capparidaceae	Capparis spinosa	Subshrub
25.	Capparidaceae	Cleome brachycarpa	Herb
26.	Capparidaceae	Cleome scaposa	Herb
27.	Capparidaceae	Cleome viscosa	Herb
28.	Capparidaceae	Gynandropsis gynandra	Herb
29.	Capparidaceae	Maerua arenaria	Shrub

	Family	Plant species	Classification
30.	Caryophyllaceae	Polycarpaea spicata	Herb
31.	Chenopodiaceae	Salsola imbricata	Shrub
32.	Chenopodiaceae	Suaeda fruticosa	Shrub
33.	Euphorbiaceae	Euphorbia	Herb
34.	Fabaceae	Alhagi maurorum	Subshrub
35.	Fabaceae	Alysicarpus ovalifolius	Herb
36.	Fabaceae	Crotalaria medicaginea	Herb
37.	Fabaceae	Cyamopsis tetragonoloba	Shrub
38.	Fabaceae	Indigofera cordifolia	Herb
39.	Fabaceae	Melilotus indica	Herb
40.	Fabaceae	Trifolium alexandrianum	Herb
41.	Hydrocharitaceae	Hydrilla verticillata	Herb
42.	Hydrocharitaceae	Ottelia alismoides	Herb
43.	Malvaceae	Abutilon bidentatum	Subshrub
44.	Malvaceae	Abutilon muticum	Subshrub
45.	Malvaceae	Hibiscus micranthus	Subshrub
46.	Malvaceae	Senra incana	Subshrub
47.	Malvaceae	Sida ovata	Subshrub
48.	Mimosaceae	Acacia nilotica	Tree
49.	Mimosaceae	Prosopis cineraria	Tree
50.	Mimosaceae	Prosopis juliflora	Large Shrub
51.	Molluginaceae	Glinus lotoides	Herb
52.	Poaceae	Paspalum vaginatum	Grass
53.	Poaceae	Phragmites australis	Large Grass
54.	Poaceae	Phragmites karka	Large Grass
55.	Poaceae	Saccharum benghalense	Large Grass
56.	Poaceae	Saccharum griffithii	Large Grass
57.	Poaceae	Saccharum spontaneum	Large Grass
58.	Poaceae	Sporobolus nervosus	Grass
59.	Poaceae	Sporobolus sp. nov.	Grass
60.	Poaceae	Tetrapogon tenellus	Grass
61.	Poaceae	Tragus roxburgii	Grass
62.	Portulacaceae	Portulaca oleracea	Herb
63.	Potamogetonaceae	Potamogeton lucens	Herb
64.	Potamogetonaceae	Potamogeton natans	Herb
65.	Potamogetonaceae	Potamogeton perfoliatus	Herb
66.	Rhamnaceae	Ziziphus nummularia	Shrub
67.	Rubiaceae	Kohautia retrorsa	Subshrub
68.	Salicaceae	Populus euphratica	Tree
69.	Salvadoraceae	Salvadora oleoides	Tree
70.	Salvadoraceae	Salvadora persica	Tree
71.	Salviniaceae	Salvinia molesta	Herb
72.	Solanaceae	Solanum cordatum	Straggling Shrub
73.	Solanaceae	Solanum nigrum	Herb
74.	Solanaceae	Solanum surattense	Herb
75.	Tamaricaceae	Tamarix alii	Shrub
76.	Tamaricaceae	Tamarix indica	Shrub

	Family	Plant species	Classification
77.	Tamaricaceae	Tamarix sp	Shrub
78.	Typhaceae	Typha dominghensis	Reed
79.	Verbenaceae	Phyla nodiflora	Herb
80.	Violaceae	Viola stocksii	Herb
81.	Zygophyllaceae	Fagonia indica	Herb

Dabh (Cynodondactylon) grass observed on riverside near toe of SH bund

Layee (Tamarixdioica) shrub observed on landside of SH Bund

Jaar observed at embankment of BU Bund

Kanderi observed at embankment of SH Bund

Sunflower cultivated on riverside at 0/5 miles of SH bund

Layee (Tamarixdioica) shrub observed at embankment of MS Bund

Figure 5.16: Typical Vegetation in Subproject Area

Tree Cover

Annex-A provides an inventory of all trees present within the working area giving species and locations with reference to miles. 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, although five times as many trees as have been lost will be replanted as part of the Contracts to be awarded for these Works. 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 (7) large mammal species including four (4) species on SH Bund, 6 species on MS Bund, three mammals on BU Bund and three mammals are on Indo Bund were recorded. While ten (10) small mammals including six (6) species on SH Bund, 8 species on different habitats of MS Bund and 5 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. The sub-project wise details are given below.

Large mammals. In month of November 2015, a total of seven animals of different species, belonging to six families (Carnivora and Artiodactyla) were recorded from the subproject area as given in the **Table 5.6** below.

Table 5-6: Large Mammals Recorded in the Project Area

	Common Name	SH Bund	MS Bund	BU Bund	INDO Bund
1	Asiatic jackal	+	+	+	+
2	Jungle cat	+	+		
3	Bengal fox		+		
4	Indian otter		+		
5	Small Indian mongoose	+	+	+	+
6	Grey mongoose	+			
7	Indian wild boar		+	+	+
Total		**4**	**6**	**3**	**3**

Asiatic Jackal is most survivor species of area and Indian wild boar Susscrofa also common in the area. Prionailurus viverrinus, Felischaus are very rare species of this area whereas Velpes bengalonsis and Herpes tesjavanicus are uncommon in the area, Herpes tesedwardsi is also rare species. The Indian desert cat Felissylvestris ornate is an endangered; Fishing cat Prionailurus viverrinus and Jungle cat Felischaus are vulnerable species, Grey Mongoose Herpes tesedwardsi is near-threatened, Small Indian mongoose Herpes tesjavanicus is Least-concern, Indian wild boar Susscrofa and Asiatic Jackal Canis aureus common species according to the IUCN Red List of Pakistan Mammals 2005.

Small mammals. The small mammals found in the subproject area are given in the following **Table 5.7**.

Table 5-7: Small Mammal Species Recorded in the Project Area

	Species	S H Band	M S Band	B U Band	Indo
1	Sindh Rice Rat	+	+	+	
2	Palm Squirrel	+	+	+	+
3	Indian crested Porcupine	+	+		+
4	Little Indian field- mouse	+	+		
5	House mouse			+	+
6	Indian Hedgehog		+	+	
7	Kuhls' bat		+	+	+
8	Common Rat	+	+	+	+
9	House shrew		+	+	
10	Indian Gerbil	+			
Total		**6**	**8**	**7**	**5**

This wetland complex contains diverse habitats such as open wetlands, shallow pools; aquatic margin vegetation, sand dunes, surrounding desert land and agriculture fields provides shelter for variety small mammals. Indian crested Porcupine is another common wildlife while Indian Gerbil it rare species.

Most of the species at this area were recorded from sandy and agriculture fields areas with one species being recorded in village near a water source and another (bat) species found roosting in a tree. "Animal Tracks and Traces" is very useful field guide for identifying wild animals by its physical makes, for time constrains we use this book as field guide, however it convenient us to identify small mammals foot prints, track records further confirmed by help of Pakistan Mammals of Pakistan written by Mr. T. J. Robert.

Birds. The common avian species in the project area are shown in the **Table 5.8** (also see **Figure 5.17** for some photographs of key species).

Table 5-8: Avian Species of Study Area

	Common Name	SH Bund	MS Bund	BU Bund	Indo Bund
1	Ashy crowned finch-lark	+			
2	Bank Myna	+	+	+	+
3	Barn owl	+			
4	Baya weaver		+	+	
5	Grey Shrike	+	+	+	+
6	Black Bittern				+
7	Black Drongo	+	+	+	
8	Black Redstart	+	+	+	
9	Black Shouldered Kite			+	+
10	Black winged Stilt		+		+
11	Blue Rock Pigeon	+			
12	Blue-cheeked Beeater	+	+		
13	Blue-throat	+	+	+	
14	Brahminy Kite		+		+
15	Caspian tern		+		+
16	Cattle Egret	+	+	+	+
17	Cettis Warbler				
18	Collared Dove	+	+	+	+
19	Common Babbler		+		
20	Common buzzard			+	+
21	Common Crow Pheasant		+	+	
22	Common Kingfisher	+	+	+	+
23	Common Moorhen	+	+	+	
24	Common Myna	+	+	+	+
25	Common or Black Coot	+	+		
26	Common pochard		+		
27	Common Teal		+		
28	Common/Barn Swallow	+	+	+	+
29	Crested Lark	+	+	+	
30	Eastern Pied Wheatear		+	+	
31	Eurasian sparrowhawk		+		
32	Glossy ibis		+		
33	Great Cormorant		+		
34	Greenshank				+
35	Grey Heron		+	+	
36	Hoopoe	+	+	+	+
37	House Bunting			+	

	Common Name	SH Bund	MS Bund	BU Bund	Indo Bund
38	Indian Collared Dove	+	+	+	+
39	Indian house crow	+	+	+	+
40	Indian House Sparrow		+	+	+
41	Indian Pond Heron	+	+	+	+
42	Indian River Tern		+	+	+
43	Indian Roller	+	+	+	
44	Jungle Babbler	+	+		
45	Little Cormorant		+		+
46	Little Egret	+	+	+	+
Total		**20**	**37**	**27**	**22**

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.

Standing water from Indus river on landside of BU bund is habitat for a wide range of water birds

Red wattled lapwing observed in standing water from river Indus near BU Bund

Prosopisjuliflora (devi)near toe of BU bund on landside

Black drongo observed at 13/3 mileof BU bund

Sunflower cultivated on riverside of SH bund at 0/5 miles within the RoW

Akk (Calotropisprocera) shrub observed on landside of BU Bund

Turtle dove observed at 19/0 miles of BU bund

Black redstart observed at 57/0 miles of MS bund

Black drongo observed at 37/0 miles of MS bund

Red vented bulbul observed at 28/6 miles of BU bund

Hoopoe (Upupaepops) observed at 2/6 miles of SH bund

Jungle babler Hoopeo observed at 38/6 miles of MS bund

Figure 5.5.17: Key Habitats and Typical Avian Species in Subproject Area

Reptiles and amphibians. The common reptile species in the project area are shown in

Table 5.9.

Table 5-9: Amphibian and Reptilian Diversity of Project Area

	English /Vernacular Name	SH Band	MS Band	BU Band	Indo Band
1	Marbled Toad/ Mandak	+	+	+	
2	Bull-frog/ maindak	+			
3	Skittering frog/ Maindak			+	
4	Common river turtle/ Kachoo	+	+	+	+
5	Brown river turtle/ Kachoo	+		+	+
6	Spotted pond turtle/ Kachoo	+		+	
7	Spiny-tailed ground lizard/ Sando	+			
8	Indian garden lizard/ KirarrQazi				+
9	Brilliant agama/ Kirarri	+			
10	Yellow-bellied house gecko/ Kirarri	+	+	+	+
11	Spotted Indian house gecko/ Kirarri	+	+		
12	Keeled rock gecko/ Kirarri	+			
13	Indian fringe-toed sandy lizard/ Kirarri			+	
14	Striped grass skink/ Kirarri			+	
15	Bengal monitor/ Gho	+	+	+	+
16	Indian sand boa/ bamoie		+		
17	Black Cobra/ Karonaag			+	
18	Sochurek's saw-scaled viper/ Lundi	+			
	Total	**18**	**6**	**10**	**5**

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 favourable for Geckos Saw scaled viper and Cliff racer snake. Whereas 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.

SH Bund. SH Band is situated near Keenjhar Lake, Right Bank Outfall Drain (RBOD) and Loop Band covering the outer part of SH band. River flow is touching the inner side of reach total length of SH is 1/0 to 3/2 mile long. The site has divers physical features, zero point of the reach is touching in hard and stony surface, which is potential habitat for reptiles (Brelient agama, Spine tailed Lizard, hilly habitat also provide nesting site and shelter for birds, some mammals including fox, Jackals, Juried and Gerbils found here.

An important Ramsar site (Keenjhar Lake) situate near the site, which is the second largest fresh water lake in Pakistan. Keenjhar Lake has been declared Ramsar site and a wildlife sanctuary. It provides a favorable habitat of winter migratory birds like Ducks, Geese, Flamingos, Cormorants, Waders, Herons, Egrets, Ibises, Terns, Coots and Gulls. It is breeding ground of the black-crowned night heron, the Cotton pygmy goose, and pheasant-tailed jacana. During field investigations in this area faunal species recorded through in-direct and direct sighting. 4 species of large mammals, 6 species of small mammals, 20 bird and 12 reptile species recorded. Information was also collect from local community by interview persons from Sonda, Ali Bahar Thenga, and, Syed Ghulam Mohammad Shah village. The Keenjhar Lake is situated at the tail of SH Bund where not work is proposed and is almost 2.7km away from the working area proposed for the sub-project.

MS Bund. MS bund reach is 29 mile, upper reach mile 1/0 to 3/2. MS Band situated near Daro village, Kahdi-belo forest, Bijoro Chach wildlife sanctuary, and Hilaya reserve forest are found near to MS band upper reach and all these sites are located away 1-7km. Further details are given in Table 5.10. Natural habitat of the area is potential for wildlife species. Ali Bahar, Monarki reserve forest and Khosa Kori are important wildlife habitats. Crop fields feeding and

rooting ground for rodents and birds, while water logged sites are proving alternate habitat to aquatic fauna including fish hatchery. River lagoon (Kori) is typical ground for water fowls and other migratory bird species. During the plot searching from this area 6 species of large mammals and 8 mammals recorded through sighting and identification of it physical marks from different locations. While 36 bird species and 6 reptiles were recorded.

BU Bund. BU bund start from 13/3 mile from Deh-Marohvighor near Qasim Khan Khushak village, Cut Monarki forest is 2 km far from upper reach, while Ghora-barireserve forest and village lies in end of reach. Length of this reach is 22 mile, habitat of BU is narrow stretch, outer part of reach is enclosed by metaled road and Irrigation canal, water logged patches and settlements found along the reach and inner part of reach is covered with scattered cultivation, most of the part is barren. While water bodies found different isolated pockets on both sides.

From this study site, three large mammal species and 7 small mammal species recorded for different micro habitats, 27 avifauna and 10 herpeto-fauna species identify by direct sighting and identifying the physical marks. Local villagers were also interviewed to acquire history of the area.

Indo bund. Indo Bund reach started right from the end of BU 15/6 mile, length of reach is 10 miles from 0/0 to 10/0 mile. Different micro habitats occurred on this reach. Agriculture is dominating practices of the area, isolated water bodies also found frequently. Second half reach contained dry and wilderness, bushes and small herbs are occurred on land side. While nomadic settlements were found throughout the study area. During this part of study three large mammals and 5 rodents found from different micro habits and 22 birds and 5 herpes were found and recorded.

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) of Riverine forests are the most productive forests of Sindh; producing wood material for domestic and commercial purposes. The rotation of various species varies from 6 years to 40 years, depending upon market demand of wood. The average yield estimate per acre at maturity that varies from 1 stack (1,000 cft.) to 5 stacks (5,000 cft.), depending upon soil conditions and silvicultural operations.

Existence of Riverine forests of Sindh is dependent on flooding by the river. They are flooded by the spate of River Indus, on lands and soils over its banks. Floods occur due to the flow of large quantities of water in the river that cannot be accommodated. Both the land configuration and the soils in riverine tract are made by flood waters. The spate was a common summer

phenomenon in the past, until such a time that the river water was not diverted and extracted through dams, barrages, head-works and link-canals.

Riverine forests are the mainstay of forestry in Sindh. They provide products and services such as timber, firewood, pit props for mines, forage and browse for livestock; supports biodiversity and game animals. Other non-timber forest products include tannin from bark, gum, honey and even fish from dhands (ponds) and dhoras (depression of old river beds). They act as carbon sinks, moderate climate, stop soil erosion and also protect soils and settlements from the ferocity of flood waters.

The annual inundation of the riverine areas during the monsoon season acts as a lifeline for the existence and flourishing of the Riverine forests. There has been large-scale degradation of riverine forests due to severe decrease in flow of freshwater down the Guddu Barrage. The situation has been worsened by the recent drought and lowest ever flow in Indus (0.75 MAF) downstream of Kotri Barrage. Major reason for great depletion of Riverine forests are continuous decrease in quantum of floods due to upper stream storage, diversion and increasing amount of take-off for irrigation/human consumption. Areas frequently flooded before are now flooded only every seven or eight year interval, which is not enough to support lush floodplain forests. High lying portions of these forests are the worst affected. Reduced frequency of high floods has left these areas in an increasingly dry state. Xerophytic trees and shrubs have replaced thick and profuse growth of Acacianilotica, which is the main and most important riverine species. The common riverine forests species such as, Bahan (Populus euphratica) and Lao (Tamarix aphylla) are gradually disappearing from the tract. Apart from over all degradation of these forests, there occurred sizeable blanks within them due to which the required forest density has diminished.

The Riverine forests in the past were only developed through the annual regeneration at the time of monsoon floods. Recently, under annual development program, some areas were developed and planted on the pattern of irrigated plantations by lift irrigation through installation of electric/diesel operated tube wells and diesel operated lift pumps on the river banks and depressions .The underground water in the riverine tract is sweet, available in abundance in the aquifer and is suitable for raising trees and agriculture crops.

Following are the main factors responsible for degradation of riverine forests:

- Severe reduction in flow of fresh water in Indus through floods.
- Population pressure for meeting the local needs of the people.
- Increase in the high lying areas due to low floods.

Productive potential of these areas can be restored by developing artificial source of irrigation such as installing tube wells and lift pumps and planting suitable tree species for increasing wood production and protection of the environment. These areas are to be developed through intensive management through land levelling and arranging the assured supply of irrigation on high-lying areas. In order to develop these forests, two strategies have been proposed in

various projects i.e. departmental forestry or traditional forestry (forestry by the department) and participatory forestry (forestry by the department and local people) with main emphasis on participation of local people, poverty alleviation and combating desertification.

In the embankments sub-project areas, there are at least A large numbers of protected forests exist in Thatta district. Some of these are declared as Wildlife Sanctuaries and Game Reserves as well under Sindh Wildlife Protection Ordinance 1972. The closest Game Reserve to the project area is Mirpur Sakro Game Reserve, Taluka Mirpur Sakro, District Thatta which was initially declared vide Notification No. VII/45-SO (FG) 65, dated on 25th May 1965 and reproduced as Game Reserve vide Notification No. WL&FT(DEC-GEN-77)/1981, dated 15th July 1981. Whereas two other Game Reserves are Deh Khalifa and Deh Jangiser. Both were initially notified as Game Reserves vide Notification No. 7(98)SO(Forest and Game)/65, dated 25th September 1965 and the same will reproduced as Game Reserve vide Notification No. WL&FT(DEC-GEN-76)/1981, dated 15th July 1981. Both the Game Reserves were Protected Forests and were at the Southern part of Protection Bund. At the time of declaration as Game Reserve, Deh Khalifa was Administratively in Ghorabari Taluka and Deh Jangiser was in Mahal Keti Bander but presently, both Game Reserves are in Taluka Ghorabari. All the three Game Reserves no longer harbor the Key Wildlife Species as the whole area was distributed for agriculture in 1996 by the then Political Government. The local Haris (poor farmers) now own this land.

Now all the land of the Game Reserves has been converted in agriculture land. Similarly, two protected Forests were declared as Wildlife Sanctuaries in the Southern Part of the Protection bund of Indus River (Kacha Area). The same were also distributed in the poor farmers (Tenants) of the area for agriculture and the Wildlife Sanctuaries are now become converted into agriculture land. None of the above Protected Areas are in the immediate vicinity of the proposed project site.

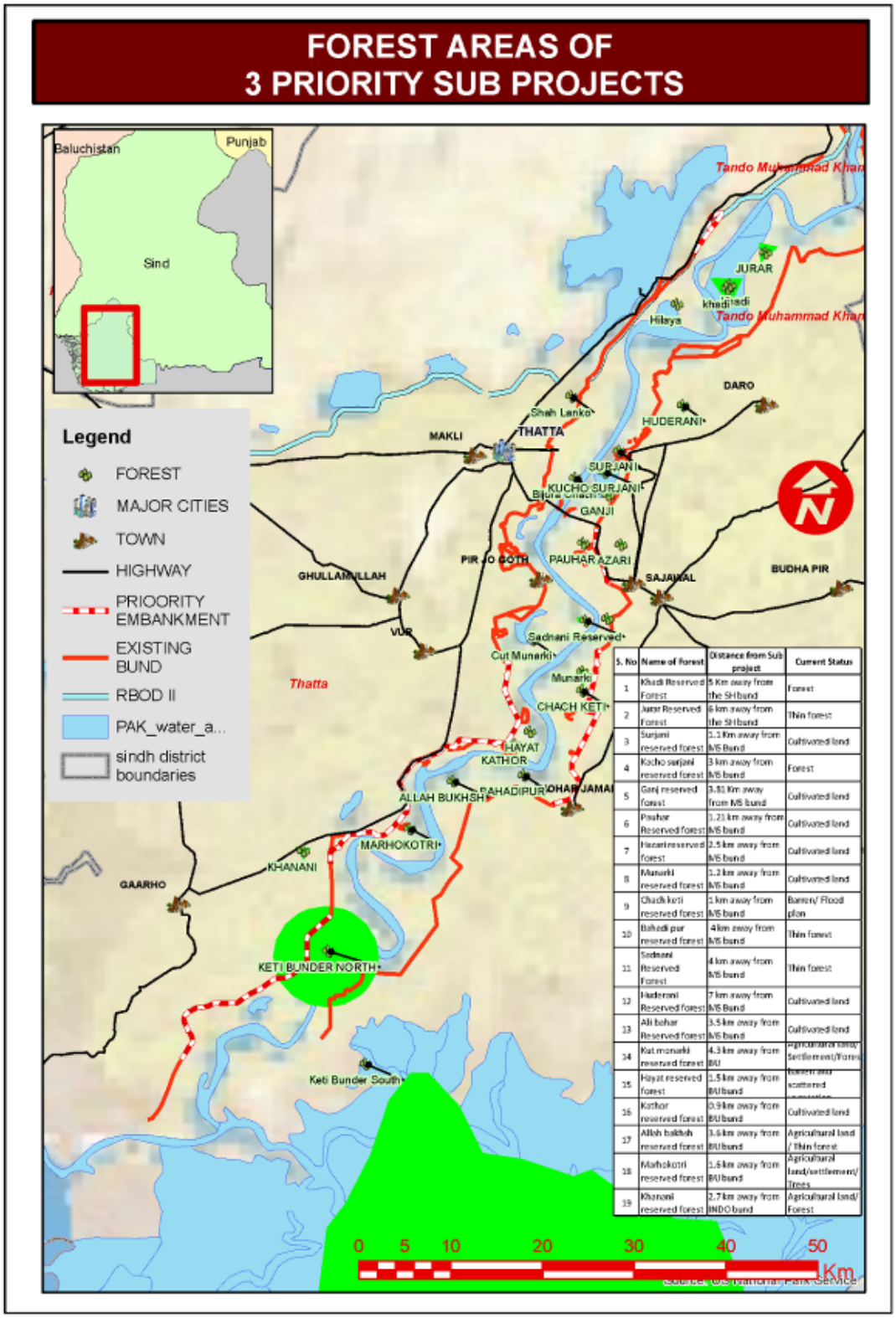
A summary of reserve forests in the area is presented in **Table 5.10** below.

Table 5-10: Reserved Forest, Current Status, and Distance from Subproject Working Area

	Name of Forest	Location and Distance from Sub project	Current Status
01	Khadi Reserve Forest	Left side of river, **5km** away from the SH bund	Forest
02	Jurar Reserve Forest	Left side of river, **6km** away from the SH bund	Thin forest
03	Surjani reserve forest	Left side of river, **1.1 km** away from MS Bund	Cultivated land
04	Kachosurjani reserve forest	Left side of river, **3 km** away from MS bund	Forest
05	Ganj reserve forest	Left side of river, **3.81 km** away from MS bund	Cultivated land
06	Pauhar Reserve forest	Left side of river, **1.21 km** away from MS bund	Cultivated land
07	Hazari reserve forest	Left side of river, **2.5 km** away from MS bund	Cultivated land
08	Munarki reserve forest	left side of river, **1.2** km away from	Cultivated land

	Name of Forest	Location and Distance from Sub project	Current Status
		MS bund	
09	Chachketi reserve forest	Left side of river, **1 km** away from MS bund	Barren/ Flood plan
10	Bahadipur reserve forest	Left side of river**, 4 km** away from MS bund	Thin forest
11	Sadnani Reserve Forest	Right side of river, **4 km** away from MS bund	Thin forest
12	Huderani Reserve forest	Right side of river, **7 km** away from MS Bund	Cultivated land
13	Ali bahar Reserve forest	Reserved forest at left side of river, **3.5 km** away from MS bund	Cultivated land
14	Kutmonarki reserve forest	Right side of river, **4.3 km** away from BU	Agricultural land/ Settlement/Forest
15	Hayat reserve forest	Right side of river, **1.5 km** away from BU bund	Barren and scattered vegetation
16	Kathor reserve forest	Right side of river, **0.9 km** away from BU bund	Cultivated land
17	Allah bakhsh reserve forest	Left side of river, **3.6 km** away from BU bund	Agricultural land / Thin forest
18	Marhokotri reserve forest	Left side of river, **1.6 km** away from BU bund	Agricultural land/settlement/ Trees
19	Khanani reserve forest	Right side of river, **2.7 km** away from INDO bund	Agricultural land/ Forest

All the forest areas are beyond the primary impact zone of the embankment sub-projects covered in this ESIA. The location of the forest areas adjacent to the sub-project is area is shown in **Figure 5-18**.



S. No	Name of Forest	Distance from Sub project	Current Status
1	Khadi Reserved Forest	5 Km away from the SH bund	Forest
2	Jurar Reserved Forest	6 km away from the SH bund	Thin forest
3	Surjani reserved forest	1.1 Km away from MS Bund	Cultivated land
4	Kacho surjani reserved forest	3 km away from MS bund	Forest
5	Ganj reserved forest	3.81 Km away from MS bund	Cultivated land
6	Pauhar Reserved forest	1.21 km away from MS bund	Cultivated land
7	Hazari reserved forest	2.5 km away from MS bund	Cultivated land
8	Munarki reserved forest	1.2 km away from MS bund	Cultivated land
9	Chachi keti reserved forest	1 km away from MS bund	Barren/ Flood plan
10	Bahedi pur reserved forest	4 km away from MS bund	Thin forest
11	Sadnani Reserved Forest	4 km away from MS bund	Thin forest
12	Huderani Reserved forest	7 km away from MS Bund	Cultivated land
13	Ali behar Reserved forest	3.5 km away from MS bund	Cultivated land
14	Kot munarki reserved forest	4.3 km away from BU	Agricultural land/ Settlement/Trees
15	Hayat reserved forest	1.5 km away from BU bund	Barren and scattered vegetation
16	Kathor reserved forest	0.9 km away from BU bund	Cultivated land
17	Allah bakhsh reserved forest	3.6 km away from BU bund	Agricultural land / Thin forest
18	Marhokotri reserved forest	1.6 km away from BU bund	Agricultural land/settlement/ Trees
19	Khanani reserved forest	2.7 km away from INDO bund	Agricultural land/ Forest

Figure 5.18: Forest Area of 3 Priority of Sub Project

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 are presented in **Table 5.11** and shown in **Figure 5.19**.

Table 5-11: Fish Species of Commercial Value in the Project Area

Local Name	Scientific Name
Morakho	Cirrhinus reba
Sunni	Cirrhinus reba
Gulfam	Cyprinus carpio
Dahi	Labeo calbasu
Torki	Labeo dyocheilus pakistanicus
Rohu	Labeo rohita
Fauji Khagga	Bagarius
Gundan	Chitala
Bachwa	Clupisoma garua
Thaili	Gibelion catla
Fauji Khagga	Bagarius
Singhari	Sperata sarwari
Malli	Wallago attu
Luhur	Heteropneustes fossilis
Chitti Mundi	Notopterus spp
Jerko	
Popri	Puntius ticto

Dayo (Wallago attu) fish species caught from Indus river at MS Bund Site

Jerki (Wallago attu) fish species caught from Indus rivers at MS Bund Site

Mundhi (Notopterus spp.) fish species caught from Indus river at MS Bund Site

Ganeer (Cirrhinnusreba) fish species caught from Indus river at MS Bund Site

Locals catching fish from water body on riverside at 26/3 miles of MS bund

Figure 5.19: Fish and Fisheries i Subproject Area

5.3. Socio–Economic Baseline

A survey and consultation with 16 villages on MS Bund, 15 villages on BU Bund, 5 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. A list of the villages visited is provided in **Table 5.12** and the locations of these villages are given in **Figures:** 5.1-5.14.

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 questionnaires used during the study are provided in **Annex-B**. 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.

Table 5-12: Villages Visited as Part of Socio-Economic Baseline Data Collection

Name of Sub-Project	Name of District	Name of Tehsil	Name of UC	Name of Village	Location Out/Inside the River
SH Bund	Thatta	Thatta	Sonda	Sonda	outside
	Thatta	Thatta	Sonda	Ghulam M. Shah Goth	outside
	Thatta	Thatta	Sonda	Wadera Ghulam M.Tenga Goth	outside
MS Bund	Sajawal	Sajawal	Ali bahar	Saeed Pur	outside
	Sajawal	Jhati	Mureed Koso	Goth Salah M. Khoso	inside
	Sajawal	Sajawal	Ali Bahar	Goth Malik M.Sharif	outside
	Sajawal	Jhati	Mureed Koso	Goth Monro	inside
	Sajawal	Jhati	Mureed Koso	Goth M. Ali Kosa	outside
	Sajawal	Jhati	Mureed Koso	Goth Gul Mohd Malah	inside
	Sajawal	Jhati	Mureed Koso	Goth Ahmad	outside
	Sajawal	Jhati	Mureed Koso	Goth Butto Lashari	outside
	Sajawal	Jhati	Mureed Koso	Goth Mawa Khan Koso	inside
	Sajawal	Jhati	Mureed Koso	Goth Jumma Khan	outside
	Sajawal	Jhati	Mureed Koso	Goth Ramo Vato	outside
	Sajawal	Jhati	Mureed Koso	Goth Mohd Hassan	outside
	Sajawal	Jhati	Mureed Koso	Rod mori	outside
	Sajawal	Chowhar	Chowhar	Chowhar Jamali Town	outside
	Sajawal	Chowhar	Chowhar	Muntarsamoo Goth	inside
	Sajawal	Chowhar	Chowhar	Goth Khamtomori	outside
	Sajawal	Chowhar	Chowhar	Goth Khamtomori	outside
BU Bund	Thatta	Gora Bari	Gora Bari	Goth yarMohdGrano	outside
	Thatta	Gora Bari	Gora Bari	Gora Bari Town	Outside
	Thatta	Gora Bari	MaroGohar	Qasim Khan khushk	outside
	Thatta	Gora Bari	MaroGohar	Goth mohammad	inside
	Thatta	Gora Bari	MaroGohar	Goth Mir	inside
	Thatta	Gora Bari	Gulail	Goth Abdullah Khan	outside
	Thatta	Gora Bari	Gora Bari	Goth Essa Mehar	outside
	Thatta	Gora Bari	Gora Bari	Goth M.SumarSharo	outside
	Thatta	Gora Bari	Gora Bari	Goth kamowaloSyao	inside
	Thatta	Gora Bari	Gora Bari	Goth haji Ibrahim	outside
	Thatta	Gora Bari	Gora Bari	Goth Maya Wasayo	outside
	Thatta	Gora Bari	Gora Bari	Qasimhamti goth	inside
	Thatta	Gora Bari	Gora Bari	Wadarolal Goth	outside
	Thatta	Gora Bari	Gora Bari	Goth Ismail Shoro	inside
	Thatta	Gora Bari	Gora Bari	Goth Haji HashamSomro	outside
Indo bund	Thatta	Gora Bari	Gora Bari	Goth Mira Dino	inside
	Thatta	Gora Bari	Gora Bari	Goth Mano Gujro	inside
	Thatta	Gora Bari	Gora Bari	Goth	outside
	Thatta	Gora Bari	Gora Bari	Goth Noor MohdJat	outside
	Thatta	Gora Bari	Gandar	Dindari	outside

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.

Population

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. The sub-project wise details are given in the **Table 5.13** to **5.15**.

Table 5-13: Population and Tribes on SH Bund

Name of Village	Estimated population of the village (No.)	House hold	Tribes in the Village	Religion	Occupation		Languages Spoken
					Primary	Secondary	
Sonda	3,000	465	Solangi, Qazi, Khaskhely and Gandra	Islam	Agriculture	Laborers	Sindhi
Ghulam M. Shah Goth	250	30	Syed and Khaskhely	Islam	Agriculture	Laborers	Sindhi
Wadara Ghulam M.Tenga Goth	2,400	320	Tenga	Islam	Agriculture	Laborers	Sindhi
TOTAL	**5,650**	**815**					

Table 5-14: Population and Tribes on MS Bund

Name of Village	Estimated population of the village (No.)	House hold	Tribes in the Village	Religion	Occupation		Languages spoken in the village
					Primary	Secondary	
Saeed Pur	1,800	260	Muslim and Hindu	Islam/Hindu	Agriculture	Laborers	Sindhi
Goth Salah M. Koso	5,000	800	Koso,Syed and Sehro	Islam	Agriculture	Laborers	Sindhi
Goth Malik M.Sharif	600	100	Khaskhely	Islam	Agriculture	Laborers	Sindhi
Goth Monro	2,000	300	Monaro	Islam	Agriculture	Laborer/ G.Jobs	Sindhi
Goth M. Ali Kosa	150	25	Koso and Mir Bahar	Islam	Tenants	Laborer	Sindhi
Goth Gulmohd Malah	240	32	Malah	Islam	Tenants	Laborer	Sindhi
Goth Ahamad	120	15	otta	Islam	Tenants	Laborer	Sindhi
Goth Butto Lashari	60	8	Lashari and Malah	Islam	Tenants	Laborer	Sindhi
Goth Mawa Khan Koso	40	4	Koso	Islam	Tenants	Laborer	Sindhi
Goth Jumma Khan Koso	400	50	Koso	Islam	Tenants	Laborer	Sindhi
Goth Ramo Vato	50	50	Vato, Malah and Oplana	Islam	Tenants	Laborer	Sindhi
Goth Mohd Hassan	1,450	200	Malah,Syed and Chawan	Islam	Tenants	Laborer	Sindhi
Rod Mori	8,000	1,200	Chawan, Jamali and Malah	Islam	Agriculture	Laborer /G.Jobs	Sindhi
Chowhar Jamali Town	16,500	2,000	Jamali, Malah and Chawan	Islam	Tenants	Laborer	Sindhi
Muntar Samoon Goth	300	40	Samoon	Islam	Agriculture	Laborer/ G.Jobs	Sindhi
Goth Khamto Mori	400	60	Vato	Islam	Agriculture	Laborer	Sindhi
TOTAL	**37,110**	**5,144**					

Table 5-15: Population and Tribes on BU and Indo. Bund

Name of Village	Estimated population of the village (No.)	House hold	Tribes in the Village	Religion	Occupation		Language spoken in the village
					Primary	Secondary	
Goth Yar Mohd Grano	250	25	Grano and Syed	Islam	Agriculture	L/S and Laborer	Sindhi
Gora Bari Town	12,000	1,800	Dal,Chawan,Korja and Malah	Islam	Agriculture	Laborer/G.job	Sindhi
Qasim Khan khushk	2,000	300	Khushk	Islam	Agriculture	Laborer/G.Jobs	Sindhi
Goth Mohammad Hassan	70	10	Khushk	Islam	Agriculture	Laborer	Sindhi
Goth Mir hassan Khushk	300	45	Khushk	Islam	Agriculture	Laborer	Sindhi
Goth Abdullah Khan Amro	250	35	Amro and Jakro	Islam	Agriculture	Laborer/G.Jobs	Sindhi
Dandari	10,000	1,450	Jat, Malah,Khaskh	Islam	Agriculture	Laborer/G.Jobs	Sindhi

Name of Village	Estimated population of the village (No.)	House hold	Tribes in the Village	Religion	Occupation		Language spoken in the village
					Primary	Secondary	
			ely and peryarh				
Goth Essa Mehar	500	75	Mehar and Bukiro	Islam	Agriculture	Laborer	Sindhi
Goth M.Sumar Shar	350	50	Shar	Islam	Agriculture	Laborer	Sindhi
Goth Kamo Walo Syao	1,800	250	Malah	Islam	Agriculture	Laborer	Sindhi
Goth Haji Ibrahim	75	7	Mehar	Islam	Agriculture	Laborer	Sindhi
Goth Maya Wasayo	40	5	Manjro	Islam	Agriculture	Laborer	Sindhi
Qasim Hamti goth	200	30	Hamti	Islam	Agriculture	Laborer	Sindhi
Wadaro lal Goth	400	50	Khaskhely	Islam	Agriculture	Laborer/G.job	Sindhi
Goth Ismail Shoro	250	20	Khaskhely	Islam	Agriculture	Livestock	Sindhi
Goth Haji Hasham Somro	300	25	Somro	Islam	Agriculture	Laborer	Sindhi
Goth Mira Dino	500	60	Lashari	Islam	Agriculture	Livestock	Sindhi
Goth Mano Gujro	100	16	Gujro	Islam	Wood selling	Laborer	Sindhi
Goth Mohd Sumar jonejo	250	31	Jonejo	Islam	Agriculture	Laborer	Sindhi
Goth Noor Mohammad Jat	150	25	Jat	Islam	Agriculture	Laborer	Sindhi
TOTAL	**29,785**	**4,309**					

Languages

Sindhi is the dominant language spoken in the project area about 95 per cent of the population speaks Sindhi and Urdu are also spoken and understood by the majority of the people in the project area.

Family system

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.

Religious Affiliations

During the socio-economic field survey it was observed that about 95 per cent of the population is Muslim whereas about five per cent consist of Hindu and other minority religions.

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 are 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.

Conflict Resolution within Tribes and Villages

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 per cent 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.

Housing

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.

Literacy

A person who can read and write statements with an understanding, in any language prevalent in Pakistan, is considered as literate. Pakistan Bureau of Statistics (PBS) carried out the survey from August 2013 to June 2014. The report reveals that in Sindh the percentage of educated people dropped by 4% to 56% in 2013-14. Just over about 5% of those living in project area have received education to any level

Educational Facilities

Education facilities in the District Thatta are given in **Table 5.16** and subproject area is given in **Annex-C**.

Table 5-16: Education Facilities in District Thatta

	Education Facilities	Male	Female
1	Primary School level Enrolment	77,798	62,504
2	Teachers/ Staff in the Primary Schools	3,740	771
3	Number Of Middle Schools By Sex	63	31
4	Enrolment of Middle Schools by Sex	1,900	2,684
5	Teaching Staff in Middle Schools by Sex	161	64
6	Number Of Intermediate Colleges by Sex	0	1
7	Enrolment Of Intermediate Colleges by Sex	0	212
8	Teaching Staff Of Intermediate Colleges By Sex	0	09
9	Number Of Degree Colleges By Sex	02	01
10	Enrolment Of Degree Colleges By Sex	2,655	1,018
11	Teaching Staff In Degree Colleges By Sex	70	15
12	Number Of Technical Colleges And Polytechnic / Monotechnic Institutions By Sex	02	0
13	Enrolment Of Technical Colleges And Polytechnic/ Monotechnic Institutions By Sex	299	0
14	Teaching Staff In Technical Colleges And Polytechnic/Monotechnic Institutions By Sex	05	0
15	Number Of Commercial Training Institutions By Sex	03	0
16	Enrolment Of Commercial Training Institutions By Sex	70	0
17	Teaching Staff In Commercial Training Institutions Education By Sex	9	0
18	Number Of Vocational Institutions By Sex	0	02
19	Enrolment Of Vocational Institutions By Sex	0	25
20	Teaching Staff In Vocational Institutions By Sex	0	02

Source: Sindh Education Management Information System (SEMIS) 2012.

The detail of available education facilities for male and female in the scheme area. There are 36 boys and 11 girls Primary schools, one middle school for boys and 3 boys high schools one girls high school and 2 boys Colleges are exist within radius of 1km on both sides of the sub-project area.

Health

It is found that many of the people have suffered from hepatitis, typhoid, eye problems, diarrhoea and other hygiene related complaints. Some of women expire during delivery cases. Majority of the women are malnourished usually being the last ones to eat their meals in the family. There are two Rural Health Centres (RHC) in which one is in Chohar Jamali town Tehsil head quarter of Sajawal district and other is in Gora Bari town of Thatta district five Basic Health Units (BHU) and seven dispensaries within the sub-projects area and all are functional. The seriously ill patients are taken for treatment to Thatta and Sajawal district hospitals.

Transport

Most of surveyed villages have village tracks or unsurfaced (Kacha) roads that are in bad condition except some of the villages. Construction and maintenance of village roads is the responsibility of local government. One provincial highway Karachi-Thatta road also passes at the end of the project area and connect Karachi with Thatta, Sajawal and Badin.

The socio-economic baseline survey reveals that the major source of the human transport in the project area is Van/Pickups for the general public, 13% individual cars and 67% motor bikes. The farm inputs and outputs are transported through Trucks Trailer and Tractor Trolley. The animals from the project area transported to Hyderabad and Karachi by Trucks. The Firewood and Furniture wood is also transported through Trucks and Trolleys.

Telecommunication

During the field survey the respondents reported that there is no landline facility available in the CoI. Mobile phone communication is widely spread in the CoI and the project area, the frequent use of mobile phone was observed during the project field visits. Landline facilities are available in the project area outside the CoI.

Energy Source

Electricity is available in 80 per cent villages in the study area. This energy source is being utilized mainly for lighting of the houses and operation of tube wells for drinking water supplies and irrigation etc. Instead people collect the firewood from the surrounding area and some people purchase firewood from nearby town.

Drinking water and sanitation

It is observed that women and children are responsible for fetching of water for drinking and domestic use. The underground water is mostly saline in the project area except along the strip of the Indus River some hand pumps are installed which is used by the population to get fresh groundwater for daily usage. Survey results showed that estimated 1,727 hand pumps exist in the project area and overall average ground water depth in sample area was 50 feet on SH Bund, 55 feet on Bu Bund, Indo Bund 25 feet and MS Bund was 30 feet for hand pumps. In some areas, where the ground water is saline and unsuitable for drinking purposes, the population relies on the canal to supply drinking water.

Within the project area people drain out used water in open places and dump solid waste in the open.

Women in subproject area

This section provides baseline information and description of the socio-economic and cultural background pertinent to female in the project area. The purpose of this socio-economic survey was to gather first-hand information about the generic characteristics of nearby female communities, their socio-economic status, cultural conditions and social issues. The Female Sociologist along with Female Team of WWF (working in the area) was carried out the study of socio-economic and cultural environment with reference to femininity of the project area. The approach and methodologies used during data gathering were interviews, focus group discussions and rapid rural appraisal techniques to qualitative data collection. Socio-economic and cultural data were collected through semi structured questionnaire and focus group interviews with female cluster at village level. This survey was carried out in 13 villages (**Table 5.17**) randomly along the Indus River embankment. A detailed results/description of the survey is presented in the following sections.

Table 5-17: Location of conducted cluster meetings with females:

Name of Villages	Name of Bund (location)	Coordinates	House Hold	Inacom an skills	Education level	Women Rights	Health and hygiene	WAS	Income source
						Poor-Fair-good	poor-fair-good	Yes/ No	
Gul Mohammad Gandaro	SH	N 24 58' 02.84 E 68 07' 49.91	25	Net making, embroidery	0 %	Poor	fair	no	net making
Umaind Ali Soomro		N 24 55 04,04 E 68 06' 06.11	120	embroidery	15 %	fair	fair	no	livestock, embroidery, poultry
Malik Sharif Khaskheli	MS	N 24 38 356 E 68 01 083	60	embroidery	5 %	poor	fair	no	embroidery, agriculture
PasandMaheshwari		N 24 37 24 98 E 68 01 29 21	25	embroidery , tailoring	0 %	fair	fair	yes	embroidery, agriculture
SumarPrayri		N 24 34 944 E 68 01 837	35	embroidery	0 %	Poor	poor	no	embroidery
Haji Khan Munaro		N 24 32 917 E 68 01 18 88	20	embroidery	8 %	Poor	fair	no	embroidery, agriculture
Hassan Mallah		N 24 25 917 E 67 59 808	80	net making	0 %	Poor	poor	no	net making, agriculture
Qasim Goth	BU and indo	N 24 22 744 E 67 49 062							
Gull Mohammad Shoro		N 24 24 447 E 67 49 660	60	embroidery tailoring	20 %	fair	fair	yes	embroidery, agriculture
KhamooWaliso		N 24 23 290 E 67 49 673	30	tailoring/Raly making	0 %	poor	poor	no	agriculture work, Raly making
Haji Mohad Ibrahim Pohio		N24 22 990 E 67 49 202	70	embroidery,	0 %	Poor	poor	no	agriculture work, Raly making, cattle raring
QasimHamayti		N 2422 744 E 67 49 062	25	embroidery	0 %	Poor	poor	no	embroidery, Raly making
Noor Mohammad Junejo		N 24 16 467 E 67 44 203	18	Raly making, embroidery	0 %	poor	poor	no	embroidery, Raly making

The status of women in the project area is classified as low class. 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.

Houses pattern in the subproject area

Houses pattern in the subproject area

The women of the project area have no any 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, diarrhoea, hepatitis, typhoid, and flue. Many women are suffering from endemic diseases.

NGOs. During the field survey it was observed that only two NGOs: HANDS and WWF were reported working in the project area. The NGOs working in the area along with their area of interest are detailed in **Annex-C.**

Priority Needs of Male Community

During consultation meeting with the male groups they prioritized their needs. The ranking of prioritized needs is derived from the individual rankings of priorities generated from the discussion with the separate groups in each village. During the male consultation meetings in the target villages, different types of problems were identified and the priorities for each village are summarized as follows;

- Expressed need of male and female primary to middle level schools in the project area.
- Demanded for the provision of health facilities in the project area.
- Employment for the jobless and educated youths.
- It was observed that the clean drinking water was the key requirement during consultation.

Priority Needs of Female Community

During consultation meeting with the women groups they prioritized their needs. The ranking of prioritized needs are derived from the individual rankings of priorities generated from the discussions with the separate groups in each village, the comprehensive priorities for the overall project area is summarized as follows;

- The female community members demanded for the provision of education facilities in the villages.
- Requested for the job opportunities during construction work to their male family members.
- Demanded for the installation of Hand pumps in the villages.
- Requested for no removal of their homes.
- Requested for not disturbing the existing access routes.
- The female community members expressed concerns that after rehabilitation of the embankments, their livestock will not be able to cross the steep and harden surface of Bund for grazing and drinking water in the Indus River

Archaeological and Cultural Heritage

The archaeological survey was conducted by the Culture and Tourism Department, GoS in 1993 and 1996. There are a total of eight archaeological sites situated in the area. The names and number of the archaeological sites are given in the **Table 5.18**.

Saints and shrines are respected highly by the local communities and there is one graveyard in the CoI of the project.

Sites of importance regarding cultural heritage are not readily apparent in the specific area of the project. But as far as districts level is concerned, the area has a rich cultural and historical background with various ancient buildings. However, these are not situated within the project area. A graveyard exists within the CoI of this subproject, one at the toe of the embankment where it meets the area for the proposed launching aprons. The archaeological map of the subproject area is provided in **Figure 5-20**.

Table 5-18: Number of Archaeological Sites in the Project Area

	Name/Description	Location	District	Estimated Distance (in km) from the Sub-Project Area
1	Makli Graveyard (On UNESCO World Heritage Monuments List)	Makli Hill	Thatta	14
2	Sonda graveyard	Village Sonda	Thatta	1
3	Kalan Kot	Makli Hill	Thatta	14
4	Nawab Amir Khan's mosque	Makli Hill	Thatta	15
5	Building with two domes	Near Civil Hospital, Thatta	Thatta	15
6	Jama Masjid	Makli Hill	Thatta	15
7	Sasian-Jo-Takar	Mirpur Sakro	Thatta	25
8	Jama Masjid	Thatta city	Thatta	12

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

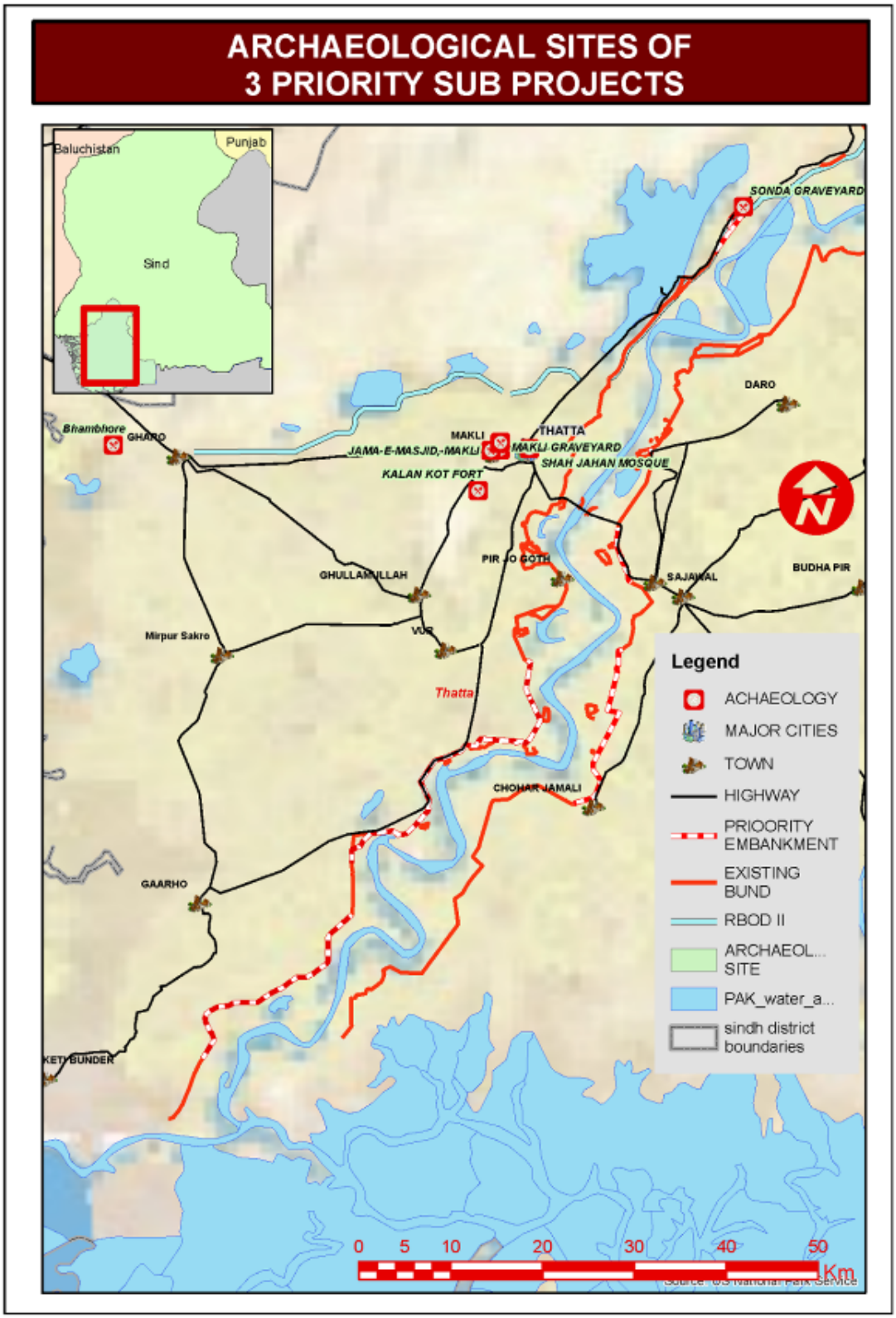


Figure 5.20: Archaeological Map of the Subproject Area

5.4. Land Acquisition and Resettlement

The proposed works under the subproject comprise rehabilitation of the existing embankments along the Indus River. As earlier discussed, these embankments are to be rehabilitated through stone pitching along the river side slope, raising and widening of the embankments susceptible to breach. Since the land for the existing embankment is already owned by the Irrigation Department, the acquisition of land is not needed for the sub-projects. However, some of the squatters settled on the crest or slopes of the embankments may need to be relocated during the construction works.

The structures which will need to be dislocated for construction include six wooden huts, two wooden mosques, 13 wooden shops, and two wooden animal sheds owned by 18 households. To mitigate these impacts, resettlement planning for the subproject has been carried out in accordance with the procedures described in the Resettlement Policy Framework and an Abbreviated Resettlement Action Plan (ARAP) has been prepared as a separate document.

6 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATIONS

The environmental impacts of the Indus River embankment sub-project principally relate to loss of habitat on and beside the Indus River embankments 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.

6.1. Air Quality

Impacts. As described in Chapter-4, the project area is outstanding for its clean air quality judged by any International standards. The only occasional problem arises from seasonal dust storms.

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. The use of water bowsers to suppress the dust on the access routes, especially on the top of the embankments which will be used frequently, will be the main mitigation during the life of the contract. Water sprinkling should be focused to access routes in the vicinity of the villages shown in **Figure 5.1** to **5.14** 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 delivered 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.

6.2. Water Quality

Impacts. The water samples were collected from the marsh/swamp land along the embankment of Indus River and the samples were analysed by PCRWR, the results are described in **Chapter-5**. In addition further monitoring of water quality parameters is to be

carried out by the ESMEC and PIC during and after completion of the physical works. The Indus River in the project area carry heavy silt loads and in the baseline, it was found that the turbidity level was the beyond the NEQS and WHO standards.

During stone pitching and construction (raising and widening) the Indus River flows may be impacted or disturbed wherever on the reaches to be rehabilitated aligning close to the river flow. 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 effect fish and other aquatic wildlife. However this is temporary impact and the effect shall be reversed naturally following construction. Therefore the magnitude of the impact from planned works is minor adverse.

A beneficial impact is the reduction of flood risk since if the Indus River embankments were left without the proposed engineering maintenance there would be a high risk of failure of the embankments resulting in flooding of the surrounding areas.

A secondary 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) at the camp and work sites. Such wastes are detailed in **Table 6.1**.

Table 6-1: Site Wastes

Type of Waste	Description
Campsite or domestic waste	Biodegradable: Foodstuffs, fruits and vegetables, wood, Campsite or domestic waste bones, grass etc.
	Non-Biodegradable: Paper, metals, glass, plastic bottles, scrap metal, textile and shoes, bottles and jars, fluorescent tubes.
Sewage and grey water	Kitchen and washing areas sewage
Workshop waste including solid and fluid	Used oil, ferrous /nonferrous materials, batteries etc.
Medical waste	Syringes, glass bottles, bandages, blood sampling tubes, expired drugs, dressing etc.
Packing waste material	Paper, plastic, textiles, cardboard, rubber, wood, glass, tin cans etc.
Excavated and Demolition waste	Rocks, sand, silt/clay, concrete, bricks and other building materials
Excess construction material	Sand, aggregate, stones and other construction materials

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 sources of drinking 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 worsened 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.

The contractor must provide the following facilities at each camp site;

- Adequate lighting and electricity supply;
- Latrines;
- Lined washing areas;
- Fire prevention and fire fighting equipment;
- Sheltered kitchen area (separated from living quarters);
- Septic tanks and soaking pits for toilet waste.

Key mitigation measures are listed below.

- All hydro-carbons and other potential pollutants should be properly bunded; there should be proper
- sewage/sanitation at work camps and proper waste water collection facilities, there should be runoff
- Collection drains and oil interceptors.
- Regular monitoring of water quality shall be carried out by the PIC and ESMU of PMU.

6.3. Cultural Heritage

Impacts. As set out in the environmental and social baseline in **Chapter-5** and marked in Figures **5.1** to **5.14** of this document, prayer platforms, mosques and graves exist in within the CoI of the project.

There is little likelihood of buried archaeological sites or artefacts since the Indus River embankments system is a relatively recent construction dating back to the British colonial period.

Mitigation. To protect the graves identified and marked in the Figures **5-1** to **5-14**, all works (including haulage) shall be excluded from the areas. The prayer platforms and mosques shown in Figures **5-1** to **5-14**, will be protected from the damage. In case of relocation, the cost is included in the Abbreviated Resettlement Action Plan (ARAP) which is a separate document. In the light of RPF and **Chapter 5** of this ESIA, the structures shall be relocated. The other cultural features as indicated in the Figures **5-1** to **5-14**, of this document, shall be identified in advance to the Contractor. 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.

The Contractor will follow the procedure as follows in case of any discovery;

Chance Find Procedure. The following procedure shall be initiated in the event of the discovery of a previously unidentified archaeological or culturally important site during construction:

- In the event of discovery of grave yards or any architectural assets which have not been identified in **Figures 5-1** to **5-14**, the contractor shall immediately cease all works in that area and report the find to the Engineer. Works may not recommence until approval is given by the Engineer.
- Upon receiving a report of a chance find of a graveyard or architectural feature, the Archaeological 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 Archaeological Department.

6.4. Biodiversity

Impacts. A detailed baseline of the main habitats and mammals, reptiles, amphibians and birds present in the project area is given in **Chapter-5** of this ESIA.

In terms of magnitude of impact, the most serious impacts are those which are likely to cause permanent adverse impact on the integrity of an ecological receptor and those which affect a major proportion of vulnerable habitats or species within the wider study area. The potential magnitude of impact to the habitat is the most significant in terms of biodiversity as its effects shall be felt long after construction is complete.

While notable, the direct impact 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 impact to the existing habitat will be loss through the disposal of excavated material and habitat change through the establishment of borrow pits. In order to assess the impact it is essential to understand the engineering baseline as set out in Chapter-4 and to compare the maps which show existing habitat and the drawings which show the engineering proposals (both included in **Figures 5-1** to **5-14**.

Mitigation:
Most of the trees are 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 of 120 trees cut by the Contractors during execution of the Works has been prepared and tree inventory of the actual cut/uprooted trees shall be maintained during construction period. Five times the number of cut trees with a girth greater than six inches shall be replanted. The felling of trees for the establishment of borrow areas shall not be allowed.

The contractor shall ensure a 3m (10ft) wide strip shall remain unexcavated at 300m (1,000ft) 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.

6.5. Borrowing and Quarrying of Materials

Impacts: A quantity of about 20,165,800 cft of earth material will be required for raising and widening of embankments in 3 sub-projects. Similarly a quantity of 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. These commercial quarries are source of stone and gravel for projects in Sindh and do not create any specific impacts for DACREP sub-projects.

However, the borrowing of earth material if not done 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, the 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 which are cultivated or 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 1.2m (4ft) 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 borrow areas shall not be close to the settlement and wherever the settlement exist and the establishment of borrow pit is unavoidable, the Contractor will be responsible to backfill the borrow pit 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.

6.6. Socio-Economic Impacts

The socio-economic impacts of the project shall exist during the construction phase of the project – such as noise, health, safety and disturbance of the surrounding communities, employment opportunities and induced economic development, as well as following the construction activities – such as improved irrigation and increased yields.

6.7. Loss of Agricultural Land

Impacts. As the establishment of borrow areas within agricultural land is prohibited, therefore; there shall be no loss of agricultural land outside the RoW due to the establishment of borrow areas.

However, during rough movement (if not regulated) of the Contractor machinery, the cultivated land and standing crops may be slightly damaged and there is no permanent loss of land. As a result of the works, the magnitude of the impact is judged to be minor adverse.

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, due to the contractor' movement into the standing crops, the Contractor will compensate the affectees without invoicing it from the project or as part of the contract.

6.8. Fish Production Ponds

Impacts. 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 of the Works (as shown in the land use map) shall not be effected by the Works.

Mitigation. The contractor shall be prohibited for disposal of wastes; excavated material and interference in the ponds exist along the Indus River embankments. Fishing by the contractor crew shall be strictly prohibited. Regular monitoring shall be carried out by the PIC and PMU of the stagnant water bodies located along the embankments. In addition, the contractor will prepare a code of conduct, sign by his crew and get approval from the PIC engineer.

6.9. Community Disturbance

Impacts. On some reaches, the CoI outside and inside of the RoW of embankments is inhabited (as shown in **Figure 5.1-5.14**). Villages and settlements also exist adjacent to the CoI. The nature of construction works in the proximity of settlements will have obvious impacts on the community (noise, potential air pollution etc.) 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 behaviour 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 created as a result of an increased volume of traffic that should be expected within the each sub-project area, resulting in congestion within transport routes causing delay of local traffic. The Contractor shall utilize existing routes which are all used as transportation/communication links by the local communities. The main impact will arise from the use of existing roads which pass through major settlements and the Contractor shall implement a traffic plan which bypasses these settlements where bypass routes exist and which minimized disturbance to local communities. Traffic accessing the Contractor's camp (to be identified at the implementation phase) shall be disallowed from using the reaches where settlement exists close to or over the embankments.

Mitigation. The contractors for the Works shall be required to implement a traffic management plan to the approval of the Engineer and the Client to reduce stress on the transport system. The contractor shall also provide adequate camps for local labourers to prevent the need for them to depend on accommodation in nearby settlements.

The contractor will limit the speed of vehicles not more than 30km/hour. Regular water sprinkling will be carried out the contractor on haulage routes and construction sites. The contractor will engage his Community Liaison Officer with the communities to address their concerns.

6.10. Noise

Impacts. Noise will be created as a result of the works. The main impact will be from traffic along haulage routes and the operation of plant and excavators. All plant shall only be permitted

to operate six days a week between the hours of 8am and 6pm, unless authorized by the Engineer. The most significant impact shall be to the settlements within or close to the embankments.

Due to the limited number of settlements present within the vicinity of work areas where noise levels shall be elevated, the magnitude of this impact is judged to be minor adverse.

Mitigation. The mitigations shall be to limit working hours to between 6am and 6pm, six days a week. The camp sites shall be situated at least 500m from any settlement.

6.11. Health and Safety of Community and construction staff/workers

Impacts. As a result of the Works there shall be impacts to the health and safety of both 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 reduce as a result of increased dust generated from construction and on transport routes, as well as due to emissions from plant and vehicles. The impact will continue for the duration of the Works (6 months) and can be mitigated by using water bowsers to prevent the creation of dust and by keeping plant and vehicles to a high standard through regular servicing to ensure they meet the NEQS. 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. In addition to use of water bowsers and regular maintenance of plant, all works (including construction of new access routes) shall be excluded from within 20m (65ft) of any residential or commercial structure which has not been identified in the Chapter-4 of this ESIA and **Figures 5-1** to **5.14**.

The following steps are suggested for proper management of traffic on routes to be used for material transport within the project area:

- The contractor will prepare an Occupational Health and Safety plan in line with the ECoPs given in the ESMF/RPF; submit to the PIC and PMU 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 labours during construction period;
- The contractor will train his crews on the aspects given in the ESMF DACREP;
- The contractor shall fence the working area and unauthorized shall not be allowed to enter in the area;
- The Contractor will display sign boards and banners about traffic diversion at places on detour routes;

- He 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;
- Obey speed limits;
- The Contractor will arrange a rescue team and first-aid facility in case of any accident;
- The Contractor will keep the smoke emission of the vehicles within NEQS;
- Water will be sprinkled on earthen routes to control dust emissions;
- No private property without permission of the owner will be used for transportation;
- Restriction on playing radio/tapes at high volumes and on use of noise producing machinery during night near settlements;
- Drivers will fix net on containers while transporting stones and soil etc.

6.12. Employment Opportunities

It is expected that the 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. There is a target for approximately 75% of the workforce (semi-skilled and unskilled) to be from the local areas.

The staffs are considered to be a social receptor of high sensitivity since the employment is only temporary and will not address their long term existing vulnerability. The local staff are of high sensitivity and the magnitude of impact on the local workforce is considered to be moderate beneficial (not major beneficial as the jobs cannot be guaranteed to extend beyond the construction phase).

6.13. Reduction of Flood Damages

The proposed rehabilitation works which are to be carried out as part of this Contract will improve the strength of the Indus Rive embankments and effectiveness is passing the super flood during monsoon without any breach 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. These benefits will ultimately manifest in protection of the earlier mentioned receptors and contribute to improvement in the lives of vulnerable people.

Agriculture is an important source of employment and exports (two thirds of employment and 80% of exports). As such this Contract shall also have a positive economic impact.

The magnitude of this impact is considered to be major beneficial as those benefiting extend outside the project area.

7 STAKEHOLDERS CONSULTATIONS

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

For new projects that have environmental and social impacts on the local communities, public consultation will not be a single conversation but a series of opportunities to create understanding about the project. As the sub-projects covered in this ESIA are Category-B sub-projects therefore; one round of public consultation is carried out during preparing the ESIA.
The purpose of consultation process was/will be to carry out and assemble feedback by means of:

- Meetings with irrigation Department.
- Structured open group meetings in communities adjacent to the visited sub-project sites of embankments.
- Views and Photos of stakeholder's consultation are attached as **Annex-D**.

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. It is of basic importance to involve representatives of local communities' right from the start. The institutional arrangements should also be in place for continuous consultation throughout the process of planning to implementation of the project.

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

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 ESIA are;

- Potential PAPs i.e. squatters located within Corridor of Influence (CoI).
- 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.

Key stakeholders

Key stakeholders, who might belong to either or neither of the first two groups, are those who can have a positive or negative effect on an effort, or who are important within or to an organization, agency, or institution engaged in an effort. The key stakeholders in case embankment sub-projects are political leaders, influential community members and other local representatives including Imams, and teachers of local schools.

7.3. Primary Stakeholder Consultations

In order to get spontaneous, blunt and candid responses, scoping sessions were carried out in all the villages located on both sides of the existing Indus River embankment. The purposes of the meetings with stakeholders were to:

- Inform the officials of the existence, nature of the sub-project and the scope of work involved in the execution of the sub-project
- Provide a forum for the initial definition of critical environmental and social issues
- Establish their interpretation, as official stakeholders, of the key sector development issues and links to the local and regional environment and social development.
- Confirmation of the suitability of the initial list of communities selected for consultation.
- Facilitation of Field Work.

7.4. Community Consultations

The conduct of the community consultations involved a program of structured discussion 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. **Table 7.1** shows the public consultations carried out on the embankment sub-projects.

Table 7-1: Summary of Stakeholder Consultations with Male Community Members

	Name of Village	Date	Number of Participants
1	Pasand Maheshwari	25-11-2015	8
2	Malik Shareef	25-11-2015	3
3	Syedpur	27-11-2015	23
4	Manaro	27-11-2015	5
5	Muhammad Yaqub	27-11-2015	10
6	Muhammad Ishaq	27-11-2015	5
7	Haji Ramzan	27-11-2015	4
8	Muhammad Ali Khosa	27-11-2015	3
9	Gul Muhammad Mallah	27-11-2015	5
10	Haji Saleh Muhammad Khoso	27-11-2015	20
11	Syed Burhan Shah	27-11-2015	7
12	Muhammad Arab Saharo	27-11-2015	5

7.5. Findings of Public Consultation with Male Community Members

Key findings of consultation with male community members on sub-projects are summarized below while details along with the list of participants, their signatures/thumb impressions and photographs are given in the **Annex-D**.

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- Sonda Goth

- The villagers expressed willingness and satisfaction that impacts of the proposed project are positive for the safety of village and agricultural land.
- They expected that project will create many employment opportunities for unskilled villagers.

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.Sumar Shoro

- 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. I t 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.

7.6. Findings of Public Consultation with Female Community Members

Key findings of consultation with female community members on sub-projects are summarized below while details along with the list of participants, their signatures/thumb impressions and photographs are given in the **Annex-D**.

- During the consultation with the female community members, most of the women were in favour 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.

7.7. Consultation Workshop

Second round of public consultation was carried out when the draft ESMF and ESIA was prepared. A Disclosure/Consultative Workshop on ESMF DACREP and for this ESIA was organized in the Irrigation office in Thatta on 30th December, 2015. The executive summaries of the draft ESMF and ESIA (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 DACREP 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 ESIA was prepared by the DACREP Consultants. In describing the engineering aspects of the sub-project or overall project, the DACREP consultant team was assisted by concerned PMU irrigation Additional Directors/XENs.

The **Table 7.2** is showing the list of participants of Consultative/Disclosure workshop organized for disclosure of ESMF while the details are given in **Annex-D**.

Table 7-2: List of Participants in the Consultative/Disclosure Workshop

	Name of the Participant	Organization	Designation	Contact Number
1	Zahoor Ahmed Sehito	Small Dams	Assistant Executive Engineer	0300-3400114
2	Nadeem Jokhio	Small Dams	Assistant Executive Engineer	0333-1313666
3	Ali Muhammad	Small Dams	Assistant Executive Engineer	0346-1139024
4	Muneer	Irrigation Department	Assistant Executive Engineer	0343-3504128
5	Mujeeb Rehman	Irrigation Department	Assistant Executive Engineer	0344-8222863
6	M. Usman Malik	Irrigation Department, Sonda Sub-division	Assistant Executive Engineer	0300-8905893
7	Balram Dodani	Irrigation Department	Assistant Executive Engineer	0308-3224117
8	Dr. Ali Asghar Mahesar	PMO	Deputy Director (Env)	0301-3561195
9	Shoaib Ahmed Sughrio	Irrigation Department, Kalri Baghar Division	Executive Engineer	0321-2886807
10	Shafqat Hussain	Irrigation Department, Pinyari Circle	Superintendent Engineer	0322-3331726
11	Ibrahim Samoon	Associated Consulting Engineers (ACE)	Regional Head	0315-2008133
12	Ghulam Mohiuddin Mughal	Irrigation Department	Executive Engineer	0300-3066693
13	Sardar Muhammad Kakar	Associated Consulting Engineers (ACE)	Team Leader	0333-2211179
14	Rubina Aziz	Associated Consulting Engineers (ACE)	Sociologist	0333-4119410
15	Attaullah	Associated Consulting Engineers (ACE)	Ecologist	0331-8480862
16	Muhammad Ramzan	-	Landlord	0321-3060993
17	Ghulam Rasool	-	Landlord	0321-3448682
18	Ali Muhammad Hingoro	-	Social Worker	0303-2535141
19	Nisar Ahmed Junejo	Irrigation Department	Assistant Executive Engineer	0301-2224091
20	Wasi Ahmed	Irrigation Department	Assistant Executive Engineer	0321-2125313
21	Fareed Ahmed Memon	Irrigation Department, Baghar Sub-division	Assistant Executive Engineer	0300-3692699
22	Azimullah	Irrigation Department	Assistant Executive Engineer	0345-3667605
23	Ali Hassan Behrani	Irrigation Department	Assistant	0321-3713850
24	Eijaz	DACREP	Assistant	0301-3618174
25	Shafi Muhammad	Irrigation Department	Pesh Imam	0322-2028817
26	Ghulam Abbas	Irrigation Department	Sub-Engineer	0312-3750310
27	Ghulam Rasool	-	Landlord	0302-2704917
28	Abdul Rasool	-	Landlord	-
29	Muharram Solangi	-	Landlord	-
30	Khamiso Khan Shar	Education Department	Teacher	0321-2874887
31	Ghulam Muhammad Shar	Education Department	Teacher	0321-3718366
32	Angario Samo	-	Landlord	-
33	Manzoor Ali Soomro	-	Landlord	03113639360
34	Mir Ali Solangi	Irrigation Department	Darogo	0321-3473460

	Name of the Participant	Organization	Designation	Contact Number
35	Ziarat Hussain	-	Landlord	0324-3091170
36	Nasir Ahmed	Irrigation Department	Darogo	0321-3275113
37	Asif Ali Siddiqui	Irrigation Department	Darogo	0320-4672110
38	Sagheer Ahmed Walhari	Irrigation Department	Sub-Engineer	0321-3718921
39	Tanveer Ahmed Walhari	Irrigation Department	Sub-Engineer	0321-3288828
40	Shanker	Irrigation Department	Clerk	0342-3341732
41	A. Sattar Bahrani	Irrigation Department	Sub-Engineer	0321-2467274
42	A.Khalique Soomro	-	Landlord	0321-3872926
43	Nazir Ahmed Walhari	-	Landlord ,BU Bund	0333-2722725
44	Hyder Ali	Irrigation Department	-	0321-2635921
45	Asif Ali Solangi	Irrigation Department	-	0322-8500137
46	M. Yakoob Jalbani	-	-	0310-3013910
47	Khan Muhammad	Irrigation Department	Clerk	0321-3281926
48	Muhammad Essa	Irrigation Department	Naib Qasid	0321-8968620
49	Haji Mallah	Irrigation Department	-	0322-3081545
50	Muhammad Suleman	Irrigation Department	Darogo	0333-2594180
51	Akram Khan	Irrigation Department	Darogo	0300-2952651
52	M. Ilyas	-	Landlord	0321-8734109
53	M. Hussain Katyar	APCA, Thatta	Jr. Clerk	0321-3160171
54	Abdul Hameed Shaikh	APCA, Thatta	Jr. Clerk	0321-3711342
55	Farooq Memon	Associated Consulting Engineers (ACE)	Environmental Engineer	0300-3120793
56	Sajid Abbas	Irrigation Department	Assistant Executive Engineer	0300-8376509
57	Kashif Channa	Livestock and Fisheries Department	Assistant Warden (Fisheries)	0312-2652144
58	Adnan Khalid Soomro	Livestock and Fisheries Department	Assistant Warden (Fisheries)	0300-3092811
59	Fareed A. Memon	Irrigation Department	Executive Engineer	0300-3049279
60	Abdul Qadir Palijo	Irrigation Department	Superintendent Engineer	0300-8258091
61	Ghukam Mohiuddin Soomro	-	Landlord	0301-2960926
62	Ghulam Mustafa Memon	Irrigation Department	Sub-Engineer	0321-3063297
63	Muneer Ahmed	Associated Consulting Engineers (ACE)	Environmental Engineer	0333-7037134
64	Javed Ali	Associated Consulting Engineers (ACE)	Computer Systems Incharge	0314-2767722
65	Naeem Samoon	Associated Consulting Engineers (ACE)	Senior Environmentalist	0312-3945753

7.8. 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 DACREP Consultant and SID: The DACREP Consultant team has carried out detailed primary stakeholder consultation at SH, BU, Indo and MS bund the details of which are provided in the ESIA 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. PMU 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 DACREP.

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 DACREP?

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 DACREP 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 DACREP 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 DACREP 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 DACREP 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.

The reports of Disclosure / Consultative workshop were published next day in local newspapers Ummat, Front Line, Kalyan, Dunya, Pak, Halchal and Aawami Aawaz.

7.9. Information Disclosure

The Irrigation Department will disclose the ESIA 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 ESIA will be translated in Sindhi language and made available to the local communities. ESIA and Sindhi version of its executive summary will be placed at the SID official website and will be made available in SID relevant offices.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

This Chapter presents the Environmental and Social Management and Monitoring Plan (ESMMP).

8.1. Project Management Responsibilities

Implementation of the ESMP will be a contractual obligation between the Contractor and PMU DACREP. The Contractor shall engage full time technical staff capable of carrying out the monitoring activities as proposed in the ESMP as contractual obligations under the contract agreement.

PIC in coordination with ESMU-PMU will carry out monitoring activities related to the project during the construction phase by using check lists and notify the Contractor of any violations of the ESMP, check the progress reports, advise the client and contractor regarding any violations which require further action, and maintain a record of events and surveys for reference.

In addition, ESMEC as independent consultants will annually monitor the environmental and social aspects of ESMP implementation including those associated with the Contractor's activities as and when required.

The overall responsibility for DACREP project as well as Environmental and Social Management and Monitoring will rest with the Project Management Unit (PMU), Irrigation Department Government of Sindh to be headed by a Project Director. The PD is supported by Additional Director Dams, Additional Director Bunds/Flood Levees, Additional Director Coordination and Technical Assistant. In addition, the PMU will be supported during Environmental and Social Management Plan (ESMP) and Resettlement Action plan (RAP) implementation by Environmental and Social Management Unit (ESMU) to be established within PMU and Project Implementation Consultant (PIC) respectively. The specific responsibilities of the institutions involved in the ESMP and RAP implementation are shown in the **Figure 8.1** and described below.

8.2. Project Management Unit

The overall responsibility for the supervision of ESMP and RAP will rest with the Project Management Unit (PMU) under Irrigation Department that will act as apex body of the project 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 PMU under the supervision of Additional Director Coordination and Technical Assistant (AD). Key positions within the ESMU shall include: Environment Specialist; Social and Resettlement Specialist; Gender Specialist; and Ecological specialists.

The ESMU shall be responsible for supervision of implementing and monitoring the ESMP and RAP. The Staff of ESMU shall be answerable to the Project Director (PD) DACREP. The ESMU shall be responsible for the monitoring defined in the ESMP and RAP as part of their overall monitoring of the social and environmental management.

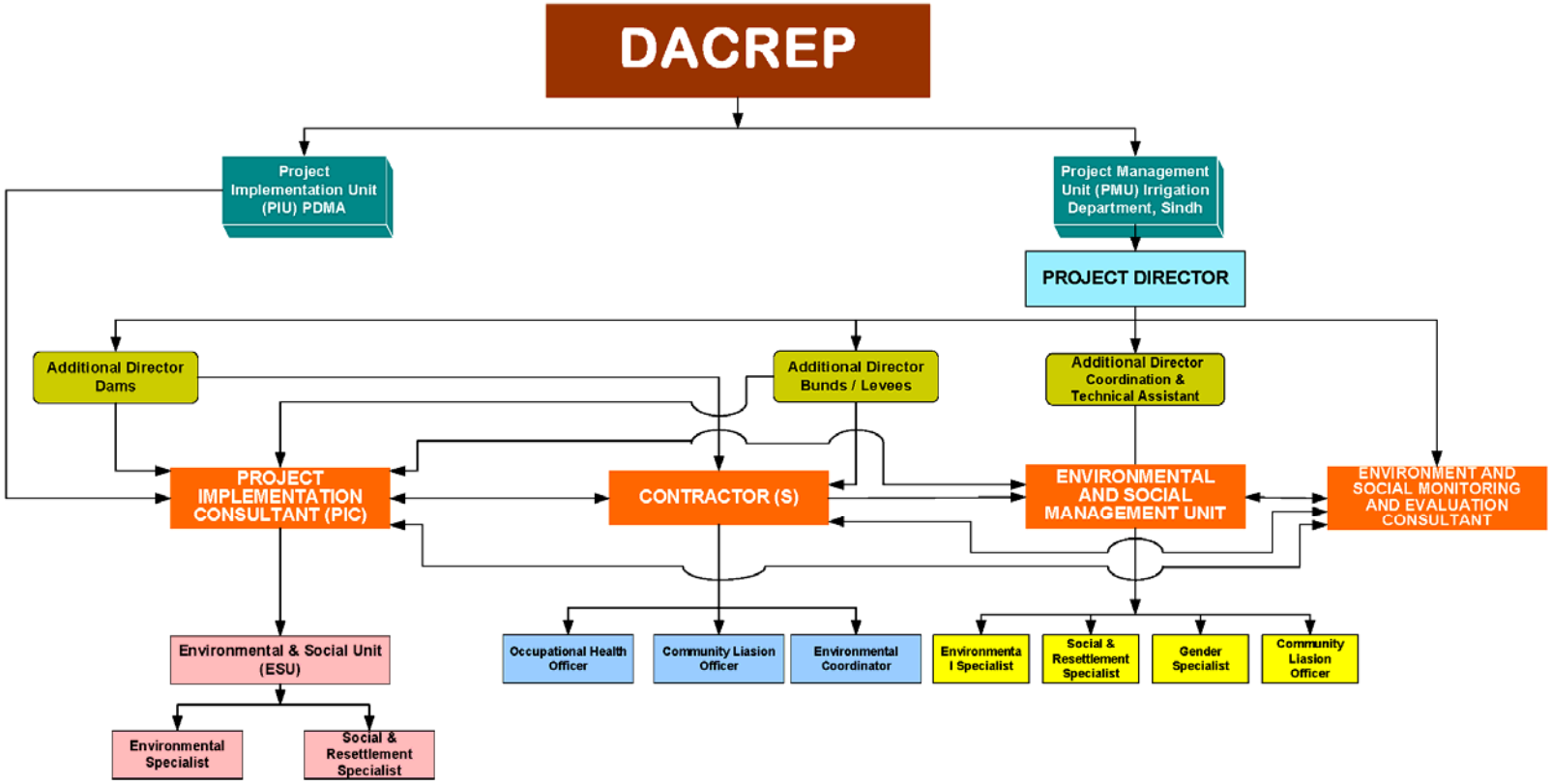


Figure 8.1 Institutional Arrangement for DACREP Project

8.3. Project Implementation Consultant (PIC)

The Project Implementation Consultant (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 (PMU) during execution of the Civil Works for sub-projects under the DACREP and shall submit periodic reports to the PMU 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:

- 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.
- Monitor the implementation of ESMPs and RAP on a regular basis during execution of civil works by the Contractor. An Environmental and Social Unit (ESU) within PIC shall be established and include the following key positions:
  a. Environmental Specialist
  b. Environmental Inspector(s)
  c. Social and Resettlement Specialist
  d. Gender Specialist
  e. Assistant Sociologist (s)

The ESU of PIC shall be responsible for monitoring the contractor's compliance with the ESMPs. The role of the ESU-PIC shall 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 PMU.

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

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

8.5. 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, ESMF, sub-project specific ESMPs 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.

8.6. 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.

i. **Pollution (Air, land and water) Control Plan**

The Contractor shall provide details of the principal pollution control facilities proposed and of contingency plans in the event of failure of these facilities. The 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.

ii. **Waste Management and Disposal Plan**

The Contractor shall include details of the procedures for the collection and disposal of wastes. The Plan shall deal with each waste stream separately.

iii. **Traffic Management Plan**

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

iv. **Plan for Handling Hazardous Material**

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

v. **Occupational Health and Safety Plan**

In producing their Health and Safety Plan, the Contractor should make reference to the General Specification and the field environment, health and safety (EHS) guidelines of the World Bank.

vi. **Environmental Awareness Training Plan**

This shall include details of the Contractor's environmental awareness training program proposed for the workforce.

vii. **Emergency Plan**

The contractor will prepare an emergency plan and the emergency plan must include the following details:

- Procedure for shutdown of site;
- Indicators on site that shall prompt the shutdown of areas of work (linked to natural events, such as maximum river water level);
- Emergency evacuation procedure of staff and members of the public within range of likely impact.

viii. **Reforestation/ Tree plantation and maintenance plan**

Most of the trees to be felled are 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. The Contractor is required to prepare an inventory of the trees to be cut/uprooted before commencement of the physical works in presence of PIC and PMU staff, submit a detailed tree plantation plan, defining the proposed plantation methodology, species and plantation locations. The plantation location shall be approved by the PIC Engineer and PMU approval. All trees to be planted shall be of native species as they have more chances of survival. The contractor shall be responsible for after care of the saplings/plantation for one year.

8.7. 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 6**.
Table 8.1 presents the mitigation and monitoring plan.

Table 8-1: Environmental and Social Mitigation and Monitoring Plan

	Project Activities	S#	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	DACREP 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	PMU-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	PMU-ESMU and PIC			Along the embankments	Construction Period
				Photographs of pre-construction state of camps	Contractor	PMU-ESMU and PIC	Photographs taken	Once	Along the embankments	Construction Period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Biodiversity monitoring	PMU	PMU-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	Tree inventory prepared by DACREP Consultant will be updated and trees likely to be cut down shall be marked in advance and approved by PIC and PMU	Contractor	PMU-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 PMU DACREP	Contractor	PMU-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	PMU-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	PMU-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	PMU-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 fauna	PIC	PMU-ESMU and PIC	Status of terrestrial and avifauna	Quarterly	Along the embankments	Construction Period
				Areas having thick/dense vegetation will be avoided as far as possible.	Contractor	PMU-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	PMU-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		PMU-ESMU and	Use of existing access tracks and	Monthly	Haul routes	Construction Period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						PIC	width of new access tracks not more than 3m			
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	PMU-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	PMU-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	PMU-ESMU and PIC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
	B.2. CONSTRUCTION and LABOR CAMPS									
B.2.1	Locating Camp	B.2.1.1	Community disturbance	Locate camp at least 500m away from the communities	Contractor	PMU-ESMU and PIC	Review of Camp layout plan	Once	Camp site	Before camp construction
				Employment of Community Liaison Officer	Contractor	PMU-ESMU and PIC	Community Liaison Officer Employed	Once	Camp site	After mobilization of the Contractor
				Compensation for loss of land and standing crops	PMU	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		PMU-ESMU and PIC				
			Surface water pollution	Locate camps away from the embankments of drainage line, watercourses and Indus River		PMU-ESMU and PIC				

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
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	PMU-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	PMU-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 Areas	B.2.3.1	Flood risk within Camp	Drainage provided and maintained to convey storm water away from camp and settlement	Contractor	PMU-ESMU and PIC	Drainage provided in camps	Monthly	Construction Camp	Following the camp construction
				Camp shall be located above or beyond the river/tributary	Contractor	PMU-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	PMU-ESMU and PIC	Drainage provided in camps	Monthly	Construction Camp	Throughout construction phase
				Camp shall be located above or beyond the river/tributary	Contractor	PMU-ESMU and PIC	Review of Camp layout plan	Once		Before camp construction
				Hazardous material storage area shall be covered	Contractor	PMU-ESMU and PIC	Covered storage of hazardous materials	Once	Construction Camp	Following the camp construction
				Run-off from refuelling and wash down areas collected from treatment	Contractor	PMU-ESMU and PIC	Measures are in place to collect the run-off from refuelling 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	PMU-ESMU and PIC	Solid flooring and surfaces are provided	Once	Construction Camp	Following the camp construction

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Contractor shall regularly clean camps	Contractor	PMU-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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Provision of adequate kitchen	Once	Construction Camp	Following the camp construction
				Provision of Doctor	Contractor	PMU-ESMU and PIC	Doctor visiting camp site regularly	Monthly	Construction Camp	Throughout construction phase
				Adequately stocked dispensary shall be provided	Contractor	PMU-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	PMU-ESMU and PIC	Tree wood not used in kitchen	Monthly	Construction Camp	Throughout construction phase
				The contractor will prepare a code of conduct and sign by his work crews		PMU-ESMU and PIC	Code of conduct signed by all staff	Monthly	Construction Camp	Throughout construction phase

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Include awareness raising on HIV/AIDS and sexually transmitted disease and prevention and treatment of vector borne disease in Contractor training plan	Contractor	PMU-ESMU and PIC	Approval of Contractor training plan	Once		At mobilization
						PMU-ESMU and PIC	Training as per approved plan	Monthly	Construction Camp	Throughout construction phase
		B.2.3.6	Community Conflicts	Set up a complaint register at Contractor and Engineer office	Contractor	PMU-ESMU and PIC	Complaint register maintained	Monthly	Contractor and Engineer's Offices	Throughout construction phase
				Contractor shall develop a code of conduct to govern behaviour of workers and all staff shall sign	Contractor	PMU-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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	No hunting reported/observed	Monthly	Project area	Throughout construction phase
				Biodiversity monitoring of impacts of fauna	Contractor	PMU-ESMU and PIC	Status and behaviour of terrestrial and avi-fauna	Quarterly	Project office	Throughout construction phase

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.2.3.8	Loss of life	Contractor shall prepare a shutdown procedure and evacuation plan	Contractor	PMU-ESMU and PIC	Plan submitted to Engineer			
						PMU-ESMU and PIC	Annual evacuation drill	Annually	Construction Camp	Throughout construction phase
				Emergency access routes shall be signed and maintained	Contractor	PMU-ESMU and PIC	Emergency access routes clear and signed	Monthly	Construction Camp	Throughout construction phase
				Fire extinguishers to be provided through out camp	Contractor	PMU-ESMU and PIC	Fire extinguishers provided	Monthly	Construction Camp	Throughout construction phase
				Public areas at risk from fire in camp identified in emergency plan with evacuation measures	Contractor	PMU-ESMU and PIC	Plan submitted to Engineer include evacuation procedure of public in event of major fire	Once		At mobilization
B.2.4	Camp Planning	B.2.4.1	All of the above issues	Camp layout plan to be submitted to Engineer	Contractor	PMU-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	PMU-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	PMU-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

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Preparation and Implementation of communication strategy	Contractor	PMU-ESMU and PIC	Approval of Contractor's Communication Strategy	Once		At mobilization
						PMU-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	PMU-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	PMU-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	PMU-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,EMEs and EMU	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	PMU-ESMU and PIC	No dust generated from stockpiles	Monthly	Stockpiles	Throughout construction period
		B.3.1.2	Ground, ground and surface water pollution	Locate storage area away from water courses, drain and transport routes	Contractor	PMU-ESMU and PIC	Review of camp layout plan	Once		Before camp construction

	Project Activities	S#	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	PMU-ESMU and PIC	Review of camp layout plan	Once		Before camp construction
				Use only designated storage areas	Contractor	PMU-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	PMU-ESMU and PIC	Hazardous material storage containers adequately labelled	Monthly	Hazardous material storage areas	Throughout construction period
				Hazardous areas to be secure and access limited to trained personnel only	Contractor	PMU-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	PMU-ESMU and PIC	Signs provided to identify hazardous material storage area	Once	Hazardous material storage areas	Following camp construction
				Provide fire extinguishers	Contractor	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Concrete flood and cover to hazardous	Once	Hazardous material storage	Following camp construction

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
							material storage areas and generators		areas	
				Concrete or masonry bunding provided at perimeter of hazardous material storage area	Contractor	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Approval of Plan	Once		At mobilization
				Hazardous material storage area or fuel tank not be situated adjacent to watercourse	Contractor	PMU-ESMU and PIC	Review of camp layout plan	Once		Before construction camp
				Space maintained between containers to allow inspection	Contractor	PMU-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	PMU-ESMU and PIC				
		B.3.2.3	Health and safety and Pollution	Oil designated storage area used	Contractor	PMU-ESMU and PIC	Stockpiles only in storage areas identified in camp layout plan	Monthly	Project area	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Training on handling, use and disposal of hazardous material must be given to all those with access to hazardous material area	Contractor	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Monitoring of effluents against NEQs	Quarterly	septic tanks	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Submit pollution plan to Engineer including design or specifications of system to show treatment rate exceeds loading rate and include plan for treatment/disposal of sludge	Contractor	PMU-ESMU and PIC	Plan submitted and approved	Once		Throughout construction 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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Used construction material not disposed of	Monthly	Landfills and burns sites	Throughout construction period
				Use of recycling Contractor	Contractor	PMU-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		PMU-ESMU and PIC		Monthly	Landfills and burns sites	Throughout construction period
				Reuse of domestic wastes (if applicable)	Contractor	PMU-ESMU and PIC	Demolition wastes not disposed of where use available elsewhere	Monthly	Landfills and burns sites	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Landfill capped	Once	Landfills	Decommissioning
		B.4.6.4	Social conflicts, odour, community health and safety	Landfill to be situated at least 100m away from the settlement	Contractor	PMU-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	PMU-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	PMU-ESMU and PIC	Fire extinguishers are provided	Monthly	Burn pits	Throughout construction period
B.4.8	Disposal of medical wastes	B.4.8.1	Ground, groundwater and surface water pollution, health and safety	Medical wastes stored on site and ultimately disposed of at medical incinerator	Contractor	PMU-ESMU and PIC	No medical wastes in landfill or burn pits	Monthly	Landfill and Burn pits	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
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, available 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	PMU-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	PMU-ESMU and PIC	No wastes littering the project area	Monthly	Routes from camps landfill	Throughout construction period
B.4.11	Disposal of 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	PMU-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		PMU-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	PMU-ESMU and PIC	Black smoke not observed emitting from Vehicles/plant	Monthly	Project area	Throughout construction period
						PMU-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	PMU-ESMU and PIC	Submittal and approval of plan	Once		At mobilization
						PMU-ESMU and	Training as per approved plan	Monthly	Project area	Throughout construction

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						PIC				period
		B.5.1.2	Generation of dust	Access road to be adequately compacted or regularly sprinkled to prevent dust generation during use	Contractor	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	No vehicle observed parked outside the approved areas	Monthly	Project area	Throughout construction period
				Movement of vehicles/plant restricted to work hours	Contractor	PMU-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	PMU-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	PMU-ESMU and PIC	Submittal and approval of plan	Once		At mobilization
				Safe driving practices included in Contractor's training plan	Contractor	PMU-ESMU and PIC	Training as per approved plan	Monthly	Project area	Throughout construction period
				All Drivers hold a valid license	Contractor	PMU-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	PMU-ESMU and PIC	Flag persons provided	Monthly	Road approaching and crossing	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	PMU-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 banks men	Contractor	PMU-ESMU and PIC	Back-up alarms or banks men 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	PMU-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	PMU-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	PMU-ESMU and PIC	No damage to roads/infrastructure	Monthly	Public roads	Throughout construction period
				Use of horns is prohibited near the settlement	Contractor	PMU-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	PMU-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 standard specified in NEQS	Contractor	PMU-ESMU and PIC	Monitor with noise meter	Weekly	Project area	Throughout construction period
				Plants/vehicles shall be restricted from playing radio/taps audible beyond the plant	Contractor	PMU-ESMU and PIC	Radio/taps are not audible at 50m or further from plant	Monthly	Project area	Throughout construction period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
			Disturbance of Fauna	Biodiversity monitoring of impacts on fauna	Contractor	PMU-ESMU and PIC	Status and behaviour 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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	No queuing delivery vehicles on public roads	Monthly	Construction camp	Throughout construction period
				Vehicles to be unloaded off	Contractor	PMU-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	PMU-ESMU and PIC	Flag persons provided	Weekly	At road partial closure	During partial road closure

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	PMU-ESMU and PIC	No complaint received	Monthly	Settlement in the project area	Throughout construction period
				Traffic by-pass should be provided and signed	Contractor	PMU-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	PMU-ESMU and PIC	Approval for road closure submitted to Engineer	Once for each closure		Throughout construction period
B.5.4	Refuelling of vehicles and plant on land or filling of fuel drums	B.5.4.1	Ground and surface water pollution	Refuelling points to be provided with a concrete pad and bund or drip trays used. Spill fuel disposed of as hazardous waste (of reused If possible)	Contractor	PMU-ESMU and PIC	No fuel spillage from refuelling operations	Monthly	Project area	Throughout construction 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	PMU-ESMU and PIC	Vehicles not washed down outside designated area	Monthly	Project area	Throughout construction period
				Wash-down areas have concrete pad foundations	Contractor	PMU-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	PMU-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	PMU-ESMU and PIC	Groundwater is not used for construction purposes	Monthly	Wash-down areas	Throughout construction period
B.6. HEALTH and SAFETY OF WORKFORCE										
B.6.1	General construction works	B.6.1.1	Health and safety of staff	Contractor shall prepare and submit occupational health and	Contractor	PMU-ESMU and	Submittal and approval of plan	Once		At mobilization

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				safety plan		PIC				
						PMU-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	PMU-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	PMU-ESMU and PIC	Submittal of accident report	Monthly	Project area	Throughout contract period
				Qualified health and safety manager will be appointed by Contractor	Contractor	PMU-ESMU and PIC	Qualified health and safety manager present on site	Monthly	Project area	Throughout contract period
				Contractor shall engage a full time Doctor on site who is registered with PMDC	Contractor	PMU-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	PMU-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	PMU-ESMU and PIC	First aid facilities provided at each work site	Monthly	Project area	Throughout contract period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				The Contractor shall include in the health and safety plan a procedure for the transfer of injured staff from the site to medical facilities including transport and provision of medical treatment in en-route.	Contractor	PMU-ESMU and PIC	Submittal and approval of plan	Once		At mobilization
							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		PMU-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	PMU-ESMU and PIC	Tree inventory prepared	Weekly	Project area	Throughout contract period
				Compensatory tree plantation is proposed	Contractor	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	Material are not borrowed from the toe of the embankments	Weekly	Project area	Throughout contract period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-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	PMU-ESMU and PIC	A clearance of 5m is maintained	Weekly	Project area	Throughout contract period
B.7.5	Access to borrow areas	B.7.5.1	Impacts on flora and fauna	available/existing access routes shall be followed	Contractor	PMU-ESMU and PIC	existing access routes are followed	Weekly	Project area	Throughout 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	Compensation to the affected person shall be paid			the affected person is compensated	Weekly	Project area	Throughout contract period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
			compensated							
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	PMU-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	PMU-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	PMU-ESMU and PIC		Weekly	Project area	Throughout contract period
		B.7.7.3	Landscape change	Grade sides of borrow areas to 1:3	Contractor	PMU-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	PMU-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	PMU-ESMU and PIC	All works excluded from the identified locations			Throughout contract period
				Works do not block access to sites	Contractor	PMU-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	PMU-ESMU and PIC	Engineer informed of discovery of unidentified cultural or	Monthly	Project Area	Throughout contract period

	Project Activities	S#	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
							religious sites			
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

8.8. 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 8.1**.

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 HSE including but not limited to the following:
- HSE Measures adopted (HSE statistics)
- Fuel and hazardous material consumption
- Workforce statistics (employment/deployment etc.)

Two complementary approaches are proposed to monitor the ESMP:

- Compliance monitoring to check whether the actions proposed in the ESMP is being carried out.
- 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-PMU with independent monitoring by ESMEC. The effects monitoring shall be the responsibility of PIC.

Examples of compliance and effects monitoring parameters are included in **Box 8.1**. Both approaches will be conducted using the monitoring parameters given in **Table 8.1** by visual observation, photographic documentation and measurement where necessary. A record of events and surveys will be maintained.

Compliance monitoring will also be facilitated using checklists included to be prepared by PIC and SEMU of PMU during the project implementation.

(i) Compliance Monitoring:

- Frequency of anti-dust water sprays during construction period;
- Safety at workplaces and working hours during construction;
- Incidence of child labor and disproportionate wages;
- Incidence of liquid/solid waste in the vicinity of work camps (type and amount of waste, amount, interference with local residents, fauna, flora and crops);
- Number of local people recruited on project works.
- Plantation of saplings of new trees against trees cut
- Survival rate of saplings of new trees
- Arrangements made at construction sites for protection of floral and faunal resources

(ii) Environmental Effects Monitoring

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

8.9. Environmental Non-compliance and Corrective Measures

The Contractor will be notified of any violations of the ESMP, as well as any corrective actions required.

Outlined below are a number of steps, relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

Step 1. PIC discusses the problem with PMU and Contractor to work out mitigations together and record the facts and the decision implemented.

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

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

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

8.10. Communication, Reporting and Documentation

The following environmental meetings are proposed:

- Primary meeting between ESMU-PMU, PIC and Contractor for setting out the format for the regular meetings shall be held before commencement of the project.
- Scheduled Environmental and Social Progress Review Meeting (ESRPM) meetings between ESMU-PMU, PIC and Contractor shall be done on a monthly basis.

The purpose of the meetings is to discuss the conduct of the operation, non–compliances noted by the PIC and ESMU environmental and social teams and measures recommended for their remedy.

The Contractor and PICs 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 PMU, 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-PMU. The following data shall be recorded for each photograph:

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

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 of PMU and ESMEC shall be appended to the monthly reports.

Social Complaints Register. The Contractor will maintain a social complaints register at the camp site and work places to document all complaints received from the local communities. The register will also record the measures taken to mitigate the reported concerns. The final report will be communicated to the ESMU of PMU. All complaints/issues of the community will be reported in the monthly progress report of the following month along with status of the last month's complaints and will be reviewed by PIC, ESMEC and ESMU of PMU.

Change Record Register. There are two scenarios in which a review of this ESMP will be triggered:

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

In the event of either scenario, the ESMP shall be updated and reissued accordingly. The design change record shall be maintained by the Contractor and PIC to document any change in the project design/operation. The ESMU and ESMEC would supervise the number of design change applications and suggestions received from the local people and its implementation by PIC and Contractor.

8.11. ESMP Implementation Cost

Costs have been estimated for implementing ESMP for the proposed subproject. The estimates for the key ESMP components are summarized in the **Table 8-2** below. Appropriate clauses will be added to the Construction Contract(s) to ensure a mechanism for compliance and payment.

Table 8-2: 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
Total Cost		**5,200,000**

A budget of **PKR 5,200,000** has been estimated for the implementation of the ESMP. The resettlement cost shall be paid from the counterpart fund to be provided by the Government of Sindh.

9 GRIEVANCE REDRESS MECHANISM

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

The grievance redress system as proposed for the embankment sub-project covered under this ESIA will primarily (but not exclusively) handle issues that emerge from construction activities of the sub-projects, or can be plausibly described as a consequence of these activities.

Grievances may arise from the implementation of the proposed embankment sub-project activities such as stone pitching, approving and raising/strengthening of the embankments. Most grievances would arise from the likely project affected persons or organizations.

9.1. Objectives of Grievance Redress Mechanism

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

a. Open channels for effective communication, including the identification of new environmental issues of concern arising from the project;
b. Demonstrate concerns about community members and their environmental well-being; and
c. 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 honoured where this is seen as important.

9.2. Principles, Procedures and Time-Lines

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

- All grievances submitted in writing to staff assigned under the proposed Public Complaints Centre (PCC) will be formally recorded, and a written acknowledgement issued;
- Multiple means of lodging complaints should be available like letter, phone, and email/web-based portal.

- Grievances will be dealt with on a referral basis; those that the Contractor or the Project Implementation Consultant (PIC) are unable to resolve will be referred to the Grievance Redress Committee, with a final provision for appeal to Project Director PMU DACREP and the Project Steering Committee (PSC) or Secretary Irrigation Department Government of Sindh if an issue cannot be resolved with the Committee.
- Every effort will be made to address or resolve grievances within the following fixed time-lines, which will be an indicator against the performance of the handling system: Acknowledgement of a written submission will be issued to the complainant within three working days. If not resolved earlier by the Contractor or Supervisory staff on site, grievances will be tabled for discussion/resolution during Committee meeting within one week of receipt of the written submission. If not satisfactorily resolved by the Grievance Redress Committee, the grievance will be referred to consideration by PSC or Secretary, SID within 1 week.
- The cases that prove impossible to resolve through Grievance Redress Committee may be referred to the PSC to be established under the Planning and Development Department (P&D), Government of Sindh, comprising senior representatives from P&D, Irrigation Department. This Board will meet as needed to adjudicate on cases and either send their recommendations for endorsement to the Secretary, P&D or refer these for legal action. Where feasible, a response will be forthcoming to such appeals within one month of submission.
- If the complainant is not satisfied, the complaint will have the option to seek redress through court of law.

9.3. Records and Monitoring

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

9.4. Dissemination

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

The PD will ensure that copies of the standard grievance registration form are available with, Consultants and Contractor and are kept in sufficient numbers in local government and area

administration offices as DC at Sujawal and Thatta during the entire period of implementation. PD shall also ensure that the database of all grievances submitted is updated on a regular basis, and that information on the status of individual cases is made available as required.

9.5. Proposed Mechanism for Grievance Redress

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

a. A Public Complaints Centre (PCC), which will be responsible to receive, log, and resolve complaints;
b. A Grievance Redress Committee (GRC), responsible to oversee the functioning of the PCC
c. A non-judicial decision-making authority e.g. Project Steering Committee or Secretary Irrigation Government of Sindh for resolving grievances that cannot be resolved by PCC;
d. Grievance Focal Points (GFPs), which will be educated people from each community on each sub-project site. The GFPs should be community members who easily approached by the community. The GFPs will be provided training by the Environment and Social Section of the PIC and PMU DACREP.

9.6. Public Complaints Center

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

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

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

9.7. Grievance Redress Committee (GRC)

The GRC will function as an independent body that will regulate the grievance redress process. It will comprise of, Environmental and Social Officers of PMU, Senior Engineer from PMU, Representative of DC office at Sujawal and Thatta and Senior members from civil society in Indus River Embankment sub-project areas.

9.8. Grievance Focal Points (GFPs)

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

9.9. Role and Responsibilities of PCC

The responsibilities of the PCC are:

a. The PCC will log complaint and date of receipt onto the complaint database and inform the PIC and the Contractor;
b. The PCC will instruct contractors and PIC to refer any complaints that they have received directly to the PCC. Similarly, the PCC will coordinate with local government to "capture" complaints made directly to them;
c. The PCC, with the PIC and the Contractor, will investigate the complaint to determine its validity, and to assess whether the source of the problem is due to project activities, and identify appropriate corrective measures. If corrective measures are necessary, PCC, through the PCI, will instruct the Contractor to take necessary action;
d. The PCC will inform the Complainant of investigation results and the action taken;
e. If complaint is transferred from local government agencies, the PCC will submit interim report to local government agencies on status of the complaint investigation and follow-up action within the time frame assigned by the above agencies;
f. The PCC will review the Contractors response on the identified mitigation measures, and the updated situation;
g. The PCC will undertake additional monitoring, as necessary, to verify as well as review that any valid reason for complaint does not recur.

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

9.10. GRM Steps and Timeframe

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

- Stage 1: When a grievance arises, the affected person may contact directly with the contractor/operator and the project manager to resolve the issue of concern. If the issue is successfully resolved, no further follow-up is required;
- Stage 2: If no ad hoc solution can be found, the affected person/s will submit an oral or written complaint to the PCC by themselves or through GRM entry points (the CFP, SDA, PMU, 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 (5) working days to the complainant, PMU 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 PMU during operation should implement the redress solution and convey the outcome to the PCC within seven (7) working days;
- Stage 3: If no solution can be identified by the PCC or if the complainant is not satisfied with the suggested solution under Stage 2, the PCC will organize, within two (2) weeks, a multi-stakeholder meeting under the auspices of the SID, where all relevant stakeholders (i.e., the complainant, PMU, 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 PMU during operation should implement the agreed-upon redress solution and convey the outcome to the PCC within seven (7) working days;
- Stage 4: If the multi-stakeholder hearing process is not successful, the PCC will inform Project Steering Committee (PSC)or Secretary Irrigation Department Government of Sindh accordingly, and the PSC or Secretary SID will organize a special meeting to address the problem and identify a solution; and
- Stage 5: If the affected people are still not satisfied with the reply in Stage 4, he or she can go through to local judicial proceedings.

9.11. Reporting

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

The tracking and documenting of grievance resolutions within the PCC and/or PMU will include the following elements: (i) tracking forms and procedures for gathering information from project personnel and complainant(s); (ii) dedicated staff to update the database routinely; (iii) systems with the capacity to analyse information so as to recognize grievance patterns, identify any systemic causes of grievances, promote transparency, publicize how complaints are being handled, and periodically evaluate the overall functioning of the mechanism; (iv) processes for

informing stakeholders about the status of a case; and (v) procedures to retrieve data for reporting purposes, including the periodic reports to the PMU and including PCC reports into the monthly ESMP Compliance monitoring report to the World Bank.

ANNEX-A

ANNEX-A

TREE INVENTORY OF MS BUND

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
29/2 to 29/3	No trees located within RoW									
36/0 to 38/0	Sindhi Babur	Acacia nilotica	17	31	6	13	0	0	3	6
36/0 to 38/0	Nim	Melia indica	12	19	1	0	0	0	0	0
36/0 to 38/0	Baidmushk	Eucalyptus sp	8	7	0	0	0	0	0	0
36/0 to 38/0	Baeer	Zizyphus jujuba	1	0	0	0	0	0	0	0
36/0 to 38/0	Amri		0	2	0	0	0	0	0	0
36/0 to 38/0	Pipal	Ficus religiosa	1	0	0	0	0	0	0	0
36/0 to 38/0	Badaam		2	0	0	0	0	0	0	0
36/0 to 38/0	Amro		9	1	0	0	0	0	0	0
36/0 to 38/0	Gedori	Cordia dicotoma	2	0	0	0	0	0	0	0
36/0 to 38/0	Jaar		1	3	0	7	0	0	0	8
36/0 to 38/0	Gidamri	Tamarindus indica	0	1	0	0	0	0	0	0
36/0 to 38/0	Jamun	Syzygium cumini	1	1	0	0	0	0	0	0
36/0 to 38/0	Amb	Mangifera indica	12	0	0	0	0	0	0	0
36/0 to 38/0	Kamori		0	1	0	0	0	0	0	0
36/0 to 38/0	Sewri		2	0	0	0	0	0	0	0
36/0 to 38/0	Laara		0	2	0	0	0	0	0	0

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
36/0 to 38/0	Khajoor	Phoenix dactylifera	1	0	0	0	0	0	0	0
38/0 to 40/0	Sindhi Babur	Acacia nilotica	3	9	6	9	0	0	1	1
38/0 to 40/0	Nim	Melia indica	12	9	0	0	0	0	0	0
38/0 to 40/0	Baidmushk	Eucalyptus sp	1	2	0	0	0	0	0	0
38/0 to 40/0	Baidmushk (Angrezi)	Conocorpus	0	2	0	0	0	0	0	0
38/0 to 40/0	Gedori	Cordia dicotoma	0	0	1	0	0	0	0	0
45/0 to 45/2	Sindhi Babur	Acacia nilotica	2	0	0	0	0	0	0	0
	Baidmushk	Eucalyptus sp	3	6	0	0	0	0	0	0
	Gedori	Cordia dicotoma	0	1	0	0	0	0	0	0
45/2 to 46/0	Sindhi Babur	Acacia nilotica	1	0	0	0	0	0	0	0
46/0 to 48/0	Sindhi Babur	Acacia nilotica	39	21	6	4	0	0	0	0
	Nim	Melia indica	3	2	2	0	0	0	0	0
	Khajoor	Phoenix dactylifera	3	6	0	0	0	0	0	0
	Baidmushk	Eucalyptus sp	0	1	1	0	0	0	0	0
	Gedori	Cordia dicotoma	1	0	0	0	0	0	0	0
50/0 to 53/0	Sindhi Babur	Acacia nilotica	0	1	2	0	0	0	0	0
	Baidmushk	Eucalyptus sp	1	0	0	0	0	0	0	0
	Nim	Melia indica	1	0	0	1	0	0	0	1
	Gedori	Cordia dicotoma	1	0	0	0	0	0	0	0

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
53/0 to 55/0	Sindhi Babur	Acacia nilotica	61	10	4	8	0	0	0	0
	Amro		7	0	0	0	0	0	0	0
	Amb	Mangifera indica	3	0	0	0	0	0	0	0
	Nim	Melia indica	11	0	3	0	0	0	0	1
	Baeer	Zizyphus jujuba	1	0	0	0	0	0	0	0
	Baidmushk	Eucalyptus sp	11	0	0	0	0	0	0	0
	Sewri (Siri)		3	0	0	0	0	0	0	0
55/0 to 58/0	Sindhi Babur	Acacia nilotica	6	1	15	1	15	1	0	0
	Nim	Melia indica	14	6	9	0	9	0	0	0
	Baidmushk	Eucalyptus sp	4	0	0	0	0	0	0	0
	Amb	Mangifera indica	10	0	0	0	0	0	0	0
	Sewri		4	1	0	0	0	0	0	0
	Srhel		0	0	1	0	1	0	0	0
	Pipal	Ficus religiosa	0	0	1	0	0	0	0	0
	Amri		3	0	1	0	1	0	0	0
	Gidamri	Tamarindus indica	1	0	0	0	0	0	0	0
	Gedori	Cordia dicotoma	0	0	0	0	1	0	0	0
Total			**279**	**146**	**59**	**43**	**27**	**1**	**4**	**17**

ANNEX-A

Tree Inventory of MS Bund

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
0/4 to 1	No trees within RoW									
1/0 to 2/0	No trees within RoW									
2/0 to 3/2	Sindhi babur	Acacia nilotica	4	0	0	0	4	0	0	0
Total			**4**	**0**	**0**	**0**	**4**	**0**	**0**	**0**

Tree Inventory of Indo Bund

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
0/0 to 1/4	Sindhi Babur	Acacia nilotica	4	1	0	0	0	0	0	0
0/0 to 1/4	Baidmushk	Eucalyptus sp	91	23	0	0	0	0	0	0
0/0 to 1/4	Nim	Melia indica	2	2	0	0	0	0	0	0
0/0 to 1/4	Khajoor	Phoenix dactylifera	1	1	0	0	0	0	0	0
0/0 to 1/4	Amri		3	0	0	0	0	0	0	0
0/0 to 1/4	Narel	Cocos nucifera	1	0	0	0	0	0	0	0
0/0 to 1/4	Pipal	Ficus religiosa	1	0	0	0	0	0	0	0
0/0 to 1/4	Jamun	Syzygium cumini	1	0	0	0	0	0	0	0
0/0 to 1/4	Badaam		0	7	1	0	0	0	0	0

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
5/0 to 6/4	Nim	Melia indica	10	0	0	0	0	0	0	0
5/0 to 6/4	Gedori	Cordia dicotoma	1	0	0	0	0	0	0	0
5/0 to 6/4	Amb	Mangifera indica	1	0	0	0	0	0	0	0
5/0 to 6/4	Badaam		1	0	0	0	0	0	0	0
5/0 to 6/4	Barr		1	0	0	0	0	0	0	0
5/0 to 6/4	Baeer	Zizyphus jujuba	1	0	0	0	0	0	0	0
6/4 to 7/0	Nim	Melia indica	1	0	0	0	0	0	0	0
7/0 to 8/0	Nim	Melia indica	8	1	0	0	0	0	0	0
7/0 to 8/0	Sindhi Babur	Acacia nilotica	4	0	0	0	0	0	0	0
7/0 to 8/0	Gedori	Cordia dicotoma	1	0	0	0	0	0	0	0
8/0 to 9/0	Sindhi Babur	Acacia nilotica	35	0	0	0	0	0	0	0
8/0 to 9/0	Siri		0	0	1	0	0	0	0	0
9/0 to 10/0	Zeeton		4	0	0	0	0	0	0	0
9/0 to 10/0	Siri		3	0	0	0	0	0	0	0
9/0 to 10/0	Amb	Mangifera indica	1	0	0	0	0	0	0	0
9/0 to 10/0	Sindhi Babur	Acacia nilotica	7	0	0	0	0	0	0	0
9/0 to 10/0	Nim	Melia indica	1	0	0	0	0	0	0	0
9/0 to 10/0	Baidmushk	Eucalyptus sp	0	0	64	0	0	0	64	0
9/0 to 10/0	Chiko		0	0	8	0	0	0	0	0

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
9/0 to 10/0	Jamun	Syzygium cumini	3	0	0	0	0	0	0	0
9/0 to 10/0	Imli		1	0	0	0	0	0	0	0
9/0 to 10/0	Badaam		1	0	0	0	0	0	0	0
Total			**189**	**35**	**74**	**0**	**0**	**0**	**64**	**0**

Tree Inventory of BU Bund

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
13/3 to 14/7	Sindhi Babur	Acacia nilotica	26	51	2	24	0	0	1	15
13/3 to 14/7	Nim	Melia indica	5	11	1	0	0	0	0	0
13/3 to 14/7	Baidmushk	Eucalyptus sp	11	11	0	0	0	0	0	0
13/3 to 14/7	Amri		1	4	0	0	0	0	0	0
13/3 to 14/7	Baeer		2	1	0	0	0	0	0	0
13/3 to 14/7	Manjhri		1	33	0	0	0	0	0	0
13/3 to 14/7	Srhel		1	51	0	0	0	0	0	0
13/3 to 14/7	Pipal		0	0	1	0	0	0	0	0
13/3 to 14/7	Amb		4	0	0	0	0	0	0	0
15/5 to 16/4	No trees within RoW									

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
18/2 to 18/7	No trees within RoW									
19/4 to 20/7	Sindhi Babur	Acacia nilotica	3	7	2	0	0	0	0	0
19/4 to 20/7	Baidmushk	Eucalyptus sp	10	5	0	0	0	0	0	0
21/4 to 22/0	No trees within RoW									
22/4 to 23/0	Sindhi Babur	Acacia nilotica	3	0	0	0	0	0	0	0
22/4 to 23/0	Nim	Melia indica	2	5	1	0	0	0	0	0
22/4 to 23/0	Baidmushk	Eucalyptus sp	2	0	0	0	0	0	0	0
22/4 to 23/0	Srhel		0	1	0	0	0	0	0	0
23/4 to 23/7	Sindhi Babur	Acacia nilotica	0	1	0	0	0	0	0	0
23/7 to 24/2	Sindhi Babur	Acacia nilotica	1	0	0	0	0	0	0	0
23/7 to 24/2	Baeer		1	0	0	0	0	0	0	0
28/0 to 28/4	No trees within RoW									
29/0 to 29/6	Sindhi Babur		11	0	1	0	0	0	0	0
29/0 to 29/6	Nim		0	0	1	0	0	0	1	0
29/0 to 29/6	Baidmushk		8	0	39	0	0	0	24	0
29/0 to 29/6	Siri		1	0	0	0	0	0	0	0
29/0 to 29/6	Narel		2	0	0	0	0	0	0	0
30/3 to 31/0	Sindhi Babur		14	0	0	0	0	0	0	0
30/3 to 31/0	Siri		2	0	0	0	0	0	0	0

ANNEX-A

Miles	Common Name of Tree	Scientific Name	Existing Trees				Trees likely to be cut			
			Landside		Riverside		Landside		Riverside	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
30/3 to 31/0	Nim		3	0	0	0	0	0	0	0
30/3 to 31/0	Narel		6	0	0	0	0	0	0	0
30/3 to 31/0	Amb		1	0	0	0	0	0	0	0
30/3 to 32/1	Amri		1	0	0	0	0	0	0	0
35/2 to 35/6	Sindhi Babur		4	0	0	0	0	0	0	0
35/2 to 35/6	Baidmushk		20	0	0	0	0	0	0	0
35/2 to 35/6	Amb		1	0	0	0	0	0	0	0
Total			**147**	**181**	**60**	**24**	**0**	**0**	**38**	**15**

ANNEX-B

ANNEX-B

Environmental & Social Impacts Assessment Questionnaires

Rapid Environmental Assessment (REA) Checklist for

Environmental Studies (Reconnaissance Surveys)

Social Impacts	Yes / No / Likely/ Not applicable	Where possible, provide details (Expected number of households, area of land, types of structures likely to be affected)
Is land acquisition necessary"		
Presence of squatters		
Loss of structures resulting in displacement		
Displacement of people due to loss of productive assets		
People losing means of livelihood and incomes (Temp. / Permanent)		
Is there any risk of economic marginalization of farmers and smallholders		
Basic facilities / services will be inaccessible (Temp. / Permanent)		
Impact on crops, trees and other fixed assets in terms of loss of production or drop in yields		
Tenants/Lessees losing any fixed assets		
Loss of community assets		
Loss of existing social and community ties		
Impacts on Vulnerable Groups, if any: Impacts on Vulnerable Groups, if any:		
Poverty group affected		
Women headed households affected		
Ethnic Minority Affected		
Other vulnerable groups" affected		
Is there any risk to smallholders in terms of loss of livelihoods		

ANNEX-C

ANNEX-C

Socio-Economic Data

Table: Educational Facilities in the Project Area

Sub-Project Name	Name of Village	Boys Primary School (in nos)	Girls Primary School (In nos)	Boys Middle School	Girls Middle School	Boys High School	Girls High School	boys College	Girls College
SH. Bund	Sonda	4	2	0	0	1	0	0	0
	Ghulam M.Shah Goth	0	1	0	0	0	0	0	0
	Wadara Ghulam M.Tenga Goth	1	0	0	0	0	0	0	0
MS. Bund	Saeed Pur	2	0	0	0	0	0	0	0
	Goth Salah M.koso	2	0	0	0	0	0	0	0
	Goth Malik M.Sharif	1	1	0	0	0	0	0	0
	Goth Monro	1	0	0	0	0	0	0	0
	Goth M. Ali Kosa	0	0	0	0	0	0	0	0
	Goth Gulmohd Malah	1	0	0	0	0	0	0	0
	Goth Ahamad	1	0	0	0	0	0	0	0
	Goth Butto Lashari	0	0	0	0	0	0	0	0
	Goth Mawa Khan Koso	0	0	0	0	0	0	0	0
	Goth Jumma Khan Koso	1	0	0	0	0	0	0	0
	Goth Ramo Vato	1	0	0	0	0	0	0	0
	Goth Mohd Hassan	1	0	0	0	0	0	0	0
	Rod Mori	3	1	0	0	0	0	0	0
	Chowhar Jamali Town	4	3	0	0	1	1	1	0
	Muntar Samoo Goth	1	0	0	0	0	0	0	0
	Goth Khamto Mori	2	0	0	0	0	0	0	0
BU. Bund	Goth Yar Mohd Grano	1	0	0	0	0	0	0	0
	Gora Bari Town	1	1	0	0	1	0	1	0
	Qasim Khan Khushk	1	1	0	0	0	0	0	0
	Goth Mohammad Hassan	0	0	0	0	0	0	0	0
	Goth Mir Hassan Khushk	0	0	0	0	0	0	0	0
	Goth Abdullah Khan amro	1	0	0	0	0	0	0	0
	Goth Essa Mehar	1	0	1	0	0	0	0	0
	Goth M.Sumar Sharo	0	0	0	0	0	0	0	0
	Goth Kamo Walo Syao	0	0	0	0	0	0	0	0
	Goth Haji Ibrahim	1	0	0	0	0	0	0	0
	Goth Maya Wasayo	0	0	0	0	0	0	0	0
	Qasim hamti goth	0	0	0	0	0	0	0	0

ANNEX-C

Sub-Project Name	Name of Village	Boys Primary School (in nos)	Girls Primary School (In nos)	Boys Middle School	Girls Middle School	Boys High School	Girls High School	boys College	Girls College
	Wadaro lal Goth	0	0	0	0	0	0	0	0
	Goth Ismail Shoro	1	1	0	0	0	0	0	0
	Goth Haji Hasham Somro	1	0	0	0	0	0	0	0
Indo Bund	Goth Mira Dino	1	0	0	0	0	0	0	0
	Goth Mano Gujro	0	0	0	0	0	0	0	0
	Goth Mohd Sumar Jonejo	0	0	0	0	0	0	0	0
	Goth Noor Mohd Jat	1	0	0	0	0	0	0	0
	Dandari	0	0	0	0	0	0	0	0
Total		**36**	**11**	**1**	**0**	**3**	**1**	**2**	**0**

ANNEX-C

Table: Common Disease in the Project Area

Sub-Project Name	Name of Village	Common diseases in villages						
		Flu /fever	Malaria	Chicken Pox	Typhoid	Diarrhea	TB	Others
SH Bund	Sonda	Yes	Yes	No	Yes	Yes	No	No
	Ghulam M.shah Goth	Yes	Yes	No	Yes	Yes	No	No
	Wadara Ghulam M.Tenga Goth	Yes	Yes	No	Yes	Yes	Yes	Jaundice
MS Bund	Saeed Pur	Yes	Yes	No	Yes	Yes	No	No
	Goth Salah M.koso	Yes	Yes	No	Yes	Yes	Yes	No
	Goth malikM.Sharif	Yes	Yes	No	Yes	Yes	No	No
	Goth Monro	Yes	Yes	No	Yes	Yes	No	No
	Goth M. Ali Kosa	Yes	Yes	No	Yes	Yes	No	No
	Goth GulmohdMalah	Yes	Yes	No	Yes	Yes	Yes	No
	Goth Ahamad	Yes	Yes	No	No	No	No	No
	Goth Butto Lashari	Yes	Yes	No	Yes	Yes	Yes	No
	Goth Mawa Khan Koso	Yes	Yes		No	No	No	No
	Goth Jumma Khan Koso	Yes	Yes	No	No	Yes	No	No
	Goth RamoVato	Yes	Yes	No	Yes	Yes	Yes	No
	Goth Mohd Hassan	Yes	Yes	No	No	Yes	Yes	No
	Rod mori	Yes	Yes	No	No	Yes	Yes	No
	Chowharjamali Town	Yes	Yes	No	No	Yes	No	No
	Muntarsamoo Goth	Yes	Yes		No	No	No	No
	Goth Khamtomori	Yes	Yes	No	Yes	Yes	No	No
BU Bund	Goth Yar Muhammad	Yes	Yes	No	No	Yes	No	No
	Gora Bari Town	Yes	Yes	No	Yes	Yes	Yes	No
	Qasim Khan khushku	Yes	Yes	No	yes	Yes	No	No
	Goth Muhammad Hassan	Yes	Yes	No	Yes	Yes	No	No
	Goth Mir Hassan	Yes	Yes	No	Yes	Yes	Yes	No
	Goth Abdullah Khan Amro	Yes	Yes	No	Yes	Yes	No	No
	Goth Essa Mehar	Yes	Yes	No	Yes	No	No	No

ANNEX-C

Sub-Project Name	Name of Village	Common diseases in villages						
		Flu /fever	Malaria	Chicken Pox	Typhoid	Diarrhea	TB	Others
Indo bund	Goth M.Sumar Shar	Yes	Yes	No	No	Yes	No	No
	Goth Kamowalo	Yes	Yes	No	Yes	Yes	Yes	Jaundice
	Goth Haji Ibrahim	Yes	Yes	No	Yes	Yes	No	No
	Goth Maya Wasayo	Yes	Yes	No	Yes	Yes	Yes	No
	Qasimhamti Goth	Yes	Yes	No	Yes	Yes	Yes	No
	Wadarolal	Yes	Yes	No	Yes	Yes	No	No
	Goth Ismail Shoro	Yes	Yes	No	Yes	Yes	Yes	No
	Goth Haji Hasham	Yes	Yes	No	Yes	Yes	No	No
	Goth Mira Dino	Yes	Yes	No	No	Yes	No	No
	Goth Mano	Yes	Yes	No	Yes	Yes	No	No
	Goth Muhammad Sumarjonejo	Yes	Yes	No	Yes	Yes	No	No
	Goth Noor Muhammad Jat	Yes	Yes	No	No	Yes	No	No
	Dandari	yes	yes	no	yes	yes	no	no

ANNEX-C

Table: Health Facilities in Thatta District

S#	Facility	No
1	Teaching Hospitals	0
2	Civil, Major Specialized and Taluka	05
3	Rural Health Centers	09
4	T.B Clinics	13
5	Mother Child Health Centers	3
6	Doctors	452
7	Nurses	48
8	Lady Health Visitors	46
9	Dispensers/Dressers	111
10	X-Ray Technicians	09
11	Lab Technicians	08
12	Operation Theater Technicians	09
13	X-Ray Assistants	01
14	Lab Assistants	23
15	Operation Theater Assistant	16
16	Mid Wives	54

Source: Directorate General of Health Service, Hyderabad, 2011-12.

ANNEX-C

Table: Health Facilities in the Project Area

Sub-Project Name	Name of Village	Rural Health Center	Basic Health Unit	Dispensary	Homeopathic Clinic	Midwifery	Medical Store
SH. Bund	Sonda	0	1	0	1	1	3
	Ghulam M.shah Goth	0	0	0	0	0	0
	Wadara Ghulam M.Tenga Goth	0	0	0	0	0	0
MS. Bund	Saeed Pur	0	0	0	0	0	0
	Goth Salah M.koso	0	0	1	0	0	0
	Goth Malik M.Sharif	0	0	1	0	0	0
	Goth Monro	0	0	1	0	0	0
	Goth M. Ali Kosa	0	0	0	0	0	0
	Goth Gulmohd Malah	0	0	0	0	0	0
	Goth Ahamad	0	0	0	0	0	0
	goth Butto Lashari	0	0	0	0	0	0
	Goth Mawa Khan Koso	0	0	0	0	0	0
	Goth Jumma Khan Koso	0	0	0	0	0	0
	Goth Ramo Vato	0	0	0	0	0	0
	Goth Mohd Hassan	0	0	0	0	0	0
	Rod mori	0	1	1	0	0	2
	Chowhar jamali Town	1	1	2	1	0	4
	Muntar samoo Goth	0	0	0	0	0	0
	Goth Khamto mori	0	0	0	0	0	1
BU. Bund	Goth yar Mohd Grano	0	0	0	0	0	0
	Gora Bari Town	1	0	0	1	0	3
	Qasim Khan khushk	0	1	0	0	0	0
	Goth mohammad Hassan	0	0	0	0	0	0
	Goth Mir hassan Khushk	0	0	0	0	0	0
	Goth Abdullah Khan amro	0	0	0	0	0	0
	Goth Essa Mehar	0	0	0	0	0	0
	Goth M.Sumar Sharo	0	0	0	0	0	0
	Goth kamo walo Syao	0	0	0	0	0	0
	Goth haji Ibrahim	0	0	0	0	0	0
	Goth Maya Wasayo	0	0	0	0	0	0
	Qasim hamti goth	0	0	0	0	0	0
	Wadaro lal Goth	0	0	1	0	0	0
	Goth Ismail Shoro	0	0	0	0	0	0
	Goth Haji Hasham Somro	0	0	0	0	0	0

ANNEX-C

Sub-Project Name	Name of Village	Rural Health Center	Basic Health Unit	Dispensary	Homeopathic Clinic	Midwifery	Medical Store
Indo Bund	Goth Mira Dino	0	0	0	0	0	0
	Goth Mano Gujro	0	0	0	0	0	0
	Goth Mohd Sumar jonejo	0	0	0	0	0	0
	Goth Noor Mohd Jat	0	0	0	0	0	0
	Dandari	0	1	0	0	0	1
	SUM	**2**	**5**	**7**	**3**	**1**	**14**

ANNEX-C

Table: Village Wise Utilities in the Project Area

Name of Village	Name of Sub-Project	Available Facilities													
		Electricity	Since year	Telephone	Since year	Post Office	Since year	Market/Shops	Police Station / Police Check Post	Since year	Bank	Since year	Link Road	Pacca (km	Katcha (km
Sonda		yes	1995	0	0	yes	don't know	55	0	0	0	0	at main h.way	0	0
Ghulam M.shah Goth		yes	1970	0	0	0	0	2	0	0	0	0	at main h.way	0	0
Wadara Ghulam M.Tenga Goth	SH Bund	yes	1973	0	0	0	0	6	0	0	0	0	at main h.way	0	0
Saeed Pur		1	2002	0	0	0	0	8	0	0	0	0	at main h.way	0	0
Goth Salah M.koso		1	1970	0	0	0	0	13	0	0	0	0	0	0	12
Goth malik M.Sharif		1	1970	0	0	0	0	2	0	0	0	0	0	0	0.5
Goth Monro		1	2008	0	0	0	0	15	0	0	0	0	0	0	0
Goth M. Ali Kosa		1	2000	0	0	0	0	0	0	0	0	0	0	0	0
Goth Gulmohd Malah		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goth Ahamad		1	2005	0	0	0	0	0	0	0	0	0	0	0	0
goth Butto Lashari	MS Bund	1	2000	0	0	0	0	0	0	0	0	0	0	0	0
Goth Mawa Khan Koso		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goth Jumma Khan Koso		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goth Ramo Vato		0	0	0	0	0	0	1	0	0	0	0	0	0	0
Goth Mohd Hassan		1	2000	0	0	0	0	3	0	0	0	0	0	0	0
Rod mori		1	1995	0	0	0	0	60	0	0	0	0	0	0	0
Chowhar jamali Town		yes	1992/93	1		yes		150	0	0	1				
Muntar samoo Goth		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goth yar Mohd Grano		no	0	0	0	0	0	0	0		0	0	0	0	0
Gora Bari Town		yes	1985	yes	70s	yes	don't know	200	yes	70s	yes	don't know	0	0	0
Qasim Khan khushk		yes	1990	0	0	0	0	20	0	0	0	0	0	0	0
Goth mohammad Hassan															
Goth Mir hassan Khushk															
Goth Abdullah Khan amro		yes	1994	0	0	0	0	2	0	0	0	0	1	0	1
Goth Essa Mehar								12							
Goth M.Sumar Sharo	BU Bund														
Goth kamo walo Syao															
Goth haji Ibrahim															
Goth Maya Wasayo															
Qasim hamti goth															
Wadaro lal Goth		yes	1995	0	0	0	0	2	0	0	0	0	0	0	0
Goth Ismail Shoro															
Goth Haji Hasham Somro		yes	2005	0	0	0	0	1							
Goth Mira Dino	Indo Bund														
Goth Mano Gujro															

ANNEX-C

Name of Village	Name of Sub-Project	Available Facilities													
		Electricity	Since year	Telephone	Since year	Post Office	Since year	Market/Shops	Police Station / Police Check Post	Since year	Bank	Since year	Link Road	Pacca (km	Katcha (km
Goth Mohd Sumar jonejo															
Goth Noor Mohd Jat															
Dindari		yes	2009	0	0	0	0	80	0	0	0	0	0	0	0

ANNEX-C

Table: Transport facility villages to nearby towns of the Project Area

		Type of Water Supply Structure														
		Estimated No of Dug Well	Drinking	Irrigation	Estimated No of Hand Pump	Drinking	Estimated No of Tube-Well	Drinking	Irrigation	Estimated No of Piped Water	Estimated No of Water Tank	Drinking	Irrigation	Estimated No of Water Channel	Drinking	Irrigation
Sonda	SH Bund	0	0	0	0	0	0	0	0	yes	0	0	0	yes	0	yes
Ghulam M.shah Goth		0	0	0	3	3	0	0	0	0	0	0	0	yes	0	yes
Wadara Ghulam M.Tenga Goth		0	0	0	0	0	0	0	0	0	0	0	0	yes	yes	yes
Saeed Pur	MS Bund	0	0	0	6	6	0	0	0	0	0	0	0	no	0	0
Goth Salah M.koso		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goth malik M.Sharif		0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
Goth Monro		0	0	0	4	4	0	0	0	0	0	0	0	1	1	1
Goth M. Ali Kosa		0	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Goth Gulmohd Malah		0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
Goth Ahamad		0	0	0	3	3	0	0	0	0	0	0	0	0	0	0
goth Butto Lashari		0	0	0	4	4	0	0	0	0	0	0	0	1	1	1
Goth Mawa Khan Koso		0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Goth Jumma Khan Koso		0	0	0	5	5	0	0	0	0	0	0	0	1	1	1
Goth Ramo Vato		0	0	0	4	4	0	0	0	0	0	0	0	1	1	1
Goth Mohd Hassan		0	0	0	4	4	0	0	0	0	0	0	0	1	1	1
Rod mori		0	0	0	15	15	0	0	0	0	0	0	0	1	1	1
Chowhar jamali Town					40	40	0	0	0	0	0	0	0	1	1	1
Muntar samoo Goth		0	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Goth yar Mohd Grano	BU Bund	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0
Gora Bari Town		0	0	0	10	10	0	0	0	0	1	1	0	1	1	1
Qasim Khan khushk		0	0	0	100	100	0	0	0	0	0	0	0	0	0	0
Goth mohammad Hassan																
Goth Mir hassan Khushk																
Goth Abdullah Khan amro		0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
Goth Essa Mehar																
Goth M.Sumar Sharo																
Goth kamo walo Syao																
Goth haji Ibrahim																
Goth Maya Wasayo																
Qasim hamti goth																
Wadaro lal Goth		0	0	0	4	4	0	0	0	0	0	0	0	1	1	1
Goth Ismail Shoro																
Goth Haji Hasham Somro		0	0	0	10	10	0	0	0	0	0	0	0	0	0	0

ANNEX-C

		Type of Water Supply Structure														
		Estimated No of Dug Well	Drinking	Irrigation	Estimated No of Hand Pump	Drinking	Estimated No of Tube-Well	Drinking	Irrigation	Estimated No of Piped Water	Estimated No of Water Tank	Drinking	Irrigation	Estimated No of Water Channel	Drinking	Irrigation
Goth Mira Dino	Indo Bund															
Goth Mano Gujro																
Goth Mohd Sumar jonejo																
Goth Noor Mohd Jat																
Dindari		0	0	0	1500	1500	0	0	0	0	0	0	0	1	1	1
Total		**-**	**-**	**-**	**1,727**	**1,727**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**11**	**11**	**10**

ANNEX-C

Table: NGOs Working in the Area

Sub-Project Name	Name of Village	NGO working in the village		Area of Interest			
		Yes	No	Health	Education	Micro Credit	Others
SH Bund	Sonda	Yes		1	0	0	0
	Ghulam M shah Goth	Yes		1	0	0	0
	Wadara Ghulam	Yes		1	0	0	0
MS Bund	Saeed Pur	1	0	1	0	0	houses construction
	Goth Salah M koso	1	0	1	1	0	0
	Goth malikM Sharif	1	0	1	0	0	0
	Goth Monro	0	1	0	0	0	0
	Goth M. Ali Kosa	0	1	0	0	0	0
	Goth GulmohdMalah	0	1	0	0	0	0
	Goth Ahamad	0	1	0	0	0	0
	goth ButtoLashari	0	1	0	0	0	0
	Goth Mawa Khan Koso	0	1	0	0	0	0
	Goth Jumma Khan	0	1	0	0	0	0
	Goth RamoVato	0	1	0	0	0	0
	Goth Mohd Hassan	0	1	0	0	0	0
	Rod mori	0	1	0	0	0	0
	Chowhariamali Town	1	0	1	0	0	0
	Muntarsamoo Goth	0	1	0	0	0	0
	Goth Khamtomori	0	1	0	0	0	0
BU Bund	Goth yarMohdGrano	0	0	0	0	0	0
	Gora Bari Town	1	0	1	0	0	houses construction
	Qasim Khan khushk	0	1	0	0	0	0
	Goth mohammad	0	1	0	0	0	0
	Goth Mir	0	1	0	0	0	0
	Goth Abdullah Khan	0	1	0	0	0	0
	Goth Essa Mehar	0	1	0	0	0	0
	Goth M.SumarSharo	0	1	0	0	0	0
	Goth kamowaloSyao	0	1	0	0	0	0
	Goth haji Ibrahim	1	0	1	0	0	0
	Goth Maya Wasayo	0	1	0	0	0	0
	Qasimhamti goth	0	1	0	0	0	0
	Wadarolal Goth	1	0	1	0	0	0
	Goth Ismail Shoro	0	1	0	0	0	0
	Goth Haji	0	1	0	0	0	0
Indo bund	Goth Mira Dino	0	1	0	0	0	0
	Goth Mano Guiro	0	1	0	0	0	0
	Goth	1	0	1	0	0	0
	Goth Noor MohdJat	0	1	0	0	0	0
	Dindari	1	0	1	0	0	0

ANNEX-D

ANNEX-D

Findings of First Round Public Consultations

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
SH Bund	Wadero Ghulam Thenga	24/11/2015	07	• The villagers were very happy about the widening of bund, they think that widening and pitching of bund is necessary for the safety of village. • 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.
SH Bund	Sonda	24/11/2015	14	o The villagers told that project impact is positive for the village and agricultural land. o They expected that project will create many employment opportunities for unskilled villagers.
SH Bund	Village Ghulam Shah	24/11/2015	04	o The villagers were very glad that finally the bund widening and pitching is being done. o They told that they were at very risk in 2010 and 2015 flood. o They told that project will protect village and our property. o The villagers expressed their willingness to work as laborers

ANNEX-D

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
				during the project works.
MS BUND	Saeedpur	27-11-2015	23	o The villagers are very happy with the project. o They believed that project will protect village from flood. o 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	27-11-2015	20	o Labors and farmers of village thinks that project impacts are positive for them, project will give them protection during flood seasons. o They expect that project will also give them job opportunities.
MS BUND	Goth Malik M.Sharif	25-11-2015	03	o Villagers thinks that project impacts are positive for them, project will give them protection during flood seasons. o They expect the employment opportunities for them from project.
MS BUND	Goth Mohd Hassan	27-11-2015	06	o They told that project is most important for their safety and it will protect village from flood. o 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.

ANNEX-D

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
				o They demanded that many employment opportunities of project must be provided to unskilled villagers
MS BUND	Rod mori	27-11-2015	07	o The villagers told that project will leave positive impacts on village and agricultural land. o They expected that project will create many employment opportunities for unskilled villagers
MS BUND	Choharjamali Town	27-11-2015	15	o The People of town are very happy with the project. o They believed that project will protect town from flood. o The peoples of town shows their willingness for the volunteer works of the project. o 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	Goth yar Mohammad Girano	26-11-2015	06	o The villagers told that this project will give protection to their houses and agricultural land. o They demanded that during project work, labor jobs must be given to villagers.
BU Bund	Gora Bari Town	28-11-2015	26	o The people of town appreciated project and shows their

ANNEX-D

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
				happiness regarding project. o They believed that project will protect villages of town and main city from flood. o The peoples of town shows their willingness for the volunteer works of the project. o 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	26-11-2015	04	o Villagers told that this project will left positive impacts on us. Project will provide safety to our village and property. o They also offered their volunteer services for the project. o They demand that labor jobs from project for unemployed villagers
BU Bund	Goth Abdullah Khan hamro	26-11-2015	14	o The villagers told that project has positive impacts, it will protect our village and agricultural land. o They demanded that during project work, labor jobs must be given to villagers.
BU Bund	Goth Essa Mehar	28-11-2015	06	o The villagers told that this project will give protection to their houses and agricultural land. o They told that they appreciate this project and they don't have any negative issue with this project. o They demanded that during project work, labor jobs must be

ANNEX-D

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
				given to villagers.
BU Bund	Goth M.SumarShoro	28-11-2015	09	o Villagers told that this project will left positive impacts on us. Project will provide safety to our village. o They also offered their volunteer services for the project. o They demand that labor jobs from project must be given to unemployed villagers
BU Bund	Goth haji Ibrahim	28-11-2015	05	o Villagers are happy about the project. They think that project will safeguard them from flood. o They also offered their volunteer services for the project. o They demand that labor jobs from project must be given to unemployed villagers
INDO BUND	Goth MohdSumarjonejo	28-11-2015	06	o The villagers are very happy with the project. o They believed that project will protect village from flood. o 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.
INDO BUND	Goth Noor MohdJunejo	28-11-2015	10	o The villagers told that project has positive impacts. I t will provide safety to our village and agricultural land. o They expected that project will create many employment opportunities for unskilled

ANNEX-D

Name of Sub-Project	Name of the Village	Date	Number of Participants	Key Issues Discussed
				villagers
INDO BUND	Dandari	28-11-2015	23	o The villagers told that our village and agricultural land will be protected with the project intervention o They told that they appreciate this project and they don't have any negative issue with this project. o They think that trade will also improve. o They demanded that during project work, labor jobs must be given to villagers.

SH Bund: Ghulam Thenga Village

ANNEX-D

SH Bund: Ghulam Thenga Village

SH Bund: Sonda Village

ANNEX-D

SH Bund: Sonda Village

ANNEX-D

Findings of Second Round Public Consultations

	Stakeholders participating		***Key Issues/Topics Raised by the Participant***	***Answers of the Consultant Team***
	Names of Participant	***Identification***		
1	Khuda Bux	Social Mobilizer	1.1. He said that as a social mobilizer, he felt that in development works advocacy campaigns are not carried out to inform the local people about the project objectives and involving them in the project cycle. 1.2. He pointed out that the districts of Thatta and Sajawal are vulnerable to the effects of climate change like floods and drought. He was glad that a project has been launched to mitigate the effects of these climatic disasters. 1.3. He pointed out that without community participation development can never be sustainable. 1.4. He questioned whether people residing near proposed dam sites have been consulted by the consultant team. 1.5. He inquired that how it will be ensured that mitigation measures mentioned in the environment assessment reports are implemented by the Contractor.	o Our team has carried out detailed primary stakeholder consultation at SH, BU, Indo and MS bund the details of which are provided in the ESMF document. o Environmental and social survey for proposed small dams has not been started by our team as yet. Our team comprises of two male sociologists and a female gender specialist. They will carry out detailed consultation sessions both with the male and female stakeholders during the environmental and social survey of the proposed small dams. o To ensure the implementation of the mitigation measures mentioned a detailed mechanism has been outlined in the ESIA. Different institutions will be involved in the implementation of the Environmental Management Plan having different roles. The Contractor's environmental team will be responsible for implementation of the mitigation measures. They will be supervised by the project implementation consultants. PMU will hire environmental and social experts who will monitor the performance of the consultant's environmental team. In addition third party monitoring will also be carried out to check environmental compliance status. With participation of large number of institutions there is transparency.
			He proposed that stone pitching be carried out along PB bund so that people residing in nearby	a) Contractor staff will be strictly prohibited from entering forests and causing cutting of trees there. b) The proponent is well

ANNEX-D

	Stakeholders participating		***Key Issues/Topics Raised by the Participant***	***Answers of the Consultant Team***
	Names of Participant	***Identification***		
			villages are protected from the flood.	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 DACREP.
2	Abdul Khalique Soomro	Landlord	1. He pointed out that PB Bund was heavily damaged during the floods. He questioned whether pitching along PB bund has been included in the proposed works under DACREP? 2. He pointed out that 'Landhi' (flood monitoring stations established along the Indus river bund) play an important role in flood monitoring. Unfortunately in the past no maintenance work was carried out on these structures. It is proposed that additional landhis be constructed along bunds. 3. He raised the concern that Keenjhrar lake is being contaminated by discharge of untreated wastewater. It is proposed to take measures to prevent discharge of untreated wastewater into Keenjhar lake. He also proposed that Hadero and Haleji Lake be activated.	Section 1.01 The Superintendent Engineer pointed all bunds below Kotri Barrage which have been damaged during 2010 floods have been included under the scope of works which also includes PB Bund. Also previously established landhis will be rehabilitated and more landhis will be established along Indus River bunds to facilitate flood monitoring. Section 1.02 Your concerns regarding deterioration of water quality in Keenjhar lake have been noted. Moreover a proposal for the activation of Hadero lake has been sent for approval.
3	Ghulam Mohiuddin Soomro	Landlord	He pointed out that Monarki bund was damaged during 2010 floods. Can the irrigation officials explain	The quality of steel plating carried out at Monarki bund was of good quality which is evident from the fact that those portions

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	Stakeholders participating		***Key Issues/Topics Raised by the Participant***	***Answers of the Consultant Team***
	Names of Participant	***Identification***		
			the reason for the damage to Monarki bund?	of the bund where steel plating was carried out resisted the 2010 floods. The steel plating got damaged in some portions due to corrosion of steel plates accelerated by high concentration of salt in the soil constituting the bund.
4	Ali Muhammad Hingoro	Landlord	1. He pointed out that he belongs to Ghora Bari which is near to BU bund. Along the bund there are access routes which are used by the locals during their daily routine. It is proposed that rehabilitation of these access routes be included in the scope of works. 2. The purpose of this project is to enhance the environmental resistance to climatic disasters. Will tree plantation be carried out in this project to achieve this objective?	3. In reaches of the bunds where stone pitching/ widening works are proposed your proposal for repair/maintenance of access ramp will also be included. 4. Tree plantation has been proposed in the ESIA. For every cut down tree five trees will be planted by the contractor.
5	Ghulam Rasool Dal	Teacher (HST)	He proposed that repair/maintenance of access routes along bund be included in the scope of works.	In reaches of the bunds where stone pitching/ widening works are proposed your proposal for repair/maintenance of access ramp will also be included.

PHOTO GALLERY

ANNEX-D

Maulana Shafi Muhammad carrying out recitation of the Holy Quran

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

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

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

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

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

ANNEX-D

groundwater

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

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

Team leader (ACE) explaining the project location map

Participants of the consultative workshop

Participants of the consultative workshop

Participant expressing his views about the importance

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of public participation in development projects

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

Participant expressing his views during the question-answer session

Participant during question- answer session

Participants of the workshop

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SH Bund: Ghulam Thenga Village

SH Bund: Ghulam Thenga Village

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SH Bund: Sonda Village

SH Bund: Sonda Village

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SH Bund: Wadero Ghulam Shah Village

SH Bund: Wadero Ghulam Shah Village

ANNEX-D

MS Bund: Syedpur Village

MS Bund: Syedpur Village

ANNEX-D

MS Bund: Saleh Mohammad Shah Village

MS Bund: Saleh Mohammad Shah Village

ANNEX-D

MS Bund: Muhammad Yaqoob Village

MS Bund: Muhammad Yaqoob Village

ANNEX-D

BU Bund: Abdullah Khan Hamro Village

BU Bund: Abdullah Khan Hamro Village

ANNEX-D

BU Bund: Qasim Khan Khushk Village

BU Bund: Qasim Khan Khushk Village

ANNEX-D

BU Bund: MuhaamadSumar Village

BU Bund: MuhaamadSumar Village

ANNEX-D

BU Bund: Ghora Bari Town

BU Bund: Ghora Bari Town

ANNEX-D

INDO Bund: Dandari Village

INDO Bund: Dandari Village

ANNEX-D

INDO Bund: Noor Muhammad junejo Village

INDO Bund: Noor Muhammad junejo Village

ANNEX-D

Public Consultations with Female Community Members

Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
Disaster & Climate Resilience Enhancement Project	Village Gul Mohammad Gandro	SH Band	18	**Views about the project:** • During the consultation with the female community members about project impact on women activities, most of the women were in favor of the sub-project and also having expectations to get benefits, but some male members share their reservation that construction activities will disturbed their daily life particularly female family members will disturbed during construction work. Steep and harden surface of Bund will restrict the cross movement of the livestock. They were demanding for jobs and basic needs like hand-pumps for drinking water, passage or road for movement, and requesting for no displacement. **Priority needs:** • The sub-project shall not the disturb the cross movement of their livestock. • During the construction work, the contractor will respect cultural norms of villagers. • Gandaro village is situated on the edge of river, females households get water from river for demotic

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
				use, therefore they were demanding that a platform needs to be formed on river beach for women movement.
	Village Umaid Ali Soomro	SH Band	14	**Priority needs:** o Both male and female community members demanded for the provision of job opportunities during construction work. o Demanded for the installation of Hand pumps in the village.
	Village Malik Sharif Khaskheli	MS Band	14	**Views about the project:** o Women of this were not aware about the project; though they were feel of displacement. **Priority needs:** o Requested for no removal of their homes. o The requested that during construction work, the Project needs to provide job opportunity to male members. o Requested for the installation of hand pumps in the village. o Requested for not disturbing the existing access routes. o Hand pumps will install in village.
	4. Village PasandMah	MS Band	18	**Priority needs:** o Requested for the provision of job opportunities to the male members.

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
	eshwari			o Requested for the installation of hand pumps in the village.
	5. Village SumarPrayri	MS Band	13	**Views about the project:** group interview, they show their concerns about displacement by the project activity, they were requesting to retain their house at same place and also give them jobs during the construction work. **Priority Needs:** o Requested for not removal of their houses. o Requested to not disturb the existing access routes. o Requested for job opportunities during construction work.
	Village Haji Khan Munaro	MS Band	13	**Views about the project:** o Female were not aware about the rehabilitation of protected Band, after briefing they about the project, they were much happy, they expressed their views that, our villages will safe due to the stone pitching and raising of protected band. **Priority Needs:** o Install hand pumps in the village o Provide job opportunity during the construction work
	Village Hassan Mallah	MS Band	14	**Views about the project:** o The villagers were very happy about the rehabilitation of protected band.

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
				o They understood that due to raising of Bund and stone pitching, they will be safe from flood danger. **Priority needs:** o They expect that the community member will engage in project work as daily worker. o Main livelihood of Hassan Malah village is fishing, they were demand that the project will provide fishing nets to them. o They have no drinking source in the village and requested for the installation of hand pumps in the village.
	Village Gull Mohammad Shoro	BU Band	20	**Views about the project:** o Females were not aware about the project, after the briefing about the project, they were glade and said it is good to know and we will be safe from the flood threat. **Priority needs:** o Gull Mohammad Shoro village is comparatively better than rest of villages we survived. Education level is little bit satisfactory but they are getting education for their kid from other towns and district headquarter. Even though no schools in the village, they demand to the project that project will facilitate to open school in the

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
				village.
	Village KhamooWaliso	BU Band	17	**Views about the project:** o Females were not aware about the project, they thought that NGO workers are enrolling the manes of women and then they will receive payments or things, after the briefing about the project, they were clear and ask shell they were not removed from their homes. **Priority needs:** o Requested for not removal of their homes. o Provide them hand pumps for drinking water. o Engage villager in project work as labors.
	Village Haji Mohad Ibrahim Pohio		22	**Views about the project:** o Village Mohammad Ibrahim is flood effected village, they shifted from inside the Band, their settlement were Kacha, and they have no basic living facility. When the team informed them about project, they were glade and said that now they will be safe from the flood. **Priority needs:** o Install hand pumps in the village for drinking water. o Engage male members as daily labor during project work.

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
				o Provide them school and health facility.
	Village QasimHamayti	BU Band	15	**Views about the project**: o after visit meeting with Qasim village women, they were positive perception about the project and also hoping to provide them jobs during the work. **Priority needs:** o Community is lacking basics of life, no electricity, no school and health center, households getting drinking water only a single hand pump, provide some hand pumps for the villager and a primary school open for children's education.
	Village Noor Mohammad Junejo	Indo	14	**Views about the project:** o The villagers were very happy about the rehabilitation/raising and pitching of protection Band. . o They understood that construction of Band will result in safeguard to settlements from the flood. o Jobs will receive to local peoples and project will consider the human development in future. **Priority needs:** o Development scheme will plane for villages close to the protected

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Name of the Project	Name of the Village	Name of Sub-Project	Total Number of Participants	Key Issues Discussed
				Band. o Provide livelihood opportunities to villages during the construction phase. o Provide marketing facility for women products like (handicrafts, embroidery and Raly)

Location of conducted cluster meetings with females:

Name of Villages	Name of Bund (Location)	Coordinates	House Hold	Inacom an skills	Education level	Women Rights	Health and hygiene	WAS	Income source
	SH					Poor-Fair-good	poor-fair-good	Yes/No	
Gul Mohammad Gandaro		N 24 58' 02.84 E 68 07' 49.91	25	Net making, embroidery	0%	Poor	fair	no	net making
Umaind Ali Soomro		N 24 55 04,04 E 68 06' 06.11	120	embroidery	15%	fair	fair	no	livestock, embroidery, poultry
Malik Sharif Khaskheli	MS	N 24 38 356 E 68 01 083	60	embroidery	5%	poor	fair	no	embroidery, agriculture
PasandMaheshwari		N 24 37 24 98 E 68 01 29 21	25	embroidery , tailoring	0%	fair	fair	yes	embroidery, agriculture
SumarPrayri		N 24 34 944 E 68 01 837	35	embroidery	0%	Poor	poor	no	embroidery
Haji Khan Munaro		N 24 32 917 E 68 01 18 88	20	embroidery	8%	Poor	fair	no	embroidery, agriculture
Hassan Mallah		N 24 25 917 E 67 59 808	80	net making	0%	Poor	poor	no	net making, agriculture
Qasim Goth	BU &	N 24 22 744 E 67 49 062							

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Name of Villages	Name of Bund (location)	Coordinates	House Hold	Inacom an skills	Education level	Women Rights	Health and hygiene	WAS	Income source
Gull Mohammad Shoro		N 24 24 447 E 67 49 660	60	embroidery tailoring	20%	fair	fair	yes	embroidery, agriculture
KhamooWaliso		N 24 23 290 E 67 49 673	30	tailoring/Raly making	0%	poor	poor	no	agriculture work, Raly making
Haji Mohad Ibrahim Pohio		N24 22 990 E 67 49 202	70	embroidery,	0%	Poor	poor	no	agriculture work, Raly making, cattle raring
QasimHamayti		N 2422 744 E 67 49 062	25	embroidery	0%	Poor	poor	no	embroidery, Raly making
Noor Mohammad Junejo		N 24 16 467 E 67 44 203	18	Raly making, embroidery	0%	poor	poor	no	embroidery, Raly making